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COKE OVEN DOORFRAME

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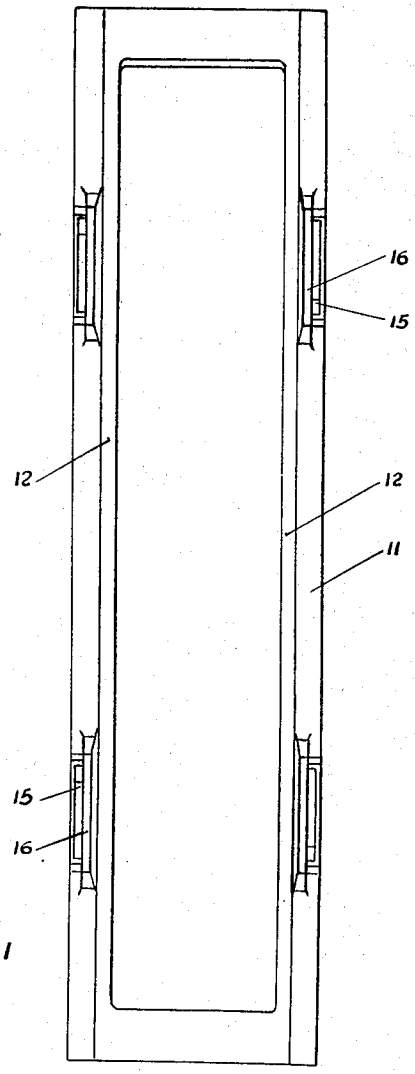


Fig. 1

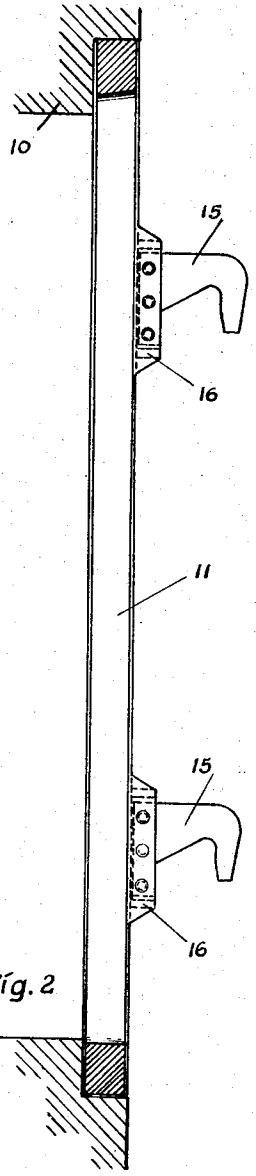


Fig. 2

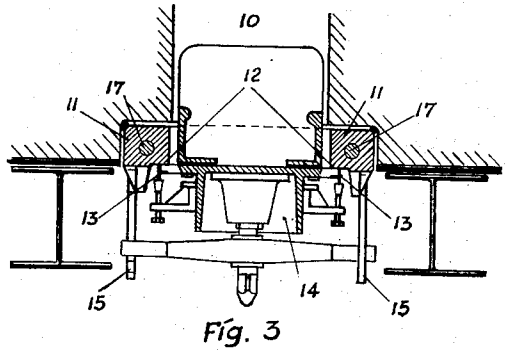


Fig. 3

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COKE OVEN DOORFRAME

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6 Claims. (Cl. 202—239)

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The present invention relates to closures for the ends of horizontal coking chambers and analogous apparatus chambers having self-sealing doors. The general object of the invention is to provide a door frame structure of novel character characterized in particular by its novel and simple form, its low inherent cost of production and its relatively small tendency to objectionable distortion as a result of thermal stresses. My novel door frame structure is primarily characterized by the fact that it is a relatively heavy, one piece, metallic structure, substantially square in cross section, and having its outer side arranged for engagement by the edge of the customary sealing member of a self-sealing door. Said door frame structure is preferably formed of cast iron. The square cross section of the improved frame provides the needed door frame strength and rigidity, and insures a desirably small degree or extent of distortion due to differences in temperature of different portions of the frame. The square cross section also facilitates the attachment to the door frame of the usual door retaining hook elements.

Most prior coke oven door frames now in use in this country, have their vertically elongated side potrions shaped in cross section like a rolled metallic section, each side portion comprising at least, two relatively thin and wide flanges or ribs. Two forms of such a prior door frame are shown, for example, in the Beimann Patent 2,126,239 of August 9, 1938. Usually, one of said flanges or ribs is transverse to the length of the coking chamber and bears against an outer side surface of the coke oven structure, while another of said flanges or ribs is parallel to the length of the coking chamber and extends into the oven structure. Frequently, such a prior type door frame comprises a third rib parallel to the oven chamber length and extending outwardly away from the oven structure. The temperature of the door frame rib extending into the oven structure progressively increases as the distance from the outer face of the oven structure increases.

While such ribbed door frames are initially strong and stiff, they are relatively expensive to construct and are subject to serious distortion as a result of the differences between the temperatures of portions of the frame at different distances from the outer surface of the oven structure. While the use of the third outwardly extending rib mentioned above tends to reduce the door frame distortion, it adds to the weight and construction cost of the door frame. The distortion of the door frames tends to imperfect

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sealing of the joint between the self-sealing door and door frame with resultant gas leakage and local overheating of the door frame and door sealing member.

With my novel door frame, substantially square in cross section, the horizontal extent of the door frame in the direction of the length of the oven chamber may be relatively small, with a corresponding reduction in the temperature variation in the door frame. The relatively high conductivity of my improved door frame to heat flow in a horizontal direction also contributes to a desirably low temperature variation in the door frame.

Heretofore, attempts have been made to minimize the distortion experienced with one piece door frame by forming the frame of a plurality of separate parts, but such subdivided door frames are inherently costly to construct and maintain, and have not provided a satisfactory solution for the distortion problem. The relatively high cost of such structures is partly due to the necessity for machining the joint portions of the different door frame parts and connecting them together.

As previously stated, my improved coke oven door is preferably formed of cast iron, and in some cases the cast iron may be reinforced by incorporating therein, a core portion of material, such as wrought iron or low carbon steel, having greater tensile strength and stretchability and a higher temperature coefficient than cast iron.

The invention is based on the concept that by using a solid and uniform cross-section, it is practically possible to provide a sufficiently great resistance to bending stresses in both directions, i. e. normal to and in the plane of the frame, and to keep the door properly sealed, notwithstanding the unavoidable stresses created by temperature differences, and to provide a door frame that can be constructed readily and at a relatively low cost. Moreover, the integral nature of the frame, and its substantially square cross section makes for better distribution of the thermal stresses than is obtainable with prior doors now in general use.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, its advantages, and specific objects attained with its use, reference should be had to the accompanying drawing and descriptive matter in which I have

illustrated and described preferred embodiment of the invention.

Of the drawings:

Fig. 1 is a front elevation of a door frame;

Fig. 2 is a vertical section of the frame; and

Fig. 3 is a cross-sectional view showing a frame with an oven door in juxtaposition.

The door frame 11 shown in the drawing is let into and secured in the brickwork of the oven chamber 10 in conventional manner, and is formed in one piece, with its long side portions substantially square in cross section. The frame 11 has an outwardly facing, machined seating face 12 against which the edge of a metallic sealing member 13 carried by the door 14 abuts when the door is in its closed position. Door locking hooks 15 are attached to the sides of the door frame adjacent the seating face 12, as shown in Fig. 3. Said hooks may be integral with the door frame or attached thereto in any suitable manner. Advantageously, and as shown, the hooks 15 are attached to brackets 16 integrally connected to the outer face of the door frame side portions. As shown, the widths of the sealing face 12 and of the projection 16 determine the widths of the vertical side portions of the door frame. It will, of course, be appreciated that the corner edges of the door frame may be rounded and that the external surfaces of the frame may be curved faces, instead of the flat faces shown in the drawings.

In the arrangement shown in Fig. 3, the cast iron body portion of the door frame is provided with a metallic core 17 which is centrally located in the cross-section of the frame. The material of the core 17 has a greater coefficient of thermal expansion and greater tensile strength than cast iron. The door frame with its core 17 may well be formed by inserting a core of wrought iron or low carbon steel core of suitable shape and cross-section in a casting mold and pouring cast iron around the core. With this arrangement, a complete fracture of the frame is prevented, even should cracks occur in the outer portions of the frame sides. The body of the frame may be made of materials other than cast iron, for example, of wrought iron.

While in accordance with the provisions of the statutes, I have illustrated and described the best form of embodiment of my invention now known to me, it will be apparent to those skilled in the art that changes may be made in the form of the apparatus disclosed without departing from the spirit of my invention as set forth in the appended claims, and that in some cases certain features of my invention may be used to advantage without a corresponding use of other features.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A metallic, one piece, door frame for use in surrounding a doorway at the end of a horizontal coking chamber and comprising vertical portions at the sides of the doorway and transverse portions at the top and bottom of said doorway, said vertical portions, being bounded by four vertical surfaces, of substantially equal width and each surface being continuous and intersecting two other of the surfaces substantially at right angles.

2. A door frame as specified in claim 1, comprising a cast iron body portion cast about a core of metal having greater tensile strength than cast iron.

3. A door frame as specified in claim 1, comprising a cast iron body portion cast about a core of metal having a higher thermal coefficient of expansion than cast iron.

4. A door frame as specified in claim 1, in which a portion of the outer face of the door frame forms a seating surface extending around the doorway for engagement by the sealing member of a self-sealing coke oven door closing said doorway.

5. A door frame as specified in claim 1, having door retaining members attached to and extending outwardly away from the outer face of the door frame.

6. A door frame as specified in claim 1, in which a portion of the outer face of the door frame, adjacent and extending around the doorway, forms a seat for engagement by the sealing member of a self-sealing coke oven door closing said doorway, and having door retaining members attached to and extending outwardly away from a portion of said face more remote from said doorway than said seat.

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