March 9, 1965 E. J. MALONEY 3,172,825

TRIPLE-SEAL OVEN DOOR SEALING MEANS

Filed June 20, 1962 3 Sheets-Sheet 1

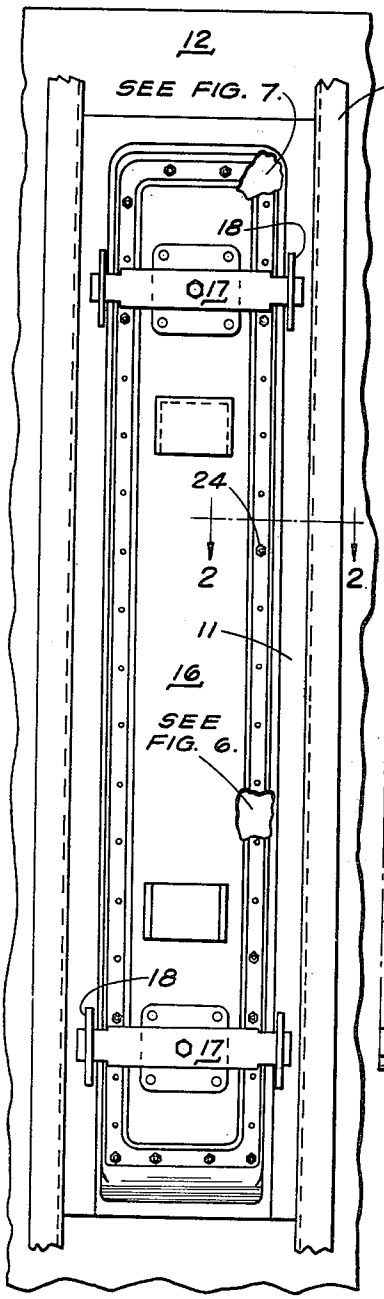


Fig. 1.

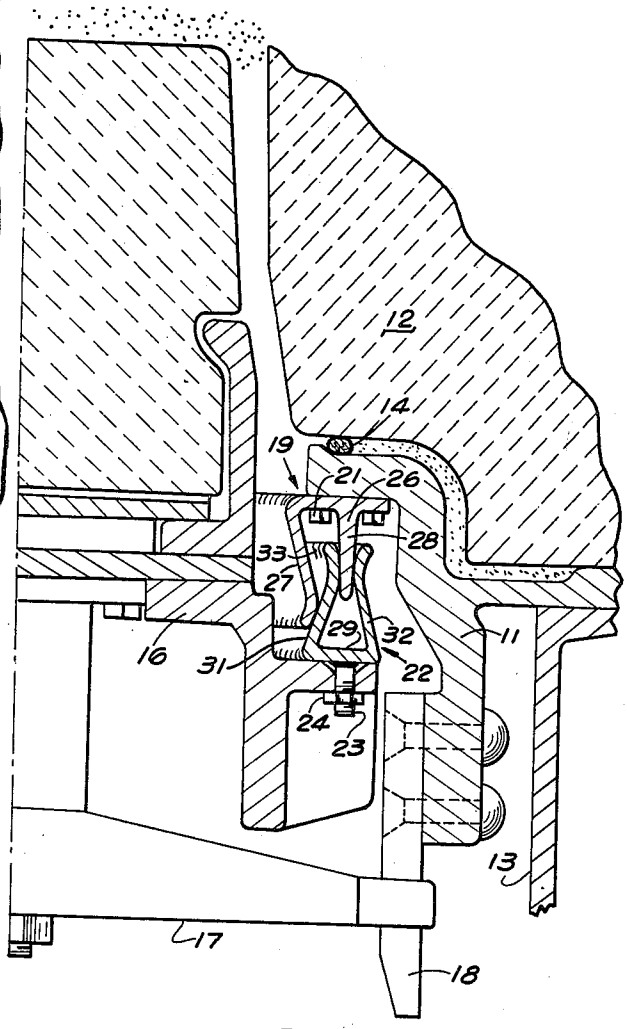


Fig. 2.

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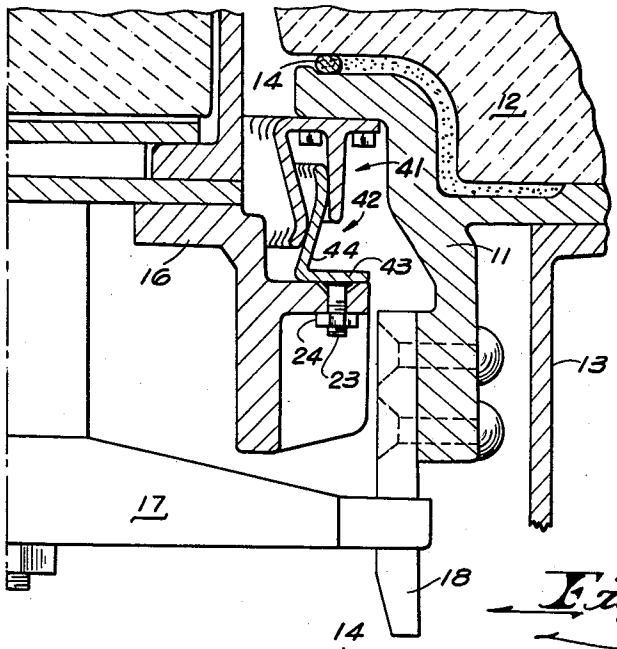


Fig. 3.

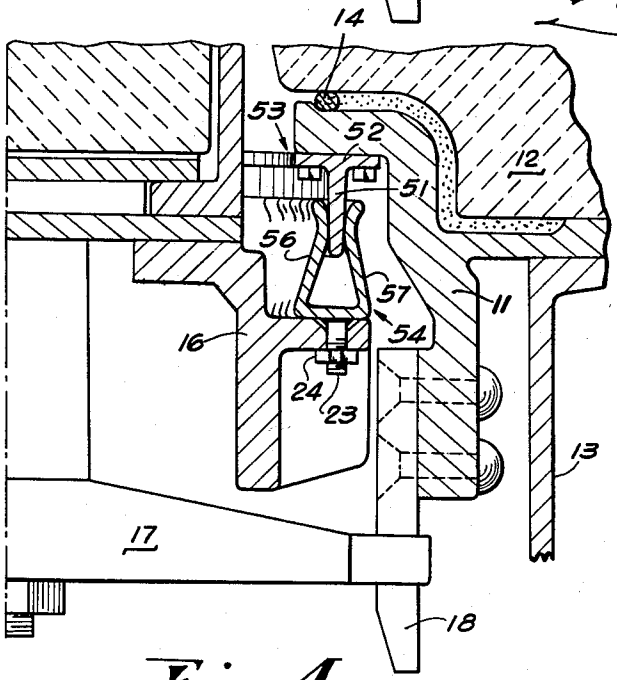


Fig. 4.

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TRIPLE-SEAL OVEN DOOR SEALING MEANS

Filed June 20, 1962 3 Sheets-Sheet 3

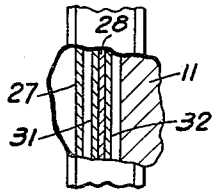


Fig. 6.

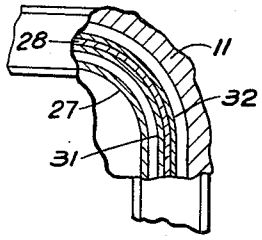


Fig. 7.

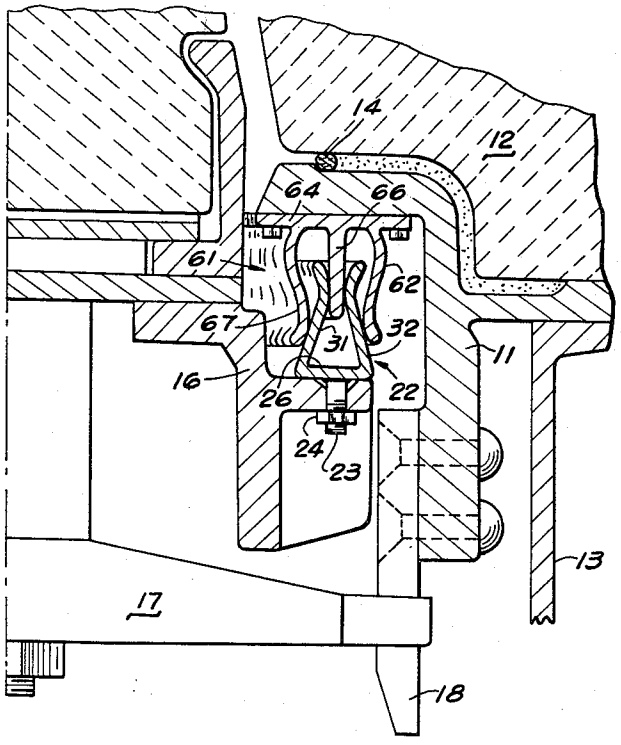


Fig. 5.

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TRIPLE-SEAL OVEN DOOR SEALING MEANS

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3 Claims. (Cl. 202—248)

This invention relates to sealing means for coke oven doors and more particularly to simple means for providing a plurality of spaced-apart continuous lines of sealing contact between the coke oven door and its frame for effectively sealing this region to prevent the passage of gases into or out of the oven chambers.

The problem underlying the difficulty of sealing the joint between the coke oven door and its frame is due to the differential warpage which is induced in these metallic components which provide closure for the oven chambers. And with the prospect of coke ovens and consequently coke oven doors being increased substantially in height, the problem of relative movement between door and frame as a result of warpage occasioned by the high temperatures to which these members are exposed promises to be aggravated to an even greater degree.

It is, therefore, an object of the present invention to provide means for reliable sealing engagement to close the space between door and frame irrespective of relative movement between these members.

It is another object of the present invention to provide a device which furnishes multiple spaced-apart continuous perimeters of sealing contact to close the space between door and frame irrespective of relative movement therebetween.

These objects are attained in the present invention by the use of a continuous wedge-like projection affixed to either the door or the frame and extending around the perimeter thereof and a pair of sinuous resilient walls projecting from the second member and extending around the perimeter of this second member in opposition to the wedge-like projection whereby when the door is placed into sealing position with the frame, the wedge-like projection enters between the opposing resilient walls thereby providing a plurality of lines of continuous sealing contact between the wedge-like projection and the resilient walls.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the figures thereof and wherein:

FIGURE 1 is an elevational view of a typical coke oven door in closure position with cut-away portions to show the arrangement therein of a preferred embodiment of the present invention;

FIGURE 2 is an enlarged sectional view taken on line 2—2 of FIGURE 1 showing the preferred embodiment;

FIGURE 3 is a sectional view similar to FIGURE 2 illustrating a second embodiment of the present invention;

FIGURE 4 is a sectional view similar to FIGURE 2 showing a third embodiment of the present invention;

FIGURE 5 is a sectional view similar to FIGURE 2 disclosing still a fourth embodiment of the present invention;

FIGURE 6 and FIGURE 7 are enlarged views of the cut-away portions of FIGURE 1.

As shown in FIGURES 1 and 2, door frame 11 is mounted to fit into an opening in the oven brickwork 12 being held in position by metallic framework such as

buckstays 13. The space between door frame 11 and oven brickwork 12 is conventionally sealed by the use of continuous packing strip 14 along with additional bulk packing material which is generally refractory in nature.

Door 16 is held in juxtaposition with door frame 11 by means of latches 17 removably positioned in door hooks 18 which are affixed to door frame 11. Between door frame 11 and door 16 are located the interengageable sealing elements, the first attached to door frame 11 and the second attached to door 16.

In the arrangement shown, male sealing member 19 is mounted on the forward surface of the door frame 11 as by bolts 21 while female sealing member 22 is affixed to the rear surface of the casting of door 16 by means of threaded stud 23, which is welded to member 22, and nut 24. This arrangement may be readily reversed with male sealing member 19 being affixed to door frame 11 and female sealing member 22 being mounted on door 16. Each of the sealing members 19 and 22 extend continuously around the periphery of door frame 11 and door 16 respectively in order to provide the requisite continuous peripheral sealing.

As shown in cross-section FIGURE 2, male sealing member 19 is composed of a base or support portion 26 from which forwardly extend two spaced projections, a resilient sinuous rim 27 and a non-resilient projecting wall 28 wedge-like in cross-section. Female sealing member 22 likewise comprises a base or support portion 29 from which extend a pair of spaced sinuous resilient walls 31 and 32.

As door 16 is moved into juxtaposition with door frame 11 as by the use of an automatic door machine (not shown) male sealing member 19 and female sealing member 22 are so aligned that as door 16 is moved inwardly toward door frame 11, projecting wall 28 is forced between walls 31 and 32. Simultaneously rim 27 which extends beyond the distal end of wall 28 bypasses the outer edge 33 of wall 31 engaging the lower portion of wall 31. In this manner three spaced-apart continuous sealing perimeters are established; one perimeter along the area of contact between rim 27 and the lower portion of wall 31, a second perimeter along the area of contact between wall 28 and wall 31 and a third perimeter along the area of contact between wall 28 and wall 32. Since walls 31 and 32 are deflected away from each other upon receiving wall 28 of male sealing member 19 therebetween the contact between walls 31, 32 and wall 28 is positive and, likewise, the engagement between rim 27 and wall 31 is a positive one.

If, as a result of exposure to the high temperatures close to the oven chamber, warpage is induced which results in relative movement between door frame 11 and door 16, the requisite positive sealing engagement between male sealing member 19 and female sealing member 22 remains undiminished regardless of whether these sealing members are moved toward or away from each other the amount normally attendant such distortions. Positive sealing engagement is maintained at all times as a result of the spring action of rim 27 forcing against wall 31 and as a result of the spring action of walls 31 and 32 reacting to displacement by wall 28.

Sealing members constructed according to the present invention as disclosed in FIGURE 3 differ from the preferred embodiment in that the sealing action results in two rather than three continuous lines or contact areas of perimeter sealing.

In this embodiment the first sealing member 41 is identical to the sealing member 19 of the preferred embodiment while the second sealing member 42 comprises a base portion 43 from which extends yieldable, sinuous portion 44 similar to the wall 31 of sealing member 22. The interaction of the sealing components during relative

movement of door **16** and frame **11** as the result of heat-induced warpage is the same as for the preferred embodiment.

The embodiment shown in FIGURE 4 like the embodiment shown in FIGURE 3 provides only two separate continuous lines or contact areas of peripheral sealing. As shown in this embodiment, wall **51** tapered in cross-section serves as the engaging member with base **52** providing the means for mounting. The wall **51** together with base **52** comprise male sealing member **53**. The female sealing member **54** is the same in all respects as the female sealing member **22** shown in FIGURE 2. The coaction between non-resilient wall **51** and spring wall portions **56** and **57** during interengagement, during subsequent relative movement due to warpage of the closure members and during withdrawal of door **16** from the opening is similar to the coaction of projecting wall **28** and walls **31** and **32** of the preferred embodiment.

A fourth embodiment illustrated in FIGURE 5 discloses a construction which will present an even greater obstruction to the passage of gases through the joint. With this construction, four separate continuous lines or contact areas of peripheral sealing are provided with the interaction of component parts of first sealing member **61** and second sealing member **22** being similar to the interaction of like parts of the sealing members described in connection with the preferred embodiment. In this embodiment, however, an additional sinuous rim **62** projects from base **64** of first sealing member **61**. Projecting wall **66** and sinuous rim **67** are formed having the same contours as are shown in FIGURE 2 for wall **28** and rim **27**. Likewise walls **31** and **32** and base portion **26** of second sealing member **22** are the same as shown in FIGURE 2.

With the construction disclosed in the various embodiments, and particularly in the preferred embodiment, the interengageable portions of the male and female sealing elements are readily placed in alignment by an automatic door machine and, other than the simple closing action as the door **16** is moved into juxtaposition with door frame **11**, no other biasing force is required to effect positive sealing engagement.

Subsequent relative movement between the casting of door **16** and door frame **11** need not be opposed by special restraining devices to maintain the effectiveness of the multi-circuit sealing action since relative movement between male and female sealing elements to the extent encountered in this application will have no effect on the positive nature of the seal.

It is further expected that the greater pressure of coke oven gases attempting to escape will exert an additional force increasing the positive sealing engagement between sinuous rim **27** and wall **31** since sinuous rim **27** will be biased outwardly thereby.

Obviously modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood, that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. Sealing means between a coke oven door and a coke oven door frame comprising:

(*a*) a first peripheral sealing member fixed to said door including a plurality of adjacent resilient walls projecting rearwardly therefrom with a first narrow slot being between adjacent first walls; and

(*b*) a second peripheral sealing member fixed to said door frame including a plurality of adjacent resilient walls projecting forwardly therefrom with a second narrow slot being between adjacent second walls,

(*c*) one of the walls of said first sealing member extending into said second slot and wedging between adjacent walls of said second sealing member; and another wall of said first sealing member coacting with one of the walls of said second sealing member, whereby the walls of said first and second members sealingly coact along a plurality of continuous peripheral surfaces when said door is placed in operative juxtaposition to said door frame.

2. Sealing means between a coke oven door and a coke over door frame comprising:

(*a*) a first peripheral sealing member fixed to said door including a pair of adjacent resilient walls projecting rearwardly therefrom and forming a narrow slot therebetween; and

(*b*) a second peripheral sealing member fixed to said door frame including a central wall between spaced apart resilient walls forming narrow slots on opposite sides of said central wall,

(*c*) the walls of said first sealing member extending into said narrow slots and wedging between the central wall and an adjacent resilient wall whereby, when said door is placed in operative juxtaposition to said door frame, the walls of said first and second members sealingly coact along the least four continuous peripheral sealing surfaces.

3. Sealing means between a coke oven door and a coke oven door frame comprising:

(*a*) a first peripheral sealing member fixed to said door including a pair of spaced resilient walls projecting readwardly therefrom and forming a narrow slot therebetween; and

(*b*) a second peripheral sealing member fixed to said door frame including a pair of spaced resilient walls projecting forwardly therefrom and forming a second narrow slot therebetween,

(*c*) one of the walls of said first sealing member extending into the second slot and wedging between the walls of said second sealing member with the other wall of said first sealing member coacting with one of the walls of said second sealing member whereby, when said door is placed in operative juxtaposition to said door frame, said first and second sealing members coact along at least three continuous peripheral sealing surfaces.

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