Fig. 3.

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This invention relates to a coke oven door and one object of the invention is to make the closure tight between the frame of a door and margins of the lid of the door when the frame of the oven or the door is more or less deformed because the coke oven has been used for a long time.

Another object of the invention is to make it easy to remove the lid of the door and the door frame of the oven for repairs.

Another object of the invention is to reduce radiation of heat from the outside of the door and thereby make easier the operation of handling the door; to make it easy for the oven door to be attached to the oven; to be able by only one operation to open and close the door, and to increase and reduce the pressure of the body continuously and automatically; and moreover, to make it possible to close the oven by pressing the door to the frame.

The invention is illustrated in the accompanying drawings wherein:

Figure 1 is a front view.

Figure 2 is a view taken longitudinally through Figure 1, portions being shown in section and other portions in side elevation.

Figure 3 is a transverse sectional view taken on the line III—III of Figure 1.

This invention consists of improvements in the construction of a door structure for a coke oven which is indicated in general by the numeral 1 and formed with a tubular door opening 1* bordered by a door frame 2 having side bars 20 and end bars 21. The side bars carry keepers or holders 3 spaced from their upper ends and also carry sets of outwardly projecting hooks 6, one set of hooks being located above the holders 3 and the other set of hooks being spaced upwardly a short distance from the lower ends of the side bars. A passage 25 for water and air is formed through the frame and has an upper inlet 26 and lower outlets 26*.

The door 4 comprises a stiff metal plate or lid 4* which is firmly secured against the outer surface of a hollow plug 4 by bolts 4* and, referring to Figure 3 it will be seen that the plug 4* is of such dimensions that it fits within the chamber opening 1* when the door is closed. Insulation 8 is packed into the door body and along opposite side edge portions of the door plate 4* are angle metal bars 7 which are mounted against the inner surface of the plate and have flanges projecting from the door surface with knife edges which bear against the outer surface of the frame 2 when the door is closed and provide a tight joint between the door and the frame. Rollers 5 are mounted at opposite sides of the door upon ends of a plate 5* and engage with the holders 3 when the door is in closing relation to the frame 2. The numeral 13 designates a rectangular frame formed from a bar of channel metal and having the long side bars 13* to and between which, at the upper and lower ends of the frame, are secured cross bars or bridging bars 20. Each bridging bar has a web portion 20* midway its ends lying in a cleft or slot formed in a bracket 20* which is secured against the door plate by the bolts 11. An elongated opening or slot 18 is formed through the web portion 20* of each bridging bar 20 and accommodates a bolt 21 which passes vertically through the companion bracket 20* and thus permit the door and the bridging bars to have limited motion relative to each other.

A stud 19 projects outwardly from each bridging bar 20 midway its ends and each of these studs passes through a sleeve 23 which is externally threaded and has a wrench engaging head 23* constituting a nut by means of which the sleeve may be turned when necessary. The numerals 22 designate upper and lower clamping bars each of which is formed with a threaded bore to receive the companion sleeve 23 and ends of the clamping bars engage with the hooks 6 which are secured as at 6* to the adjacent sides of the frame 2. When the sleeves are turned by engagement of a wrench with the nuts 23* the clamping bars will be shifted longitudinally of the studs 19 and the clamping bars moved in or out of binding engagement with the hooks. A small nut 24 screwed upon the outer end of each stud holds the threaded sleeve 23 and its head or nut 23* upon the stud. By shifting the sleeves along the studs pressure upon the door will be controlled. Each bracket 20* embodies a pair of spaced ears 10* extending down therefrom, between which extends a bar 9* for engagement by a door lifting hook, designated 10*. These hooks engage about bars or rods 9 extending between and carried by legs of the frame 13 and extending across the door.

Pressure upon the door to form a tight joint between the flanges 7 and the frame 13 is applied by spring loaded means carried by the frame 13 and spaced from each other in the longitudinal direction of the frame which connects the side bars 13* and along the transverse bottom part of the frame.

Each of the spring loaded means is formed as shown in Figures 2 and 3 and upon reference to Figure 3 it will be seen that each such means comprises a casing 14 rigidly mounted in and across the channel of the channel bar of which the frame 2 is formed and each casing is open along its outer side as shown both in Figure 2 and Figure 3. A plunger 15 is slidably mounted in the casing 14 and is connected with a guide 14* at the inner side of the casing and this plunger is threaded for a portion of its length and carries a plate or washer 17 which thereby is shiftable along the plunger. A helical spring 15b about the plunger 15 has one end bearing against the outer side of the casing 14 and its other end engaging the washer 17 and by turning the washer to move it along the plunger tension of the spring may be adjusted. When the door is in a closed position and the clamping bars 22 are each engaged with the hooks 6, the nut or sleeve 23 is turned to offset binding grip between ends of a bar 20. The hooks engaged by it and the door will be shifted inwardly of the door opening 1* and edges of the flanges 7 will be pressed tightly against the frame 2 by the plungers 16 by the springs 15 which are compressed and maintained under tension as shown in Figure 3.

The door 4 terminates at its top in downwardly spaced relation to the upper end of the door frame 2 and through this space is disposed the hollow casing or frame 27 of a leveling device, the casing being surrounded by a flange 27* which is firmly secured to the adjacent top portion of the plate 4a. The casing 27 has its outer end closed by a plate or door 31 across which extends a rocker bar 28 having an upper end pivotally mounted about a shaft or rod 29 and having a lower end portion formed with a sloping portion 30. The door 31 is connected with the bar 28 by a bolt 32. Ears 33 and 34 are carried by the door 31 and through these ears are mounted
the walls of the slot 18 engage the bolt 21 on account of the advance of the holder 20, and the force of the springs 15 will be ineffective and the bar 22 can be rotated by hand. Therefore, when some trouble arises, it is unnecessary to prepare installations in order to make repairs on a large scale.

As the entrances or ports 26 and 26a are at the upper and lower ends of the frame 2, after the insulation 8 has been closed, and if the lid 4, the passage 25 in the frame 2 constitutes the passage for air or water. When the air is removed from passage 25, the heat in the oven is less radiated, and repair operations outside the oven will be easy to do, and yet, as the frame is cooled by passing air and water through the passage 25 this improved construction does not have the defect of releasing the connection of the frame 2 from the flange 7 when the frame 2 is deformed.

Still, as the rollers 5 are installed at the right and left side edges of the lid 4 and the lid is hung, after the rollers 5 are inserted in the projection 3 of the frame 2 of the door, the lid 4 can be easily inserted and it will be held in cooperation with the frame 2.

Moreover, both the increase and decrease of pressure and the opening and shutting of the door 31 can be done by only one operation, and yet closing of the oven can be done easily and accurately pressed against the frame 27 of the leveling-door.

Having thus described about my invention, what I claim as new is:

1. A coke oven door structure comprising a first door frame, a door disposed in front of and covering the opening defined by the frame, hooks connected to opposite sides of the frame and adapted to extend outwardly therefrom, a second frame disposed in front of said door between said hooks, bridging bars disposed horizontally within the second frame, said door embodying a plate and bonding flanges about the perimeter thereof, the flanges bearing against opposite surfaces of the first frame, forwardly projecting brackets secured to the front of the door, each bracket having a forwardly opening slot loosely receiving a portion of a bridging bar whereby the second frame and bridging bars are freely detachably joined and supported by the door, clamping cross bars each disposed across the second frame in front of a bridging bar and formed intermediate its ends with a threaded opening, a nut carrying sleeve threaded in each threaded opening and having a portion bearing upwardly on the side of the clamping bar remote from the bridging bar, a stud extending from each bridging bar through the adjacent sleeve for rotation of the sleeve thereon, a removable bolt coupling each bracket and the received portion of the adjacent bridging bar, the bolt coupled bracket and bridging bar being relatively movable, and a plurality of spring loaded pins supported by and around the second frame and pressed against the door around and adjacent to the perimeter of the latter, the movable relationship of the bracket and bridging bar permitting the second frame to move upon rotation of the threaded sleeves in one direction on the studs.

2. The invention according to claim 1 with a multiplicity of housings supported by the second frame for enclosing said spring loaded pins, each of the spring loaded pins embodying a coil spring encased in a housing and a thrust pin supported by opposite ends of the housing for axial movement therein, the encased spring in each housing bearing at one end against an end wall of the housing remote from the adjacent door and bearing at its opposite end against a washer encircling and threaded on the thrust pin, said thrust pins being formed at their outer ends to facilitate rotation whereby to effect movement of the threaded washer thereon for altering the tension of the spring.

3. The invention according to claim 1, with a pair of oppositely positioned rollers carried upon the outer sides
of the second frame to turn about a common axis extending transversely of the frame and supporting holders carried by the first frame in position to have said rollers rest thereon when the door structure is in operative position.

4. The invention according to claim 1, with depending spaced ears carried by each bracket and a lift bar mounted horizontally between each pair of ears and adapted to be engaged by lifting mechanism.

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