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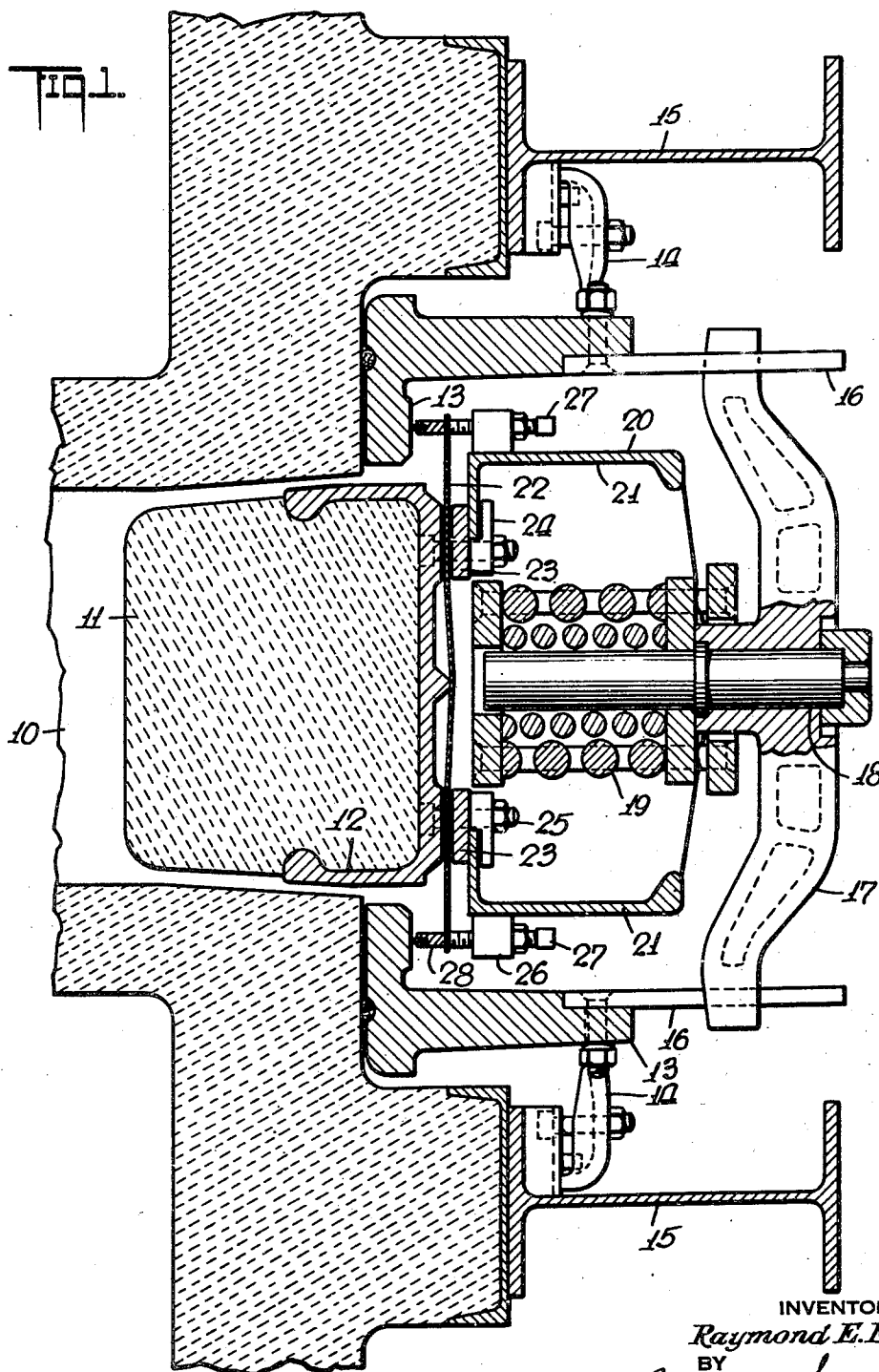
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2,442,348

SELF-SEALING COKE OVEN DOOR

Filed Sept. 12, 1945

2 Sheets-Sheet 1



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Fig. 3.

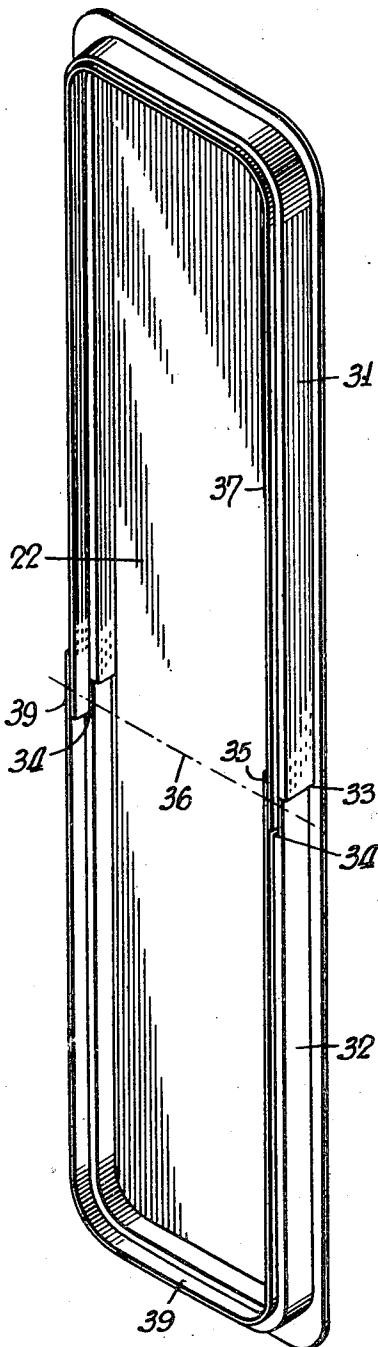


FIG. 2.

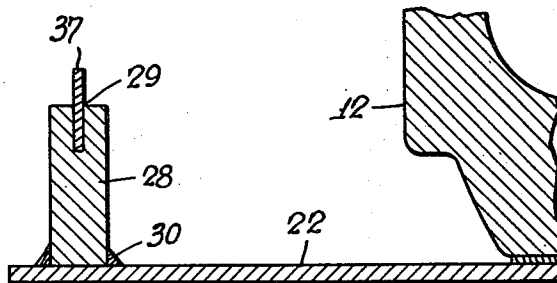
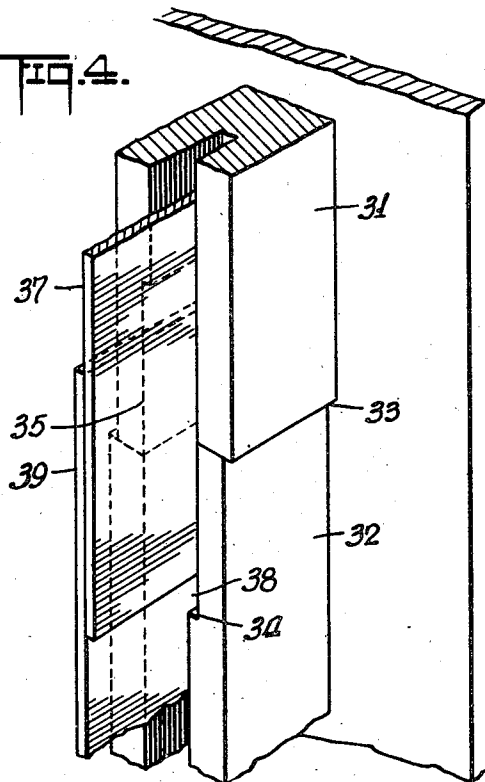


Fig. 4.



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SELF-SEALING COKE OVEN DOOR

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4 Claims. (Cl. 202-248)

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This invention relates to coke oven doors of the self-sealing type for closing the ends of coking chambers of horizontal coke ovens.

The portion of a self-sealing coke oven door which most readily becomes worn or defective and requires replacement is the seal-edge which makes edge contact with the door frame and forms a substantially gas tight closure for the coke oven door opening. In modern designs of self-sealing coke oven doors this sealing edge is formed by an angle or T iron which is welded or otherwise inseparably secured to the sealing frame of the door. The sealing frame may be of the type which involves a through-plate carrying the angle or T iron or of the type involving a frame which may be welded to the outer supporting structure or other portion of the door and has welded along the marginal edges thereof the angle or T iron having the sealing edge. When it becomes necessary to replace the sealing edge for any reason, the practice has been to remove the door, lay it gently in position so as to avoid damage to the refractory plug, separate the parts of the door to permit removal of the sealing frame having welded thereto the angle or T iron and replace the same with a new sealing frame. Such construction has the obvious objection that it involves arduous and time consuming labor to remove and replace the sealing frame and associated sealing edge. Further it involves substantial economic waste in that while it is only the sealing edge that requires replacement, since this edge is, as a practical matter, inseparably attached to the sealing frame, the sealing edge alone cannot be replaced but it is necessary to replace the entire sealing frame.

It is an object of this invention to provide a self-sealing coke oven door closure of substantially gas tight construction in which the sealing edge is so mounted that it and it alone can readily be removed and replaced without dismantling the remainder of the door closure parts, as has been necessary in prior designs of coke oven door closures.

Another object of this invention is to provide a self-sealing coke oven door in which the sealing edge is provided with an expansion joint which alleviates stresses to which this edge is subjected in use due to temperature changes, thereby increasing the effective life of the sealing edge and resulting in a more efficient and durable closure.

In accordance with this invention a self-sealing coke oven door closure is provided in which a readily separable sealing edge in the form of a

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replaceable sealing blade making edge contact with a cooperating portion of the door frame is associated with the sealing frame on the door. In a preferred embodiment of the invention a holder bar is welded or otherwise secured to a diaphragm plate, the holder bar completely surrounding the door opening and having therein a milled groove also extending completely around the door opening into which groove is fitted the replaceable sealing blade in the form of a plate with its sides in frictional contact with the sides of the groove and an edge portion of the blade protruding from the holder bar and forming a sealing edge. When the sealing edge becomes worn it is only necessary to remove the replaceable sealing blade and insert a new blade in the groove of the holder bar, which operation requires little time and involves little expense.

The holder bar is preferably so designed as to have in its upper and lower portions respectively hairpin shaped grooves with the legs extending in parallel direction along the longitudinal marginal portion of the diaphragm plate, the terminal portions of the legs of the upper and lower grooves overlapping and being displaced laterally a distance equal to the width of the replaceable sealing blade so that where the leg portions of the grooves overlap a groove of double width, as compared with the width of the remainder of the groove, is formed. Two flexible replaceable plates, which collectively function as the sealing blade, are inserted in the two hairpin grooves, one in the upper groove and the other in the lower groove with the terminal portions of the plates overlapping and being disposed in the portion of the groove of double width, the plates when cold being of a length to leave an expansion joint space between the ends of the grooves in which they are disposed and the ends of the plates. The side portions of the two plates in overlapping relationship are in sliding contact with each other. This construction provides an expansion joint permitting expansion of the sealing blade due to temperature changes and yet maintains a substantially gas tight seal.

Other objects and advantages of this invention will be apparent from the following detailed description thereof.

In the accompanying drawings forming a part of this specification and showing for purposes of exemplification a preferred embodiment of the invention, but without limiting the claimed invention specifically to such illustrative instance:

Figure 1 is a horizontal section through a coke oven door closure embodying this invention;

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Figure 2 is a fragmentary enlarged section showing the mounting of the holder bar on the diaphragm plate;

Figure 3 is a perspective view showing the diaphragm plate carrying the holder bar having the removable sealing blades therein, and further showing the expansion joints in the sealing blades; and

Figure 4 is a fragmentary perspective view, on an enlarged scale, showing one of the expansion joints.

In the drawings a coking chamber 10 has inserted in its side opening an inner plug section 11 of refractory material which plug is carried by a holder 12. The sides of the coking chamber opening have a door frame 13 secured thereto by any conventional means such, for example, as the clamps 14 extending from the backstays 15. Latch hooks 16 are secured to the frame 13 and are arranged to be engaged by the latch bar 17 carried by the bearing body 18 mounted on the coke oven door.

In the embodiment of the invention shown in Figure 1 of the drawing the door is maintained in spring pressed engagement with the door frame by means of a spring 19. It will be understood, however, that the invention herein is applicable to doors which do not involve the use of springs for maintaining them in sealing engagement with the door frame, and that the spring pressed type of door shown in the drawing represents but one form of well known self-sealing door to which the invention is applicable.

The weight of the door is carried by an outer supporting frame 20 consisting of channel bars 21. A diaphragm plate 22 extends between the holder 12 and spacer plates 23 disposed longitudinally along the length of the door on each side thereof, as shown in Figure 1. Clamps 24 through the nut and bolt connections 25 secure the holder 12 for the inner plug section 11 and the diaphragm plate 22 to the channel irons 21 forming the outer supporting frame 20. Instead of diaphragm plate 22, a sealing frame in the form of a substantially annular frame may be used; in both cases the door is provided with a sealing member extending laterally beyond the sides of the inner plug section 11 and having a sealing edge for making edge contact with the sealing surface on the door frame surrounding the door opening.

The diaphragm plate or sealing frame should be of flexible construction such as to permit maintenance of the sealing edge under tension in sealing engagement with the door frame to provide a substantially gas tight closure. To adjust the tension on the sealing frame, which term is used herein in a generic sense to include both diaphragm plate and frame types of sealing members, as well known in the art, a series of bearing members 26 is provided spaced along the sides, top and bottom of the supporting frame each bearing member being provided with an adjustable bolt 27 for exerting tension on the sealing frame.

In accordance with this invention the sealing frame 22 is provided with a holder bar 28 which may be in the form of a metal bar having a milled groove 29 in one edge portion and having the opposite base edge portion welded or otherwise secured to the sealing frame 22, as indicated by the reference character 30. As shown in Figures 3 and 4 the holder bar 28 extends along the marginal edges of the diaphragm plate and is constituted of an upper portion 31 of sub-

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stantially hairpin shape and a lower portion 32 also of substantially hairpin shape, the two portions at their points of jointure indicated by the reference character 33 being displaced laterally a distance equal to the width of the groove 29. The legs of the lower hairpin portion 32 of the holder bar are provided with short grooves 34 which are in longitudinal alignment with the grooves in the legs of the upper hairpin portion 31 of the holder bar. Likewise the legs of the upper hairpin portion 31 of the holder bar are provided with short grooves 35 forming extensions of the grooves in the legs of the lower hairpin portion 32 of the holder bar. Thus in effect the holder bar is provided with two hairpin shaped grooves completely encircling the door opening, the grooves being of uniform width, except for a portion in the area near the transverse median line of the door indicated by the reference character 36 in which area the grooves are of double width, the lower groove being displaced laterally relatively to the upper groove a distance equal to the width of the groove.

A flexible replaceable sealing plate 37, of a thickness substantially the same as the width of groove 29, say $\frac{1}{4}$ inch, for insertion therein, is removably inserted in the upper groove, the plate when cold being of a length such as to completely fill the length of the groove, except for a small expansion joint space indicated by the reference character 38. A second plate indicated by reference character 39 is inserted in the groove in the lower portion of the holder bar and also terminates short of the ends of the groove in which it is disposed. Due to the transverse displacement of the two grooves the sides of the plates in the median portion 36 are in sliding engagement with each other, as shown in Figures 3 and 4. The expansion joint spaces 38 permit expansion of the resultant sealing blade due to temperature changes; in view of the sliding engagement of the sides of the plates with each other as hereinabove described, such expansion does not interfere with the maintenance of a substantially gas tight seal about the door opening.

Thus it will be seen the present invention provides a coke oven door closure in which the sealing edge is readily removable without dismantling other parts of the coke oven door. Furthermore the coke oven door closure of this invention has the sealing edge provided with an expansion joint which does not interfere with the gas tight seal and increases the efficiency and durability of the door closure.

The terms "blade" and "plate" are used in the claims to include one piece constructions as well as constructions consisting of a plurality of sections as shown for example in Figures 3 and 4 of the drawings.

The invention as hereinabove set forth is embodied in a particular form but may be variously embodied within the scope of the claims hereinafter made.

What is claimed is:

1. A self-sealing coke oven door closure comprising a door frame having a sealing surface, an outer supporting structure, an inner refractory plug section, a diaphragm plate, a holder bar of substantially rectangular shape secured to said diaphragm plate and having in an outer edge thereof a groove which is also of rectangular shape, the groove consisting of an upper portion comprising two legs extending in a general longitudinal direction relative to the sides of the diaphragm plate and a lower portion comprising

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two legs also extending in a general longitudinal direction relative to the sides of the diaphragm plate, the longitudinally extending legs of the lower portion being displaced transversely a distance equal to the width of the groove relative to the longitudinally extending legs of the upper portion and the terminal portions of the grooves overlapping to provide grooves in the overlapping areas of double width, a flexible blade having its sides removably mounted in the upper groove and its ends terminating short of the ends of the upper groove, and a second flexible blade having its sides removably mounted in the lower groove and having its ends terminating short of the ends of the said groove, the side portions of the two blades overlapping and the overlapping portions being in frictional contact with each other, said blades having edge portions protruding from the holder bar and adapted to make edge contact with the sealing surface on the door frame.

2. A self-sealing coke oven door, comprising a flexible metal sealing frame extending laterally from the sides of the door and also from the top and base portions of the door, a holder-bar having its base welded to the face of said sealing frame near the marginal edge thereof and having its edge opposite the base provided with a milled groove and a sealing blade in the form of a plate removably mounted within said groove, the sides of said plate being in frictional contact with the side walls of said groove providing a substantially gas-tight seal between said blade and said groove, said blade and holder-bar extending completely around the marginal portion of the sealing frame and said blade having a sealing edge portion protruding from said holder-bar.

3. A self-sealing coke oven door as claimed in

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claim 2, in which the blade has an expansion joint.

4. A self-sealing coke oven door, comprising an outer supporting structure, an inner plug section, a flexible metal diaphragm plate having its marginal portion extending laterally beyond the side, top and bottom edges of said inner plug section, a metal holder-bar extending along the marginal portion of said diaphragm plate, having its base welded to the face of said diaphragm plate and having a milled groove in its edge opposite the said base, a flexible metal blade in the form of a plate removably mounted within said milled groove, the sides of said plate being in frictional contact with the side walls of said groove so as to provide a substantially gas-tight seal between the said blade and said groove, said blade and holder-bar extending completely around the marginal portion of the diaphragm plate and said blade having a sealing edge portion protruding from said holder-bar, and an expansion joint in said blade.

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