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White, Jr.

[11] **3,881,995**

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[54] **METHOD AND APPARATUS FOR SEALING A COKING CHAMBER**

[76] Inventor: **Herbert A. White, Jr.**, 2516 Collin Rd., Pittsburgh, Pa. 15235

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[51] **Int. Cl.**.... **C10b 1/06;** C10b 25/06; C10b 25/24

[58] **Field of Search** ..... 202/248, 247, 242, 269; 110/173 R, 174, 175 R; 122/498

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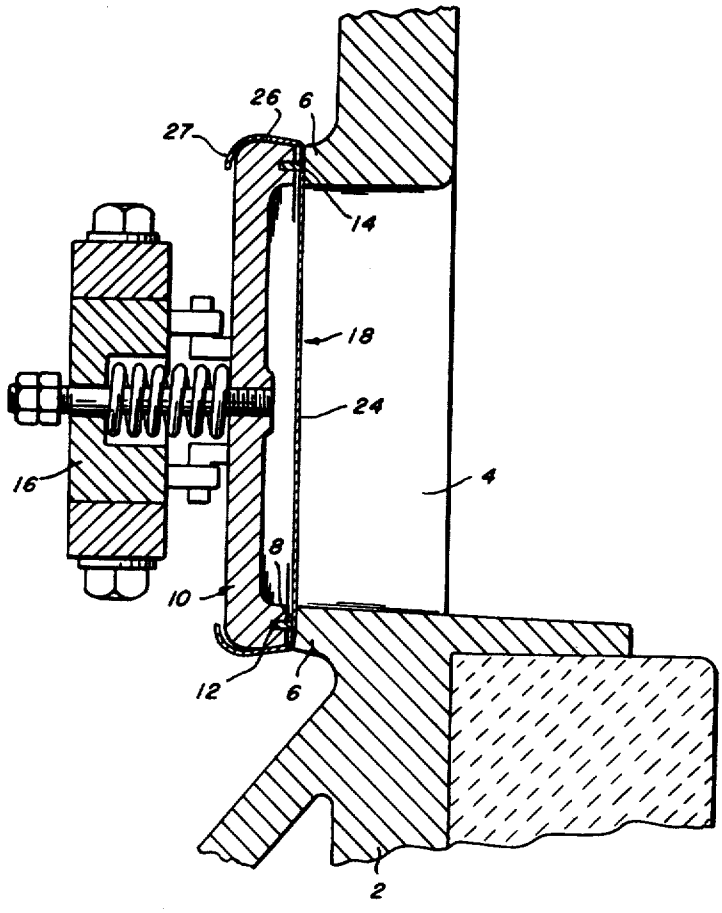
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Primary Examiner—Norman Yudkoff
Assistant Examiner—D. Sanders
Attorney, Agent, or Firm—Martin J. Carroll

[57] **ABSTRACT**

A method and apparatus for providing a good seal between sealing edges and sealing surfaces of a coke oven door includes placing a high temperature resistant, compressible and deformable sealing member on the door between the sealing edge and sealing surface.

10 Claims, 12 Drawing Figures



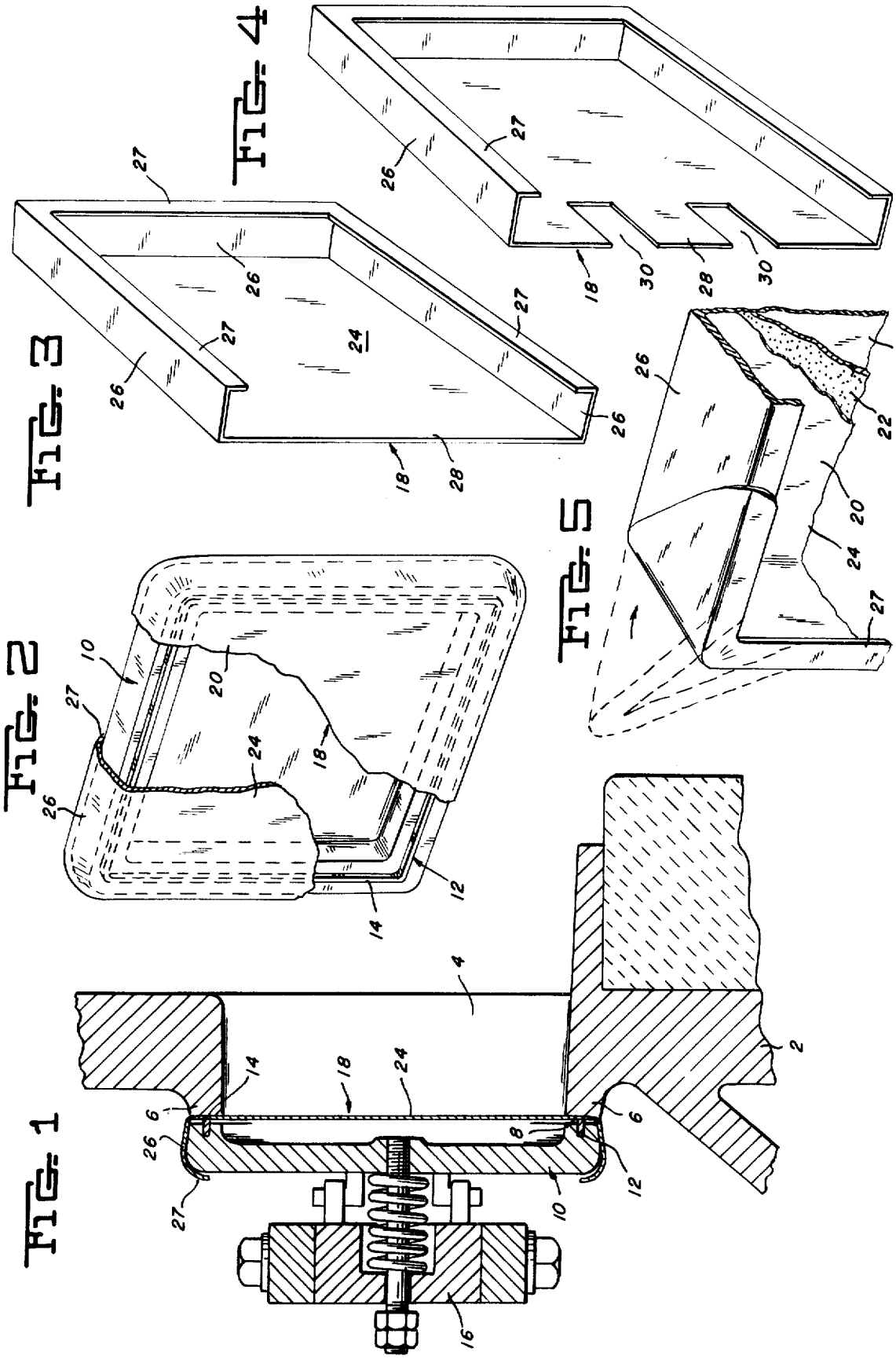

FIG. 4
FIG. 3
FIG. 5
FIG. 2
FIG. 1

FIG. 6

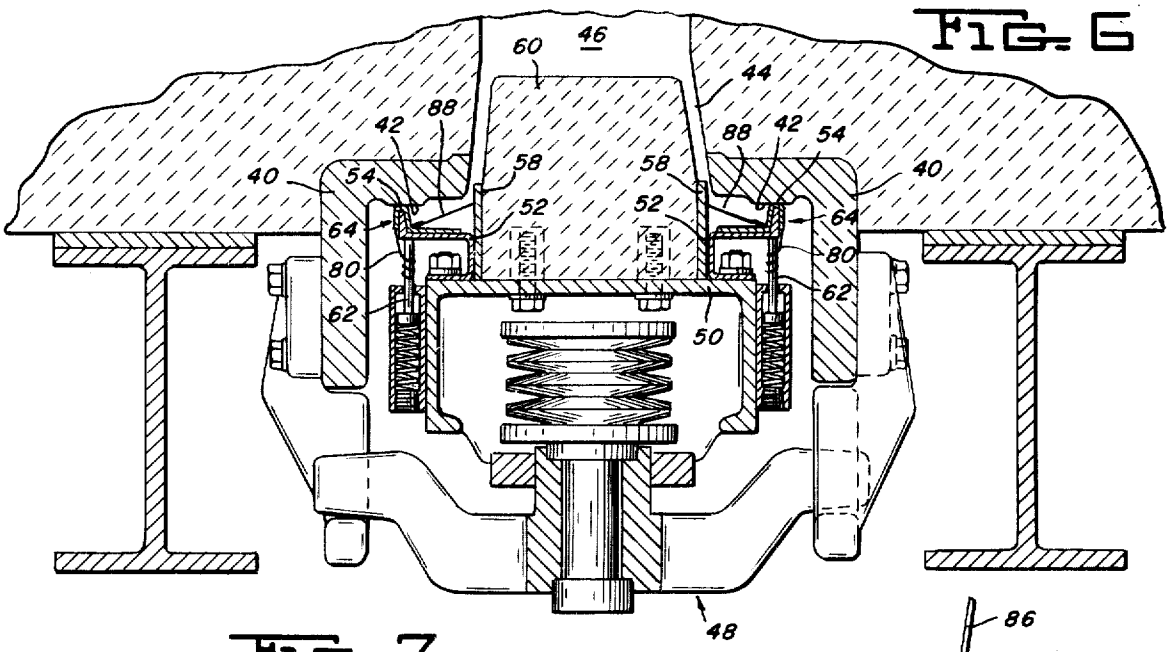


FIG. 7

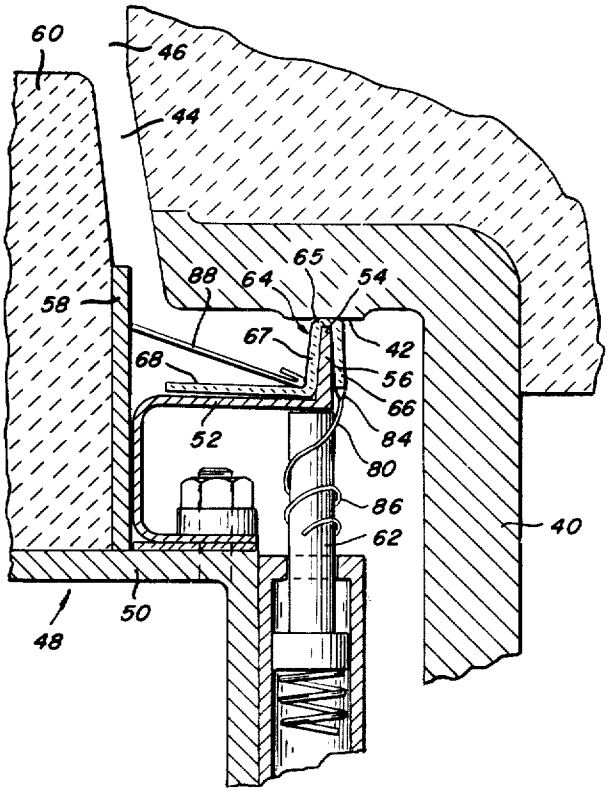


FIG. 8

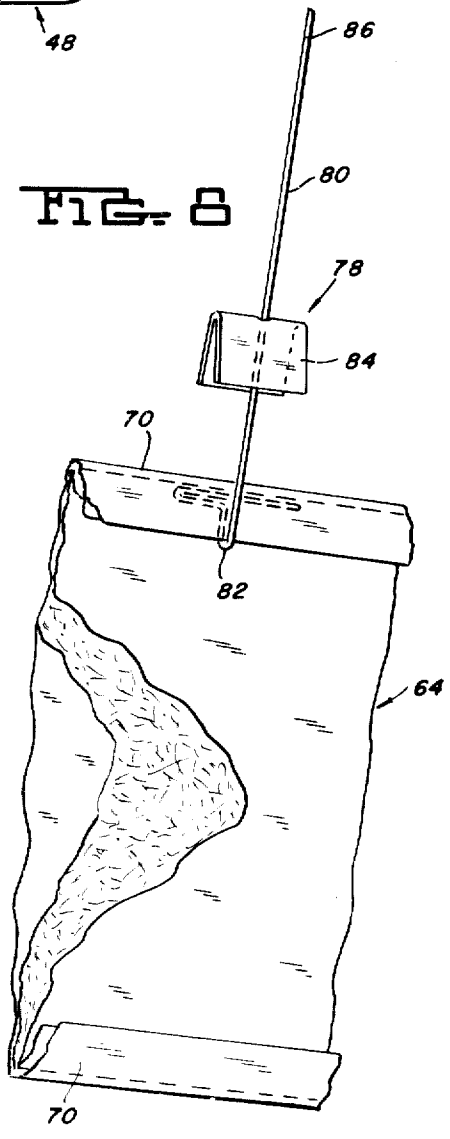


FIG. 9

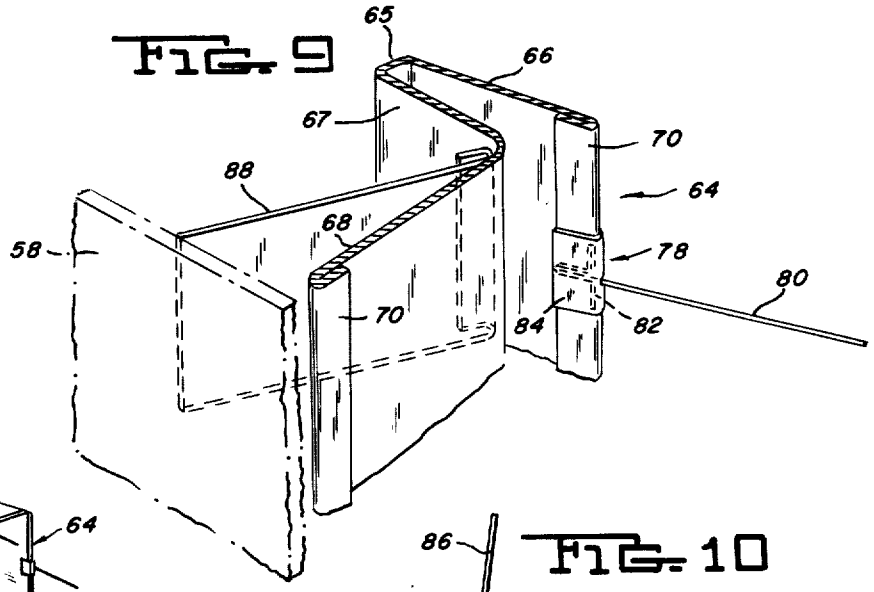


FIG. 12

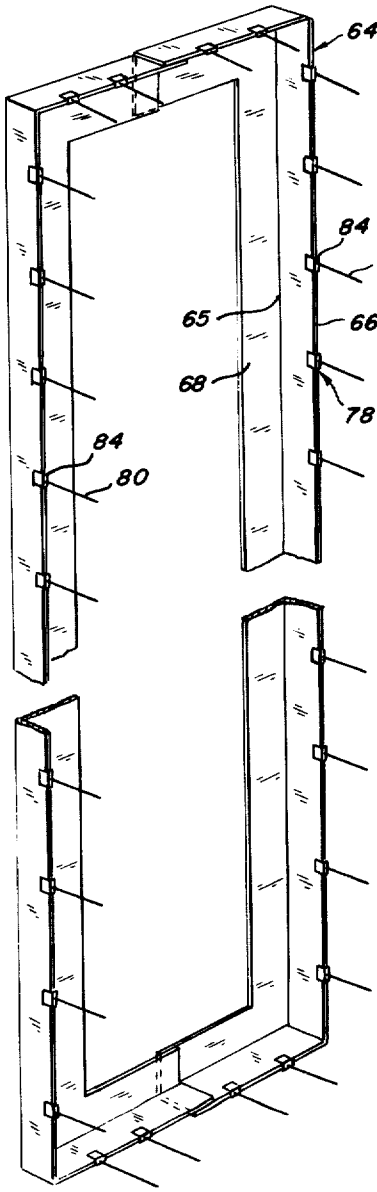
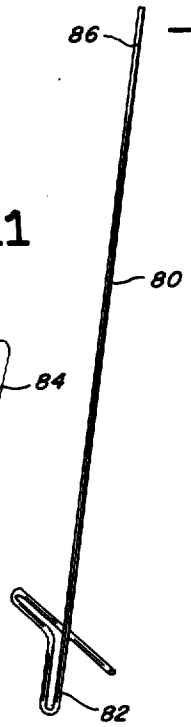


FIG. 11



FIG. 10



METHOD AND APPARATUS FOR SEALING A COKING CHAMBER

This invention relates to a method and apparatus for sealing a coking chamber or the like. A by-product coke oven includes a large number of spaced apart coking chambers with heating chambers therebetween and doors for sealing the door openings at the pusher and discharge ends of each coking chamber. Coal is charged into the coking chambers and heated to or above the coking temperature of about 1,300°F. The door at the pusher side is provided with a smaller leveler door which is removed to provide an opening through which leveler apparatus is inserted to level the charged coal prior to coking. It is important to have a tight seal at all of the doors to prevent heat from escaping, but still more important to prevent the gases from escaping to the air and contaminating it. For these reasons the door jambs are provided with flat peripheral sealing surfaces and the doors with peripheral sealing edges for engaging the sealing surfaces. There are several types of doors of this construction in which the sealing surface is metal and the sealing edges are formed by steel strips extending outwardly from the door and urged or pressed into engagement with the sealing surface. While such doors have been in use for many years with relatively good results when new they are still one of the major causes of air pollution at a coke plant. One reason for this is that the sealing surface and/or sealing strips become warped in use. Another reason is that the evolved gases, which include tar, builds up on the sealing surfaces and edges in spite of the fact that expensive scrapers are used to remove the materials deposited. Many attempts have been made to overcome these problems without success.

It is therefore an object of my invention to provide apparatus for providing a good door seal to prevent or greatly decrease escape of gases from a coking chamber.

Another object is to provide such apparatus which will protect the door from the heat of the oven.

Still another object is to provide such apparatus which greatly reduces build up of material on the sealing surfaces and edges.

A further object is to provide a method of providing a good seal to prevent escape of gases from a coke oven chamber which method is not expensive in cost and which can be preformed without undue delay of the operation of the coke ovens.

These and other objects will become more apparent when referring to the following specification and drawings, in which

FIG. 1 is a sectional view of a leveler door in place in a coke oven and having my seal incorporated therein;

FIG. 2 is a perspective view of the door of FIG. 1 with the seal in place thereon;

FIG. 3 is a perspective view of the seal prior to installation;

FIG. 4 is a view, similar to FIG. 3, but showing a slight modification;

FIG. 5 is a perspective view of a corner of the seal with parts broken away and shown in section;

FIG. 6 is a sectional view of a main coke oven door utilizing my seal in place in a coke oven;

FIG. 7 is an enlarged sectional view of a portion of FIG. 6;

FIG. 8 is a perspective view of a seal of my invention with attached fastening means;

FIG. 9 is a perspective view of an installed seal;

FIG. 10 is a perspective view of one element of the fastening means;

FIG. 11 is a perspective view of another element of the fastening means; and

FIG. 12 is a perspective view of the seal of FIGS. 6 and 7 showing its shape prior to installation.

Referring more particularly to FIGS. 1 to 5 of the drawings, reference numeral 2 indicates an oven door on the pusher side of a coking chamber of a coke oven. The door 2 has a door opening 4 therein for receiving a door jamb 6 having a peripheral sealing surface 8 surrounding the door opening. A leveler door 10 is provided with a peripheral steel strip 12 forming a sealing edge 14 adapted to engage the sealing surface 8. The door 10 is moved into position with the edge 14 held against surface 8 by spring tensioning means 16. The apparatus and operation so far described are conventional.

According to my invention I provide a high temperature resistant, deformable and compressible sealing member 18 which is positioned between the surface 8 and edge 14. While the member 18 may be formed by a number of separate strips I prefer that it be a single unit as shown in FIGS. 2 to 5. I also prefer that it be made of two outer layers of steel foil 20 (FIG. 5) with a layer 22 of high temperature resistant insulating material therebetween A combination of alumina and silica is very suitable for layer 22. One commercial product of this nature is sold as FIBRE FRAX paper. For best results it is preferred that the overall thickness be between one-sixteenth and one-eighth inch. As best shown in FIGS. 2 to 5 the member 18 has a base 24 which is co-extensive with the outside of door 10, a flange 26 which extends along three sides of the base 24, a flange 27 extending inwardly from flange 26 and a base extension 28 which is of the same length as flange 26 plus flange 27. As shown in FIG. 4 cutouts 30 may be provided in extension 28 for door hinges when present.

In operation, the member 18 of FIGS. 3 or 4 is placed over the door 10 with the flange 26 ground three sides thereof and the base extension 28 is then bent ground the remaining side thereof as shown in FIGS. 1 and 2. After the coal is leveled in the usual manner the door 10 is positioned in the usual manner against the door jamb. Because the member 18 is deformable and compressible it will form a good seal regardless of slight irregularities in the sealing surface or sealing edge. I have also found that the seal eliminates or greatly reduces the build-up of materials on the sealing surface and sealing edge. In addition since the seal extends completely across the door opening it protects the door from the heat of the oven. Thus it is seen that the sealing member in addition to providing a better seal helps eliminate the conditions that have caused poor seals in the past. It has been possible to use the sealing member for a period of 2 weeks without substantial reduction in its efficiency.

FIGS. 6 to 12 disclose a main coke oven door which requires a modified type of sealing member. As best shown in FIGS. 6 and 7 a door jamb 40 having a flat peripheral sealing surface 42 surrounds door opening 44 into coking chamber 46. Door 48 includes a metal frame 50 having a peripheral bent steel plate 52 fas-

tened thereto. The plate **52** has a sealing edge **54** formed at the inner end of an outwardly extending surface **56.** Also fastened to frame **50** are inwardly extending metal flanges **58** for receiving a refractory plug **60** which extends into the door opening **44** beyond sealing surface **42.** Spring pressed plungers **62** mounted on frame **50** in spaced apart relationship about its periphery bias the sealing edge **54** into engagement with sealing surface **42.** This construction and other parts shown as well as the door handling apparatus are conventional.

According to my invention I provide a sealing member **64** which is of the same material as sealing member **18.** The member **64** is positioned between the sealing surface and sealing edge. In this embodiment the sealing member is preferably made of two overlapping pieces, one for each side and a portion of the top and bottom as shown in FIG. **12.** Each piece includes a first portion or flange **65** adapted to be placed between the sealing edge and sealing surface and a second portion or flange **66** adapted to be placed against or adjacent surface **56.** Extending from flange **65** are connecting flanges **67** and **68.** The outer steel foil layers at the end of flanges **66** and **68** are bent to form flanges **70.** The separate pieces of sealing member **64** are secured to the door **48** by a plurality of fastening means **78** spaced apart as best shown in FIG. **12.** Each fastening means includes a steel wire **80** having a bent inner portion **82** adapted to be received between flanges **66** and **70.** A tab **84** slidable on wire **80** is pressed over the outside of flanges **68** and **70** for better attachment. The outer end **86** of each wire **80** is wound around the adjacent plunger **62** to secure the sealing member **64** to the door.

In operation, the sealing member **64** is attached to door **48** as described above and the door **48** is then positioned in the usual manner against the door jamb. After the flanges **65, 66, 67** and **68** are wrapped around the door frame a plurality of plates **88** are placed in spaced apart relationship with one end bearing against the adjacent flange **58** and the other against the seal at the junction of flanges **67** and **68** so as to further hold the sealing member **64** on the door. These plates are preferably made of **20** gauge cold rolled steel with the end bearing against the seal either bent over as shown or at least free of sharp edges which would cut the foil. It will be seen that the seal protects only a portion of the metal of the door. The operation and advantages of this seal are essentially the same as in the first embodiment except that the entire door is not protected from the heat of the oven.. The life of this seal is not as long as that of the first embodiment since it requires more careful handling which is difficult to obtain from the workmen. However, it can be used for several pushes.

While several embodiments of my invention have been shown and described, other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. In a coke oven or the like having an elongated heating chamber for receiving coal to be coked, a door opening at an end of said chamber, a door jamb surrounding the door opening and having a flat sealing surface extending around its periphery, and a door having a sealing edge extending around the periphery thereof and adapted to engage said sealing surface, said sealing edge being at the end of a metal strip arranged generally normal to said sealing surface; the improvement comprising a detachable relatively thin high temperature resistant, deformable and compressible sealing member adapted to be received between said sealing surface and said sealing edge for the full extent of the edge, said sealing member including a plurality of contacting layers with one outer layer adapted to rest on said sealing surface and the other outer layer adapted to bear against said sealing edge.

2. The combination of claim **1** in which said deformable sealing member is normally flat and includes outer layers of steel foil one adapted to rest on said sealing surface and the other adapted to bear against said sealing edge, and a layer of high temperature resistant insulating material between the layers of steel foil.

3. The combination of claim **2** in which said layer of high temperature resistant insulating material is a combination of alumina and silica.

4. The combination of claim **1** in which said deformable sealing member extends completely across said door opening.

5. The combination of claim **2** in which said door includes a refractory plug extending into said chamber and a surface on said metal member extending outwardly from said sealing edge, said deformable sealing member includes a first portion adapted to bear on said sealing surface, a second portion extending from said first portion along said outwardly extending door surface, and an inwardly extending portion at the outer end of said second portion formed by a portion of said outer layers of steel foil, and means secured to said inwardly extending portion of said sealing means to secure said sealing means to said door.

6. In a coke oven or the like having an elongated heating chamber for receiving coal to be coked, a door opening at an end of said chamber, a door jamb surrounding the door opening and having a flat sealing surface extending around its periphery, and a door having a sealing edge extending around the periphery thereof and adapted to engage said sealing surface; the improvement comprising a detachable relatively thin high temperature resistant, deformable and compressible sealing member adapted to be received between said sealing surface and said sealing edge and extending across said edge in its peripheral extent, said deformable sealing member including outer layers of steel foil one adapted to rest on said sealing surface and the other adapted to bear against said sealing edge, and a layer of high temperature resistant insulating material between the layers of steel foil.

7. The combination of claim **6** in which said layer of high temperature resistant insulating material is a combination of alumina and silica.

8. A method of sealing a coking chamber or the like, having a door jamb having an opening into said chamber and a peripheral flat sealing surface which comprises providing a door having a peripheral sealing edge on the end of a metal member generally normal to said sealing surface and adapted to engage said sealing surface, attaching a high temperature resistant relatively thin deformable sealing means to said door with a portion thereof bearing against said sealing edge, and then moving said door into closed position with said sealing means in tight engagement with said sealing surface and said sealing edge.

9. The method of claim 8 in which said sealing means completely covers said door opening to protect the door from heat.

10. The method of claim 8 in which said sealing means is normally flat and comprises a layer of high temperature resistant insulating material between outer layers of steel foil.

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