May 29, 1923. 1,456,649

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LEDGE PLATE AND WATER BOX MOUNTING FOR FURNACES

Filed July 25, 1921 2 Sheets-Sheet 1

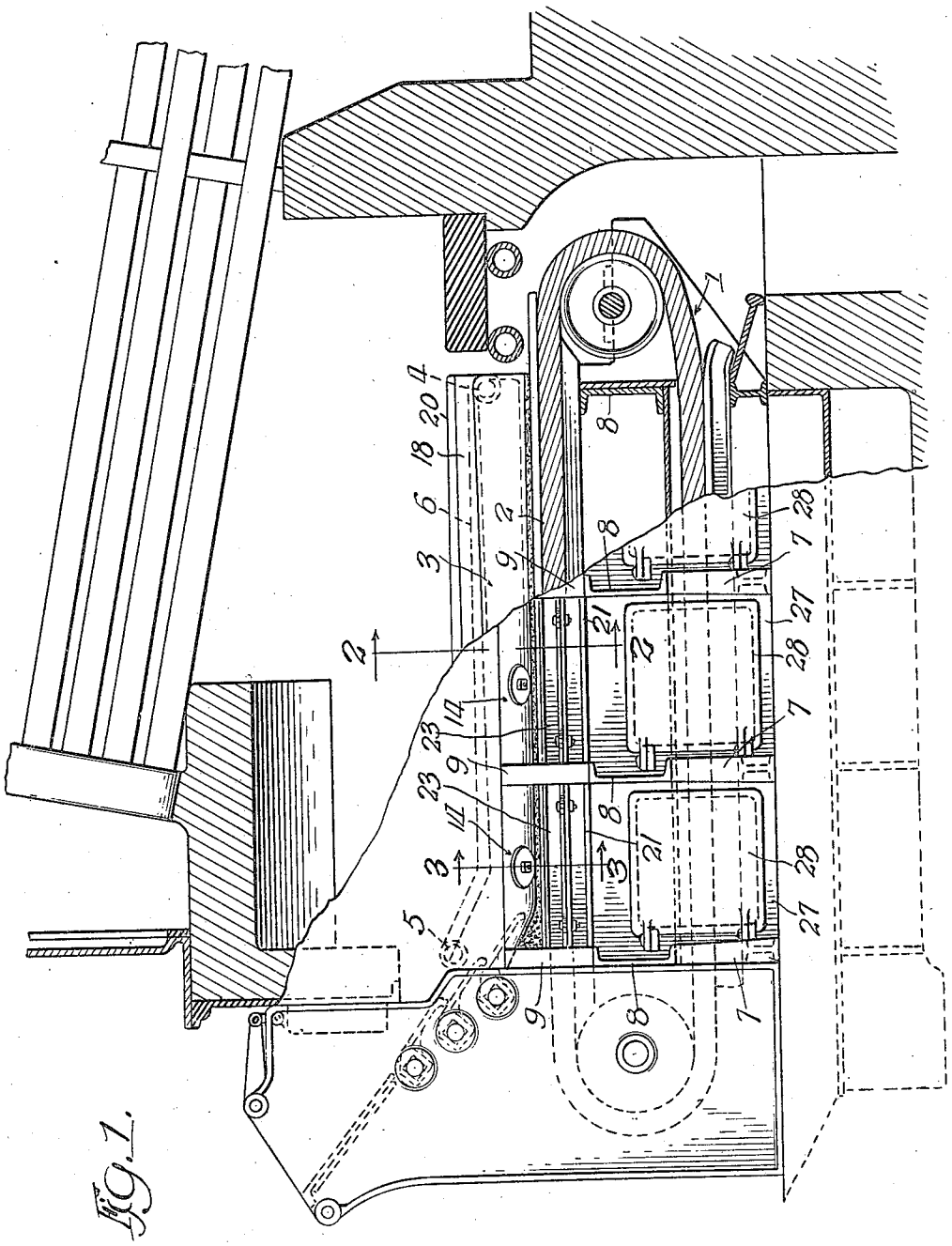


FIG. 1.

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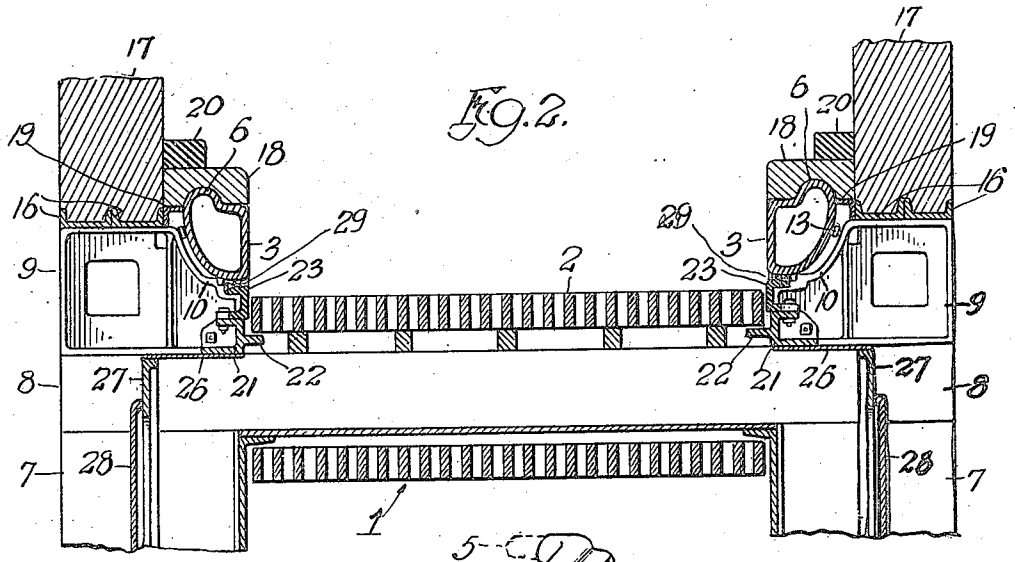



Fig. 2.

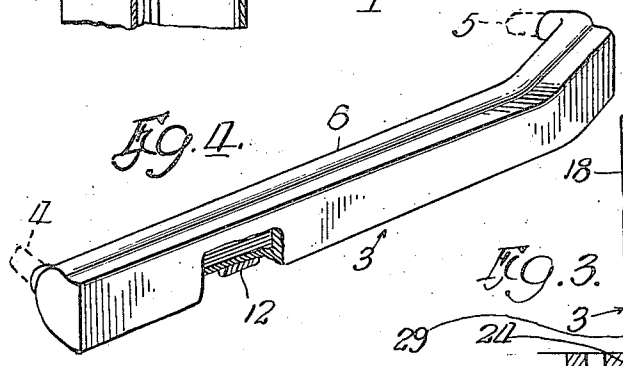



Fig. 4.

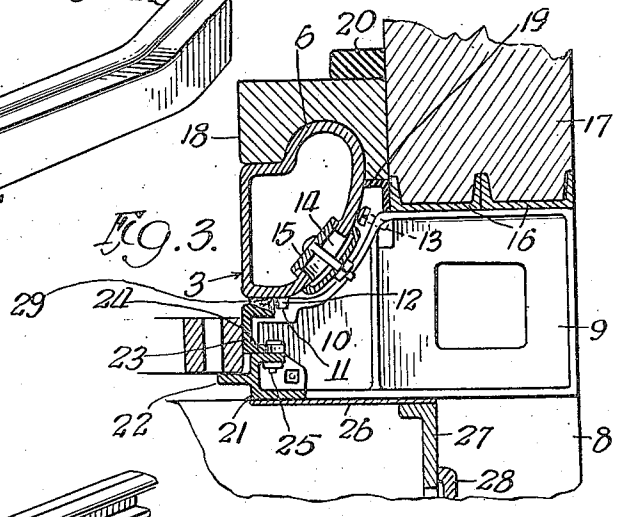



Fig. 3.

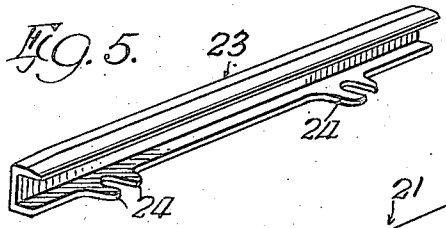



Fig. 5.

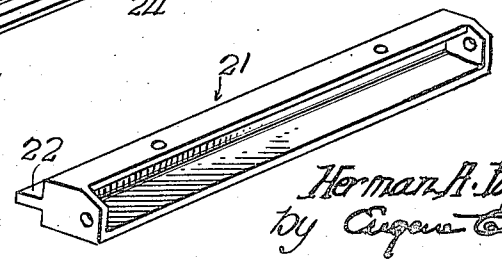



Fig. 6.

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# UNITED STATES PATENT OFFICE.

HERMAN A. POPPENHUSEN, OF HAMMOND, INDIANA, ASSIGNOR TO GREEN ENGINEERING COMPANY, OF EAST CHICAGO, INDIANA, A CORPORATION OF ILLINOIS.

## LEDGE PLATE AND WATER-BOX MOUNTING FOR FURNACES.

Application filed July 25, 1921. Serial No. 487,242.

*To all whom it may concern:*

Be it known that I, HERMAN A. POPPENHUSEN, a citizen of the United States, residing at Hammond, in the county of Lake and State of Indiana, have invented new and useful Improvements in Ledge Plate and Water-Box Mountings for Furnaces, of which the following is a specification.

This invention relates to furnaces and more particularly to water box and ledge plate mountings therefor.

One object of my invention is to provide the side walls of the furnace setting with means or openings whereby the water boxes and ledge plates at the sides of the grate may be reached through said walls for cleaning or repairing the water boxes and adjusting the ledge plates, respectively, from the exterior of said walls and thus avoid crawling into the combustion chamber for such purposes. A further object of the invention is to locate the water boxes entirely inside of said walls so that the weight of the latter is not on the boxes, and thus permit the boxes to be installed and removed without tearing down or in any way disturbing said walls. Another object of the invention is to support the boxes from said walls and provide means permitting the boxes to expand and contract lengthwise as the temperature thereof varies with respect to the supporting means and said walls.

Other and further objects of my invention will appear from the following specification taken in connection with the accompanying drawings, in which—

Fig. 1 is a side elevational view with parts in section of a furnace provided with a chain grate stoker and equipped with ledge plate and water box mountings constructed in accordance with my invention;

Fig. 2 is a vertical transverse sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a vertical sectional view taken through one of the water boxes on line 3—3 of Fig. 1;

Fig. 4 is a perspective view of one of the water boxes;

Fig. 5 is a perspective view of one of the ledge plates; and

Fig. 6 is a perspective view of the ledge plate supporting member.

In the drawings, 1 indicates a chain grate stoker actuated by the usual sprocket wheels at the ends of the stoker and having an upper lead 2 for supporting the fuel bed in a layer and for carrying the same through the combustion chamber of the furnace from the front to the rear end thereof, where the consumed fuel is discharged into the ash pit over the rear end of the stoker.

At each side of the upper lead 2 is an elongated box 3 having an inlet opening 4 at one end and an outlet opening 5 at the opposite end, so that water or other cooling fluid may be circulated through the box to maintain the same relatively cool for preventing adherence of the fuel bed thereto, the boxes lying in direct contact with the fuel bed at the sides of the grate, as shown. The water boxes may be connected with the boiler circulation if desired.

The top wall of each box is provided with an enlarged portion 6 extending lengthwise thereof and tapering from the inlet end 4 to the outlet end 5, the taper being greater at the latter end. This forms a steam collecting chamber along the upper wall of the box to permit the escape of steam likely to be created in the box by the heat of the fuel bed against the same, and the outlet being in direct communication with the steam chamber to carry off any steam generated in the box. This feature forms the subject-matter of my co-pending application Serial No. 346,473, filed December 22, 1919.

For supporting the boxes 3, 3 in position, I provide the following construction. At each side of the stoker there are a plurality of upright stools 7, 7, laterally spaced apart and secured to the foundation of the furnace setting. Resting on and secured to such stool is an upright channel member 8. All the channel members have the same height and terminate at the upper ends in the same horizontal plane. Seated on and secured to each channel 8 is an upright chair 9 having a length to extend across the channel, as shown in Figs. 2 and 3. Each chair 9 has an inner curved flange 10 forming a concave seat for the associated water box 3, as shown in Figs. 2 and 3. In the base of this flange 10 is provided a key slot 11 to receive a key 12 on the bottom wall of the water box. In the structure shown in the drawings, each water box 3 is provided with as many keys as there are chairs 9, instead of having the key extended the full length of the water box, which could be done if desired. This construction permits the

water boxes to move endwise across the chairs 9 in the expansion and contraction of the boxes as they heat when the furnace is in operation and cool off when the furnace is shut down. To maintain the inner vertical wall of the water boxes in proper upright position, I provide at each chair a set screw 13 to bear against the curved outside wall of the boxes for that purpose. Each box 3 is provided in this outside wall with a plurality of holes 14 closed by hand hole covers 15. This permits access to be had into the water boxes for cleaning and such other purposes as may be desired.

Arranged above and supported by the chairs 9 are channel members 16, which extend transversely of the chairs and support the brick or masonry work 17, which constitutes that portion of the side wall of the furnace setting above the structure therebelow. Resting on the top wall of each water box 3 are a plurality of fire bricks 18, which have their under surfaces formed to receive the steam collecting chamber 6 of the water box. These bricks shield or protect the vapor collecting chambers from the direct action of the heat of the fuel bed on the grate. They also extend down around the curved back wall of the box and there rest on a supporting angle member 19 secured to the adjacent channel member 16, as shown in Fig. 2. An additional set of bricks 20 are placed on each row of bricks 18 and against the side wall 17 of the furnace setting, as shown in the drawings.

Extending between the several chairs 9 are members 21 riveted at their ends to the chairs between which they extend. Each member 21 has a flange 22 extending into the combustion chamber and below the upper lead 2 of the chain grate. The upper lead 2 rests on these flanges 21 and the latter form a support therefor. At each side of the upper lead 2 is a ledge plate 23 made substantially channel shape in cross-section and having a length to extend the full length of the side margin of the grate. The ledge plates 23 are supported by the several chairs 9 and are adjustably secured to the members 21 so that said plates may be adjusted toward and from the grate 1 for gaining sufficient contact with the side edges of the upper lead 2 of the grate to provide air seals at such points. The form of structure shown in the drawings, permitting the ledge plates to be adjusted, comprises bifurcated lugs 24 on the ledge plates engaging bolts 25 on the member 21.

Horizontal plates 26, 26 extend between the angle members 8, 8 at the sides of the structure and close the spaces between the bars 21 and the vertical door plates 27, to be hereinafter mentioned. The plates 26 are secured to and rest on the upper edges of the angle members 8, 8 and extend beneath the bases of the chairs 9. These plates 26, 26 prevent cool air being drawn into the furnace between the door plates 27 and the bars 21.

From the structure described, it will be observed that the ledge plates 23 may be reached from the exterior of the side walls of the furnace setting through the openings or spaces provided between the several chairs 9, and thus the ledge plates may be adjusted after the chain grate stoker is in place to fit properly against the side edges of the same. Any variations likely to be caused in the operation of the stoker, due to the heat of the fuel bed on the same, can also be accommodated for by adjusting the ledge plates 23 and thus properly maintain an air seal at the sides of the stoker chain. This can all be accomplished from the exterior of the furnace by having access to the ledge plates between the chairs 9, and thus avoid crawling into the combustion chamber of the furnace for this purpose or taking down the stoker structure or in any way disturbing the furnace setting because the ledge plates are readily accessible from the exterior of the side walls of the combustion chamber. These spaces also enable access to be had to the boxes 3, 3 through the furnace walls from the exterior thereof.

In having the boxes 3, 3 mounted inside of the side walls 17 of the furnace setting, the weight of such walls is not on the boxes. Furthermore, the boxes being inside of said walls and supported by the chairs in the manner described, permits the boxes to expand and contract with respect to said walls and said chairs without disturbing the position of the boxes or injuring said walls.

In the form of furnace structure illustrated, the spaces between the stools and angle members 8 are closed by plates 27 having draft openings with hinged doors 28. The spaces between the boxes and the ledge plates are closed or sealed by suitable material, as ganister 29.

While I have shown and described herein in detail a water box and ledge plate mounting for furnaces, yet it is to be of course understood that the various details of construction and arrangement of parts may be variously changed and modified without departing from the spirit and scope of my invention.

I claim as my invention:

1. In a furnace, the combination with a combustion chamber and a grate therein, of a water box extending along one side of the grate and lying in direct contact with the fuel bed thereon, said box being located inside of the adjacent side wall of the combustion chamber and having inlet and outlet openings, a plurality of laterally spaced chairs supported by said side wall and extending under the water box for supporting

the same, said box and said chairs having a key and slot connection permitting the box to expand and contract endwise with respect to said chairs and said side wall, said box having clean-out openings in the spaces between said chairs so that access may be had thereto through said wall from the exterior thereof.

2. In a furnace, the combination with a combustion chamber and a grate therein, of a water box extending along one side of the grate and lying in direct contact with the fuel bed thereon, said box being located inside of said side wall and having inlet and outlet openings, said box being provided in its top wall with an enlarged portion forming a vapor collecting chamber communicating with said outlet, a plurality of laterally spaced chairs supported by said side wall and extending beneath said box for supporting the same, said box and chairs having a connection permitting the box to expand and contract lengthwise with respect to said chairs and said side wall, and means supported by said box and said side wall and extending in front of said enlarged portion to shield the same from the direct heat of the fuel bed.

3. In a furnace, the combination with a combustion chamber and a grate therein, of a water box located in said combustion chamber and having inlet and outlet openings, said box extending along one of the side edges of the grate and lying in direct contact with the fuel bed thereon, said box being located inside of said wall, a plurality of laterally spaced chairs supported by said side wall and extending beneath said box for supporting the same, said box having in its top wall an enlarged portion offset rearwardly from that wall of the box in contact with the fuel bed and forming a vapor collecting chamber in communication with said outlet, a member located above said chairs and interposed between said side wall and said box and extending toward the latter, a plurality of fire bricks resting on the top wall of said box and extending over and in front of said enlarged portion to shield the same from the direct heat of the fuel bed, said bricks being supported in part by said box and said member.

In testimony that I claim the foregoing as my invention, I affix my signature this 22nd day of July, A. D. 1921.

HERMAN A. POPPENHUSEN.