United States Patent [19]

Tucker

[11] **3,897,310**

[45] **July 29, 1975**

[54] **COKE OVEN DOOR**

[75] Inventor: **Linwood G. Tucker**, Pittsburgh, Pa.

[73] Assignee: **Koppers Company Inc.**, Pittsburgh, Pa.

[22] Filed: **Mar. 7, 1974**

[21] Appl. No.: **448,960**

[52] **U.S. Cl.** ..... **202/248;** 110/173 R

[51] **Int. Cl.**[2] **C10B 1/06;** C10B 25/06; C10B 25/24

[58] **Field of Search** ..... 202/248, 247; 110/173 R

[56] **References Cited**

UNITED STATES PATENTS

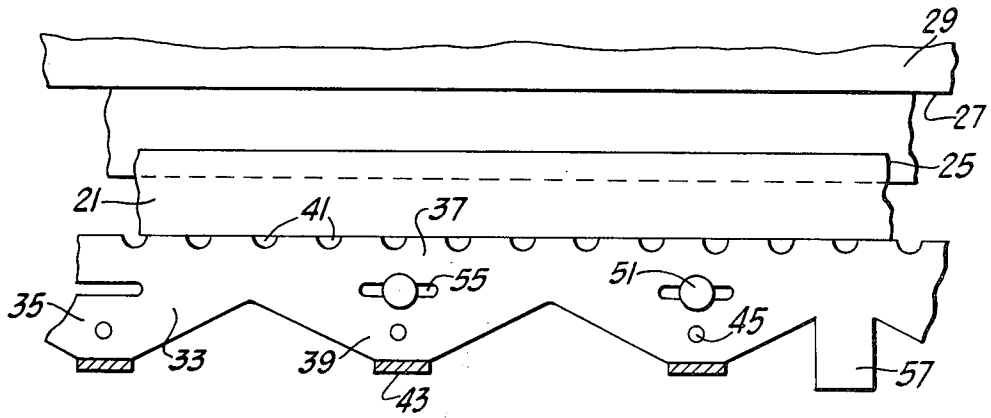
2,007,318	7/1935	Wilhelm	202/248
2,251,541	8/1941	Grasshoff	202/248
2,778,784	1/1957	Otto	202/248
3,785,932	1/1974	Tucker	202/248

Primary Examiner—Norman Yudkoff
Assistant Examiner—Darrell Sanders
Attorney, Agent, or Firm—Sherman H. Barber; Olin E. Williams; Oscar B. Brumback

[57] **ABSTRACT**

A coke oven door frame carrying an edge member and a sealing strip supports latching racks that cooperate with the edge member latching dogs are adjustably mounted to a door jamb. Means is provided to move the latching racks linearly to bring the latching dogs into engagement with the latching racks to urge the sealing strip into sealing engagement with the door jamb.

2 Claims, 5 Drawing Figures



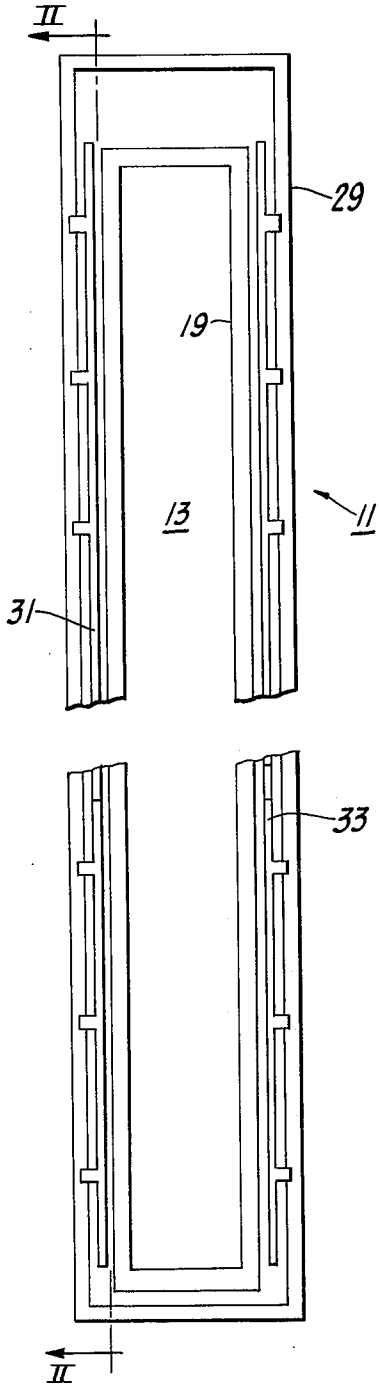


FIG. 1

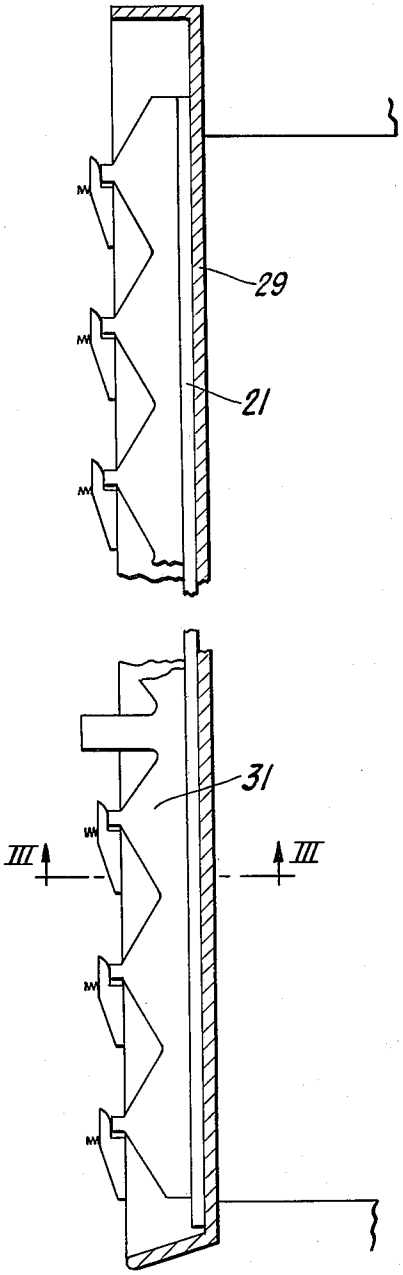


FIG. 2

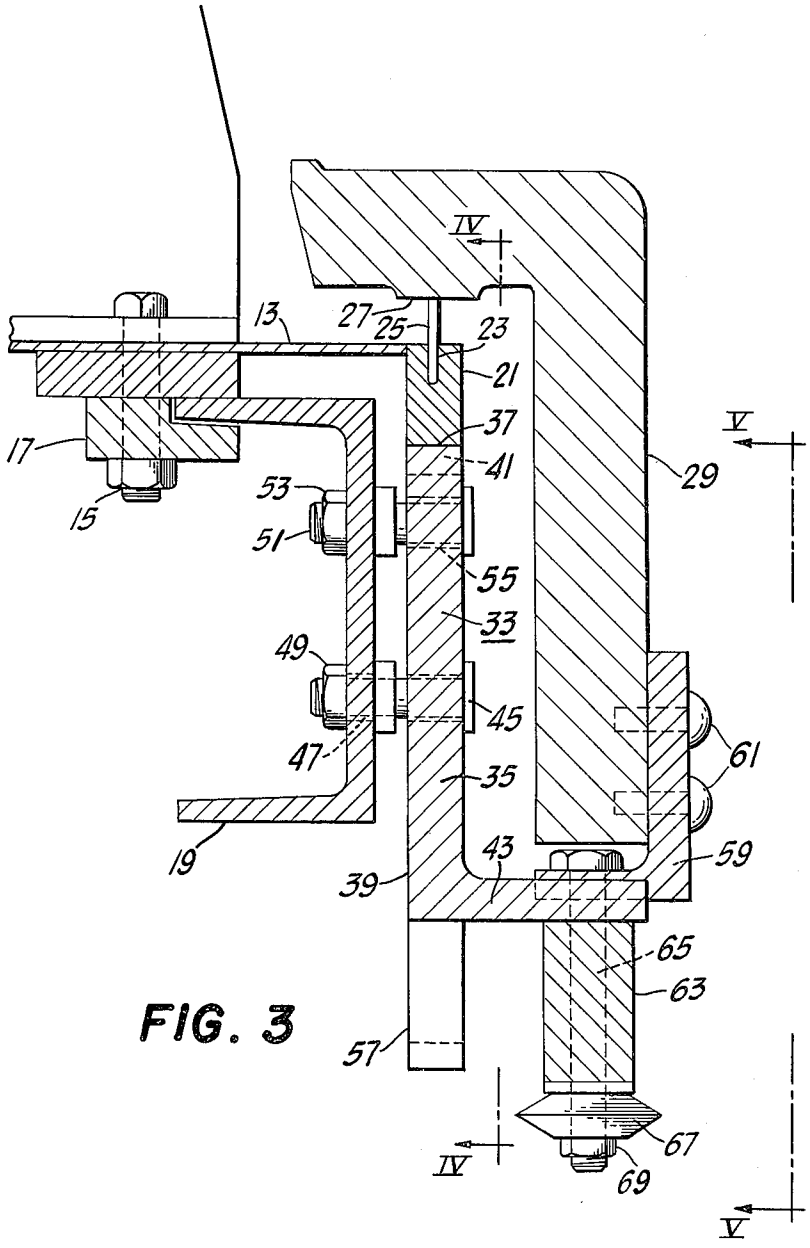

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FIG. 3

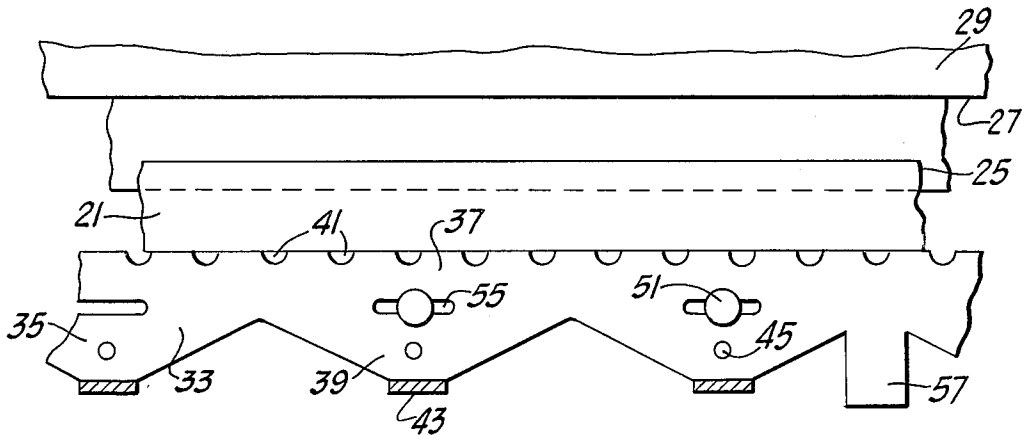

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FIG. 4

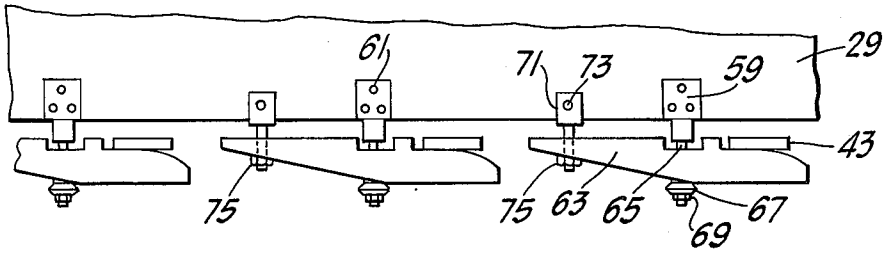

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FIG. 5

COKE OVEN DOOR

BACKGROUND OF THE INVENTION

The present invention relates to coke ovens generally, and, more particularly, to coke oven chamber doors.

There is a trend in the design and construction of coke oven batteries to make them taller than at one time was considered feasible. Coke ovens in modern batteries are twenty feet tall, and some batteries in the design stage are even taller. But, in such tall ovens, the problems of door and door jamb warpage due to thermal conditions is already a very serious problem. In addition to thermal warpage problems, structural deflections of such massive door structures must be taken into consideration. A suitable and practical balance between massive door structures that can resist structural deflection, but that are subject to severe thermal warpage because of their massive size, is difficult to achieve.

It has become evident, too, that coke oven doors installed on future ovens must be entirely and not just practically tight, and free of leakage.

The present invention discloses a coke oven door that, when constructed, would be entirely free of leakage and that embodies the desired balance.

BRIEF SUMMARY OF THE INVENTION

A coke oven door frame carries, along its two longer vertical sides, novel toothed racks. After the coke oven door is placed in position one rack is moved linearly upwardly while the other rack is moved linearly downwardly, so that wedge-faced teeth on the racks contact cooperative latching dog elements on the adjacent door jamb. As the motion continues, the latching dogs urge the racks toward the sealing surface of the door jamb, and they exert a heavy thrust on a back-up bar and sealing strip in contact with the sealing surface of the door jamb.

For a future understanding of the invention and for features and advantages thereof, reference may be made to the following description and the drawing which illustrates a preferred embodiment of equipment in accordance with the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a schematic simplified front view of a coke oven door in accordance with the invention;

FIG. 2 is a view along line II—II of FIG. 1;

FIG. 3 is a view along line III—III of FIG. 2;

FIG. 4 is a view along line IV—IV of FIG. 3; and

FIG. 5 is a view along line V—V of FIG. 3.

DETAILED DESCRIPTION

Referring to FIG. 1, a coke oven door 11 in accordance with the present invention includes a central flat panel or diaphragm 13 (see also FIG. 3) that is secured by bolts 15 and clips 17 to a structural channel door frame 19.

To the central flat panel or diaphragm 13 there is fastened, as by welding, an edge member or back-up bar 21 that extends around the entire perimeter of the diaphragm 13, and that carries in a groove 23 a thin sealing strip 25. The thin sealing strip 25 coacts with a flat sealing surface portion 27 of a door jamb that is suitably mounted in the battery structure as is customary.

The door frame 19, along the two elongate vertical sides, carries latching racks 31, 33, as shown generally in FIG. 2 and more specifically in FIG. 4. The latching rack 31 is shown in FIG. 2 and the latching rack 33 is shown in FIG. 4.

The latching rack 33 comprises an elongate flat bar member 35 that has one straight elongate edge 37 and an opposite saw-tooth shaped edge 39. The straight elongate edge 37 has in it, however, a plurality of notches 41 which are conveniently made, in the present instance, as semi-circular openings, spaced apart at regular intervals; such notches or openings 41 being so constructed that the edges of the opening slope downwardly toward the bottom of the door 11 and allow foreign matter to pass outward.

The saw-tooth shaped edge 39 carries at each crest thereof a horizontally directed member 43 that is disposed generally perpendicular to the flat bar member 35.

The flat bar member 35 carries a plurality of pins 45 that extend through elongate openings 47 in the door frame 19. A suitable nut 49 is threaded onto the pin 45, as shown in FIG. 3. The door frame 19 also carries a plurality of other pins 51, having nuts 53 threaded thereon, that extend through elongate openings 55 in the flat bar member 35. The flat bar member 35 also has a lug 57 which is used to move the latching rack 33 linearly up or down depending upon whether the door 11 is being latched or unlatched.

The door jamb 29 also carries a plurality of angle members 59 that are secured thereto by bolts or screws, or any other suitable type of fasteners 61. To each angle member 59 there is secured an elongate latching dog 63, having a shape about as shown in FIG. 5. The latching dog 63 has a rectangular cross section, as shown in FIG. 3, and a bolt 65 extends through the angle member 59 and the latching dog 63 at about its mid-length point. The free end of the bolt 65 carries a Belleville-type spring 67, or other suitable resilient bias device, and a nut 69, as a means for adjusting the force exerted by the spring 67. The one end portion of the latching dog 63 is rounded, as shown, so as to more readily engage the horizontal member 43 when the latching racks 31, 33 are moved to latch the door 11. The other end portion of the latching dog 63 is also secured to the door jamb 29 by means of a pad 71, bolted or riveted thereto as shown at 73, with a bolt and nut assembly 75 securing it to the end portion of the latching dog 63.

The latching racks 31, 32 are located only on the long vertical sides of the door. Across the top and bottom of the door, a back-up bar 21 in each location would be supported in a normal manner by set screws. The sealing strips 25 would not be rounded at the corners of the door as is customary, but instead, the sealing strips would be like those shown in my co-pending application, Ser. No. 210,704 filed Dec. 22, 1971.

The surface of the end portions of the latching dogs that coact with the horizontal members would have hardened steel inserts or would be case hardened for longer wear in an area where the unit pressure is high and where there is considerable friction every time the door is latched and unlatched.

When the door is to be removed from the coke oven door jamb, the latching racks 31, 33 are moved linearly so as to disengage the latching dogs from the horizontal members 43. Then, when the door is to be relatched

the latching racks **31, 33** are moved linearly in the opposite direction to bring the latching dogs into engagement with the horizontal members **43.** The rounded faces of the latching dogs are in effect arcuate wedges that coact with the horizontal members and that exert an increasing force as they move toward the members. Thus, they urge the latching racks, the back-up bars, and ultimately the sealing strips into a tight sealing engagement with the door jamb sealing surface.

From the foreing description of one embodiment of the invention, those skilled in the art should recognize many important features and advantages of it, among which the following are particularly significant:

That warpage and deflection of the door will not influence the unit load force exerted on the knife edge sealing strip which is great enough to maintain a tight seal with the door jamb;

That the unit load force applied to the sealing strip is not carried through the door frame; wherefore any thermal warpage of the door frame does not affect the seal;

That there is no bending moment force on the door jamb or door frame resulting from the latching pressure;

That the latching dogs can be adjusted readily to increase or to decrease the latching pressure on the sealing strip;

That the sealing strip is supported and pressure thereon is exerted uniformly, which reduces the commonly experienced tendency for the sealing strip to distort between pressure points and lose its effectiveness;

That both the door frame and the diaphragm of the door are bent to the contour of the jamb so that the tendency of the diaphragm to distort is greatly reduced; and

That the door frame can be made more simply since its only function is to carry the diaphragm and the customary door plug.

Although the invention has been described herein with a certain degree of particularity, it is understood that the present disclosure has been made only as an example and that the scope of the invention is defined by what is hereinafter claimed.

What is claimed is:

1. A coke oven door wherein the improvement comprises:

a. a door frame having a diaphragm plate and an edge member carrying a sealing strip that cooperates with a surface of a door jamb and forms a seal therewith when said door is in place;

b. a latching rack engaging said edge member and movably mounted to said door frame;

c. latching dogs resiliently mounted to said door jamb; and

d. means for linearly moving said latching rack into cooperative engagement with said latching dogs and thereby urging said sealing strip into sealing engagement with said surface of said door jamb.

2. A coke oven door wherein the improvement comprises:

a. a door frame having a diaphragm plate and an edge member carrying a sealing strip that cooperates with a surface of a door jamb and forms a seal therewith when said door is in place;

b. a latching rack engaging said edge member and movably mounted to said door frame;

c. means mounting said rack to said door frame in such a manner that said rack is movable linearly with respect to said door frame;

d. latching dogs resiliently mounted to said door jamb and cooperative with said latching rack when said door is in the latched position; and

e. means for moving said latching rack linearly in one direction to engage said dogs with said rack and in the opposite direction to disengage said rack from said dogs, said dogs urging said rack against said sealing strip and creating a seal with said surface of the door jamb when said dogs and rack cooperate.

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