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2,085,775

DOOR FOR HORIZONTAL CHAMBER OVENS FOR THE PRODUCTION OF GAS AND COKE

Filed Sept. 23, 1935

2 Sheets-Sheet 1

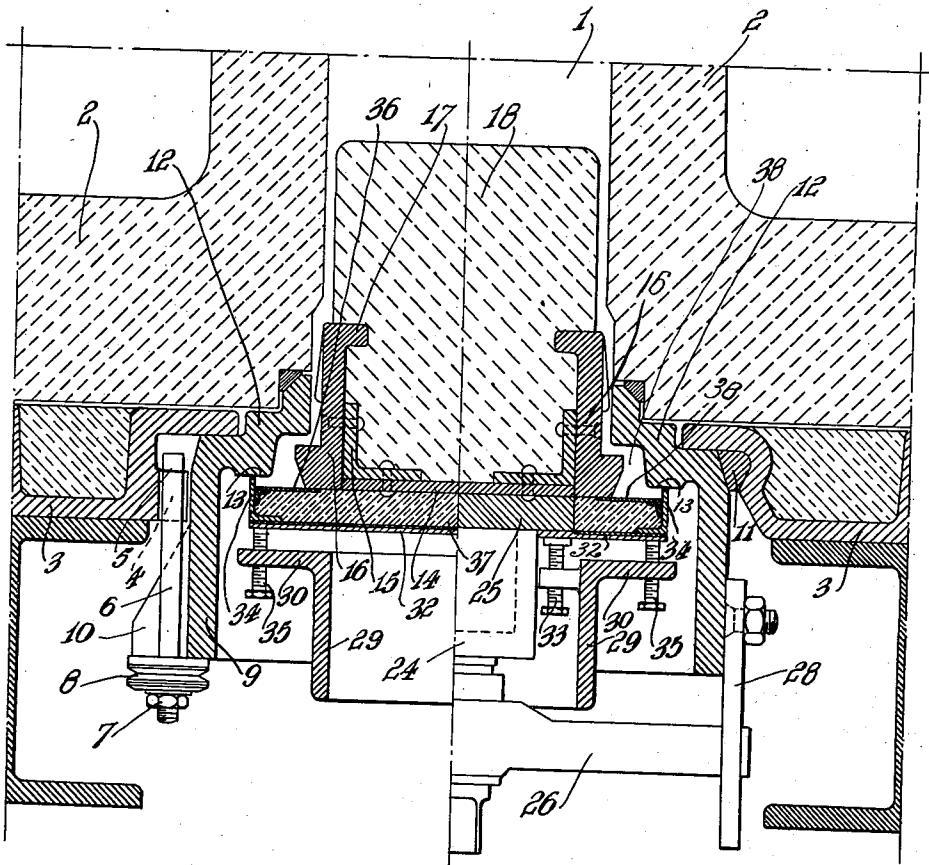


Fig. 1.

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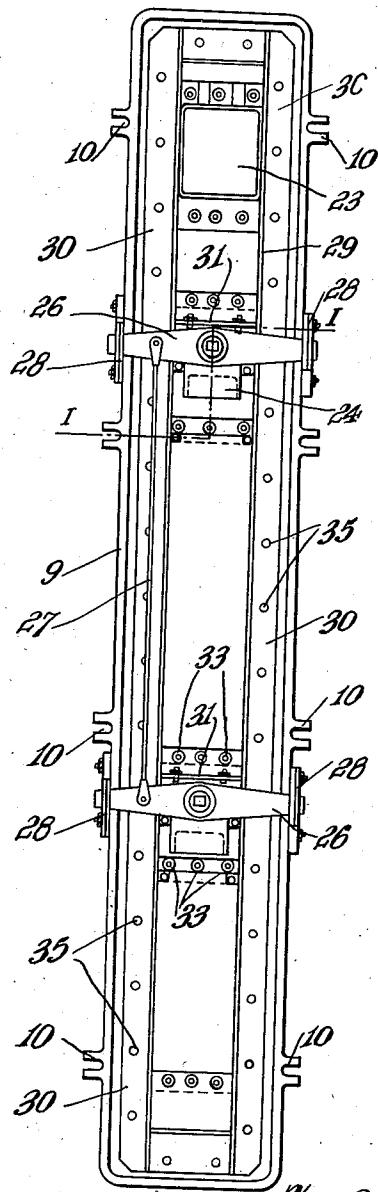
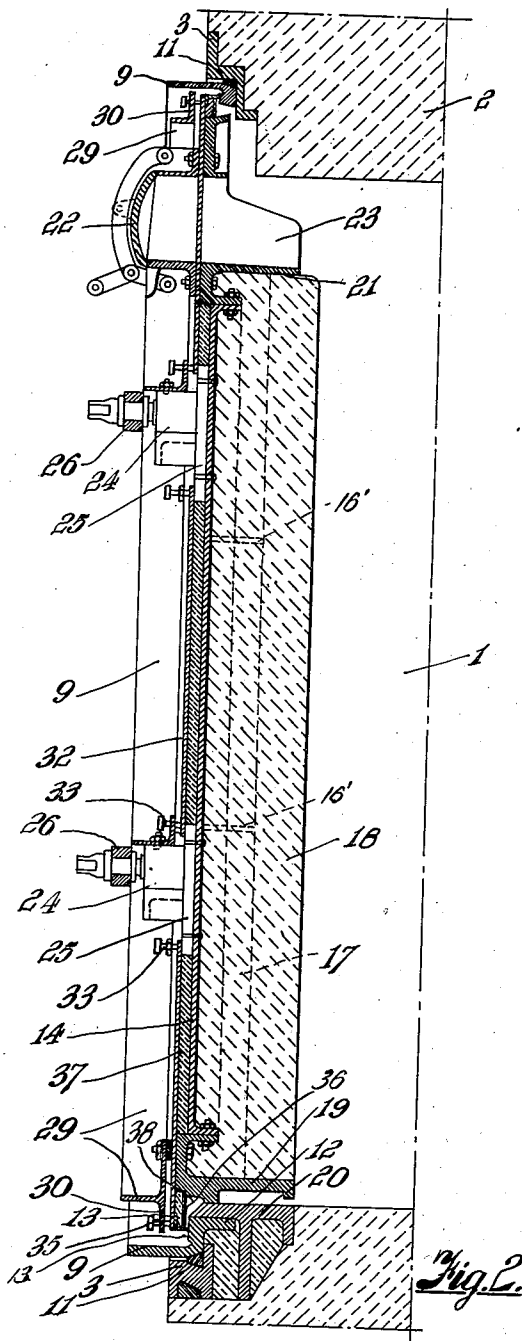
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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DOOR FOR HORIZONTAL CHAMBER OVENS
FOR THE PRODUCTION OF GAS AND COKE

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5 Claims. (Cl. 202—248)

The invention relates to doors serving to close the lateral openings of horizontal chamber ovens for the production of gas and coke and in particular to doors which are packed by means of a metal frame, connected with the rigid door body by means of an elastic metal diaphragm, which is pressed against the door frame.

In order to pack the chamber opening securely by means of the door it is necessary that the packing frame, preferably provided with a bevelled front edge, is pressed firmly against the front side of the door frame and abuts tightly against the door frame over its entire circumference. As the door frame is never completely level and often becomes warped after a certain operative period the packing frame of the door must be constructed in such a way that it can easily be brought into a shape which corresponds to the existing course of the face of the door frame. In order to make the packing frame adjustable against the rigid door body without influencing the tightness of the door it has been proposed to connect the packing frame with the door by means of an elastic metal diaphragm of thin sheet metal.

In certain doors constructed with such a metal diaphragm the diaphragm has been cut out in the form of a frame but has the disadvantage that the packing of the diaphragm on the door body is not permanent and is produced with difficulty.

It has in addition been proposed to use, instead of a frame diaphragm, a sheet metal flap to connect the packing frame with the door body. The sheet metal plate was thus fastened firmly outside on the door body. This latter suggestion has not been able to be carried out as the sheet metal plate often warps on account of the unavoidable heat during operation and finally breaks where the sheet metal plate is fixed to the door body.

The object of the present invention is to provide improvements in the doors used for horizontal chamber coke ovens which exhibit a packing frame connected with the rigid door body by means of an elastic metal diaphragm, so that a permanent and also completely tight connection is produced between the movable packing frame and the door body.

For this purpose according to my invention, I provide on the coke oven door for connecting the packing frame with the rigid door body an elastic sheet metal flap extending over the whole door, which is firmly connected on the edge with the said packing frame and which is movably fixed to the door body, and in addition, in the

intermediate space between the door body of the sheet metal plate, a layer of an insulating material which is a bad conductor of heat, so that the sheet metal plate is protected against the action of heat from the coking chamber. I will now explain the purpose of my present invention more particularly by means of the accompanying drawings in which:—

Fig. 1 is a horizontal cross-sectional view taken on the line I—I of the coke oven door shown in Fig. 3 and constructed in accordance with the invention

Fig. 2 shows a vertical section through the door according to Fig. 1 and

Fig. 3 is a front elevation of the door.

On the drawings 1 indicates the coke oven chamber, whose lateral opening is closed by the door. The coke oven chamber 1 is built of fire-proof brickwork 2 which is covered on the outside by a metal casing 3.

About the door opening the casing 3 has projections 4 behind which heads 5 of fixing screws 6 are placed. The nuts 7 are provided on the screws 6 which with the assistance of the plate springs 8 serve to fasten the door frame 9, preferably made of cast iron, to the brick work casing 3. The door frame has for this purpose on the circumference a row of fork shaped projections 10, (as can be seen from Fig. 3) in which the screws 6 are arranged. The joint between the door frame and the casing 3 is packed by means of an asbestos band 11 or the like.

The door frame 9 has in conformity with the door opening a projecting part 12, on the outside of which a flat surrounding seating surface 13 is provided. The door itself is comprised of an inner plug-section, an outer rigid frame-section, and an interposed flexible sheet-metal plate-section. The inner plug-section is formed of a metal backing plate 14 which is firmly connected with the angle irons 15 to side frame parts 16 which latter are preferably sub-divided as indicated in dotted lines at 16' in Fig. 2. The frame 16 has at the end inwardly directed edge projections 17 all of which serve to hold the fire-brick inner lining 18 of the door. The lining 18 projects into the chamber 1 and protects the metal parts of the door against the action of the heat of the coking chamber.

The door plate 14 is substantially coextensive with the whole of the brick lining and carries underneath, the foot part 19 with which the door is supported in the closed position of the base part 20 of the door frame 9.

On the top of the door plate 14 a box-like

extension 21 is provided which has an opening 23, closable by means of the cover 22, for insertion and removal of the levelling bar which levels the chamber charge. The levelling bar is not illustrated in the drawings.

Two pedestal bearings 24 are provided on the outside of the door plate 14 for the door-machine grips for opening and closing the door. The pedestal bearings 24 have a circumferentially projecting base plate 25. In addition they each carry on the outside a rotatable cross bar 26 which are hingedly connected with each other by means of a link bar 27 so that they can be operated simultaneously. The cross bars 26 are placed behind hooks 28, fixed on the door frame when the door is in the closed position.

The pedestal bearings 24 support a built-up rigid outer metal frame-section comprising individual angular shapes in which the sides are formed as an angle iron frame 29 whose side 30 circumferentially follows the contour of the door as clearly shown in Fig. 3. The frame 29 is connected with the pedestal supports 24 by cross-connecting angular structural shapes as by means of bars 31.

Between the frame 29 and the door plate there is arranged a packing plate or frame 32 in the form of a diaphragm which is interposed between the inner-section and the outer-section of the door, is carried by the inner-section, and covers the whole of the doorway and consists of fine sheet metal or any other suitable elastic metal diaphragm. Only in the region of the pedestal supports 24 and the case like extensions 21 in which the levelling bar opening is provided, has the plate 32 cut out portions. The plate 32 is fixed by clamping to the base plate 25 on the pedestal supports 24 by means of the clamping screws 33 which are provided on the cross bars and projections of the frame 29 forming a part of the outer rigid frame-section of the door. The cut out portions of the diaphragm plate 32 and the pressure which the clamping screws 33 exert are selected in such a way that a restricted relative movement of the margin of the diaphragm plate is possible with respect to the door frame 9 and the inner-section of the door. On this account the diaphragm plate can be tightened or loosened by the pressure screws 33 to determine the degree of tautness with which the plate is held on the door body allowing for some yielding of the diaphragm plate 32 under pressure screws 35 so that warping of the diaphragm is avoided.

The diaphragm plate or packing frame 32 carries on the marginal edge a packing blade in the form of a closed angle iron frame 34 whose front edge, which is preferably bevelled, lies in reach of the packing seating surface 13 of the door frame 9 when the door is in closed position, as can be seen from Figures 1 and 2. This frame 34 is pressed firmly against the packing seating surface 13 in order to pack the door for metal-to-metal self sealing. In order to keep the frame 34 tightly against the seating surface 13 on the entire circumference of the door frame, even if the packing seating surface 13 is not completely level, a row of adjusting screws 35 are provided on the frame 29 on the door within the region of the packing frame 34. With the help of these fixing screws the restricted elastic frame 34 can be brought into such a shape that its bevelled edge accurately follows the packing seating surface 13. On account of this a very efficient packing of the door opening is produced, and furthermore, in the

practical use of the door during the coking of a chamber charge of coal, tarry constituents often condense on the packing edge or bevelled packing seating surface 13 of the door frame and close up the small cracks, which are only the fraction of a millimetre in width.

As can be seen from Figs. 1 and 2 the packing frame 34 supports on the inside a flexible tongue 36 whose inner free end rests on the plug-section framework 16, 21 and 19 in the region of the door plate 14. This tongue closes the intermediate space between the region of the door plate 14 and the diaphragm plate 32 so that a poor heat-conducting material, for example an asbestos packing, can be arranged in this intermediate space, as shown at 37. The asbestos packing protects the diaphragm 32, which is important for the tight fitting of the door, from the heat of the coking chamber and increases the life of the diaphragm.

It should also be mentioned that the door constructed according to the invention can be provided with the usual clay packing instead of a metal packing. For this purpose the junction 38 between the part 16 of the door and the door frame 9, as can be seen from Fig. 1, is made in the shape of a wedge. If the door is to be provided with a clay packing the frame 29 and the diaphragm plate 32 are taken from the door. The junction 38 is then free and the packing clay can be placed in this junction.

I have described my invention above with reference to one form of construction but without limiting the invention to that described. The invention may furthermore be varied as desired within the scope the following claims.

I claim:—

1. A self-sealing door for coke-oven chambers comprising an inner plug-section, an outer rigid frame-section and an intermediate flexible sheet-metal plate-section; the inner plug-section comprising a metal backing plate firmly connected with a liner retainer for refractory liner brick and substantially coextensive with the whole of the liner brick, a foot part for supporting the door in the chamber, and door securing pedestal bearings firmly secured to said backing plate; said outer rigid frame-section being secured to and carried by the pedestal supports and said intermediate flexible plate-section being mounted on and carried by the inner plug-section; said intermediate plate-section being in the form of a continuous diaphragm extending over the whole area of the door and terminating at its margins in an inwardly extending metallic sealing edge; said diaphragm plate being fixed on the inner-section by securing means arranged on parts of the outer frame-section but only in the region of the vertically extending middle area of the diaphragm plate remote from margins and with the securing means confined to restricted zones which are remote from each other vertically along the diaphragm and said diaphragm being thereby held in spaced relation from the outer rigid frame-section for dissipation of the marginal bending strains throughout the same, and adjusting screws on the outer frame section in the region of the marginal edges of the diaphragm for adjusting the sealing edge.

2. A door as claimed in claim 1, and in which the diaphragm is provided with cut-out portions through which devices project including the pedestal bearings and in which the restricted zones for the securing means are limited to the margins of the cut-out portions and also to a

zone near the upper and a zone near the lower ends of the diaphragm.

3. A door as claimed in claim 1, and in which the diaphragm is provided with cut-out portions through which devices project including the pedestal bearings, and in which the securing means are clamping screws, and in which the restricted zones for the securing means are limited to the margins of the cut-out portions and also to a zone near the upper and a zone near the lower ends of the diaphragm.

4. A door as claimed in claim 1, and in which

the entire diaphragm is arranged at a distance from the backing plate, and a thick filling of heat insulating material is provided in such space, said thickness being several times as thick as the thickness of the diaphragm or the thickness of the backing plate.

5. A door as claimed in claim 1, and in which the liner retainer comprises liner brick retaining sections vertically arranged on opposite sides of the door and connected with the backing plate by angle irons.

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