It is the object of our invention, broadly considered, to increase the life of the lining of the combustion chamber in a boiler. The most rapid deterioration in the furnace lining takes place at the sides of the furnace at and just above the fire level. To prevent the rapid deterioration which occurs at this place, we form the furnace lining at and above the fire level of a series of hollow blocks providing a continuous air passage within the furnace wall, through which passage we force a continuous stream of air which lowers the temperature of the furnace lining and decreases deterioration.

The accompanying drawing illustrates our invention: Fig. 1 is a fragmental vertical section through the boiler furnace showing somewhat diagrammatically details of the stoker mechanism and means for forcing draft air to the ash pit and cooling air through the wall passages; Fig. 2 is a horizontal section through an air passage in one of the furnace walls; Fig. 3 is an end elevation of one of the hollow blocks with parts thereof broken away to show the construction more clearly; Fig. 4 is a perspective view of two of the hollow blocks in superposed relation; and Fig. 5 is a perspective view of one of the cover plates used to cover the opening in the inner wall of the blocks.

The furnace shown in the drawing has an automatic stoker 10 which discharges on to the grate 11. Below the grate 11 there is a compartment 12 which receives draft air from a blower 13 through a conduit 14. The conduit 14 is provided with a damper 15 by means of which the rate of air flow through it may be controlled. Our invention is not directly concerned with any of the features just mentioned, as such features or equivalents of them can be found in many prior structures.

In carrying out our invention, we set in the inner surface of the furnace lining at and above the fire level a plurality of hollow blocks or boxes 20 which are desirably iron castings. Each of these blocks is open at its ends and closed at the top and bottom. The inner sides of the box are provided with openings 21, and the opposite or outer sides are closed. For each of the openings 21 there is provided a cover 22 which has on its rear face two ears 23 and 24 that are adapted to engage respectively the bottom and top edges of the associated openings 21 to retain the cover in place, as is clear from Fig. 3. The outer face of each of the covers 22 may be recessed, and the recesses may be filled with refractory material if desired.

In Fig. 3, the cover 22 is shown in place on the box 20. To remove the cover, it is raised to permit disengagement of the ear 23 of the lower edge of the openings 21, and the bottom of the cover is then swung outwardly until the ear 23 clears the openings 21. Thereupon, the cover may be lowered to disengage the ear 24 from the upper edges of the openings 21.

Desirably, there are provided on the rear face of each of the covers 22, a plurality of heat-radiating fins 25 which extend outwardly into the passage through the hollow box 20. Extending between the top and bottom of each of the boxes 20, we may provide struts 26 which serve as strengthening members and which, in addition, may be inclined to draw the air passing through the interior of the boxes against the fins 25, as is clear from Fig. 2.

When used in a furnace having an inclined grate, the top and bottom of each box 20 may be stepped, as is clear from Figs. 1 and 4. The dimensions of the box and the height of this step are such as to conform with the size of the brick from which the furnace wall is built up. This facilitates the placing of the boxes in the furnace wall, as the grates 11 of boiler furnaces usually slope in the manner illustrated in Fig. 1.

As shown in the drawing, I have provided two tiers of boxes 20, the boxes in the upper tier being relatively superposed upon those in the lower tier. There are thus provided two passages through which cooling air may flow.

Desirably, the conduits through which air is conducted to and led from the passages through the boxes 20 are formed in the furnace wall. The inlet conduit 30 is connected to the discharge conduit 14 of the fan blower 13, desirably at a point beyond the damper 15. The conduit 30 may be provided with a damper 31 by means of which the rate of air flow through it may be controlled. At the rear end of the passages through two tiers of boxes 20, such passages communicate with a discharge conduit 31 which extends downward below the grate and discharges through an opening 32 into the compartment 12.

When the furnace is in operation, coal is being forced on to the grate 11 by the stoker 10, and air is being forced through the conduit 14 by the blower 13. Such air is discharged into the compartment 12 and passes upward through the grate and fire. A portion of the air discharged through the blower 13 is conducted through the conduit 30 to the passages through the boxes 20. After it emerges from these passages, such air passes downward through the conduit 31 into the com-

UNITED STATES PATENT OFFICE

Patented Apr. 24, 1934

1,955,996

COOLED FURNACE WALL

Thomas N. Wynne and Aaron E. Klingensmith, Indianapolis, Ind.

Application December 26, 1929, Serial No. 416,419

8 Claims. (Cl. 110—75)
partment 12. During its passage through the boxes, the air is heated, and the heat it thus acquires is returned to the fire. The covers 22, which form substantially the entire inner surface of the furnace wall at and above the fire level, are cooled by reason of the passage of air across the fins 25. This cooling action materially prolongs the life of the furnace lining. I have found that covers 22, even when their recesses are not filled with refractory material, have a much longer life than does the best quality of refractory brick used in furnace linings. Should the covers 22 become damaged due to exposure to high temperature, they are readily replaced without the necessity for tearing down the wall of the furnace.

We claim as our invention:

1. In a furnace having side walls and an inclined grate, a row of hollow boxes in the inner surface of each side wall extending generally parallel to said grate, each of said boxes being provided with end openings through which adjacent boxes communicate to form a continuous passage, said boxes being formed with stepped tops and bottoms and being provided in their inner surfaces with openings, removable covers for said openings, said covers being provided within the boxes with heat radiating projections, means for supplying air to one end of the passage through the row of boxes, a passage for conducting air from the other end of said row of boxes to a point below said grate, and means within said boxes for deflecting air passing therethrough against said covers.

2. In a furnace having side walls and a grate, a row of hollow boxes in the inner surface of each side wall, each of said boxes being provided with end openings through which adjacent boxes communicate to form a continuous passage, said boxes being provided in their inner surfaces with openings, removable covers for said openings, said covers being provided within the boxes with heat radiating projections, means for supplying air to one end of the passage through the row of boxes, a passage for conducting air from the other end of said row of boxes to a point below said grate, and means within said boxes for deflecting air passing therethrough against the heat-radiating projection on said covers.

3. In a furnace having side walls and an inclined grate, a row of hollow boxes in the inner surface of each side wall extending generally parallel to said grate, each of said boxes being provided with end openings through which adjacent boxes communicate to form a continuous passage, said boxes being formed with stepped tops and bottoms and being provided in their inner surfaces with openings, removable covers for said openings, said covers being provided within the boxes with heat radiating projections, means for supplying air to one end of the passage through the row of boxes, a passage for conducting air from the other end of said row of boxes to a point below said grate, and means within said boxes for deflecting air passing therethrough against the heat-radiating projection on said covers.

4. In a furnace having side walls and a grate, a row of hollow boxes in the inner surface of each side wall, each of said boxes being provided with end openings through which adjacent boxes communicate to form a continuous passage, said boxes being provided in their inner surfaces with openings, removable covers for said openings, said covers being provided within the boxes with heat radiating projections, means for supplying air to one end of the passage through the row of boxes, a passage for conducting air from the other end of said row of boxes to a point below said grate.

5. In a furnace having side walls and a grate, a row of hollow boxes in the inner surface of each side wall, each of said boxes being provided with end openings through which adjacent boxes communicate to form a continuous passage, said boxes being provided in their inner surfaces with openings, removable covers for said openings, means for supplying air to one end of the passage through the row of boxes, a passage for conducting air from the other end of said row of boxes to a point below said grate, and means within said boxes for deflecting air passing therethrough against said covers.

6. In a furnace having side walls and a grate, a row of hollow boxes in the inner surface of each side wall, each of said boxes being provided with end openings through which adjacent boxes communicate to form a continuous passage, said boxes being provided in their inner surfaces with openings, removable covers for said openings, means for supplying air to one end of the passage through the row of boxes, and a passage for conducting air from the other end of said row of boxes to a point below said grate.

7. A hollow box, suitable for forming, with other boxes, an air passage in the wall of a furnace, said box having a stepped top and bottom, and end openings, one side wall of said box being provided with one or more openings, covers for closing said last named openings, said covers being provided on their inner face with heat-radiating projections, and struts extending between the top and bottom of the box, said struts having inclined faces to direct air flowing through the box against the projections on said covers.

8. In a furnace, a side wall provided with an air passage, said wall also being provided with openings through which said passage may communicate with the interior of the furnace, means within said passage for deflecting air flowing through the passage toward said openings, and covers for said openings, said covers being removable from said passage and said air-deflecting means.

THOMAS N. WYNNE.
AARON E. KLINGENSCHMITZ.