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C. HARRIS

2,369,965

FURNACE

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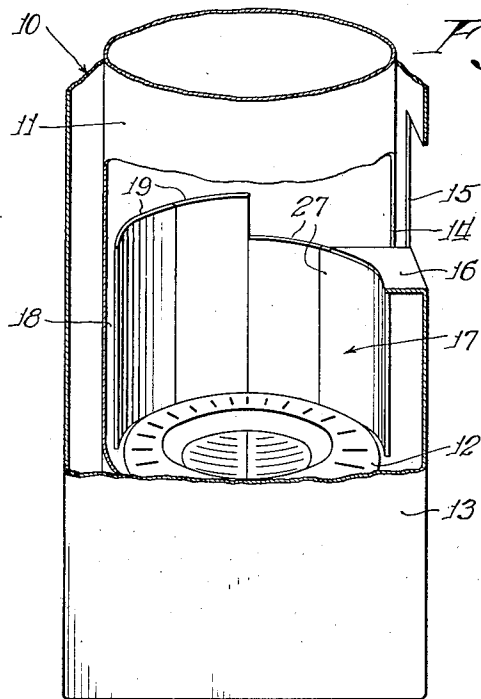


Fig. 1

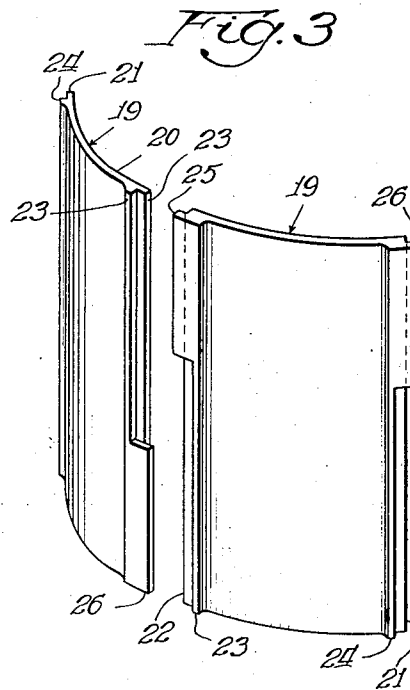


Fig. 3

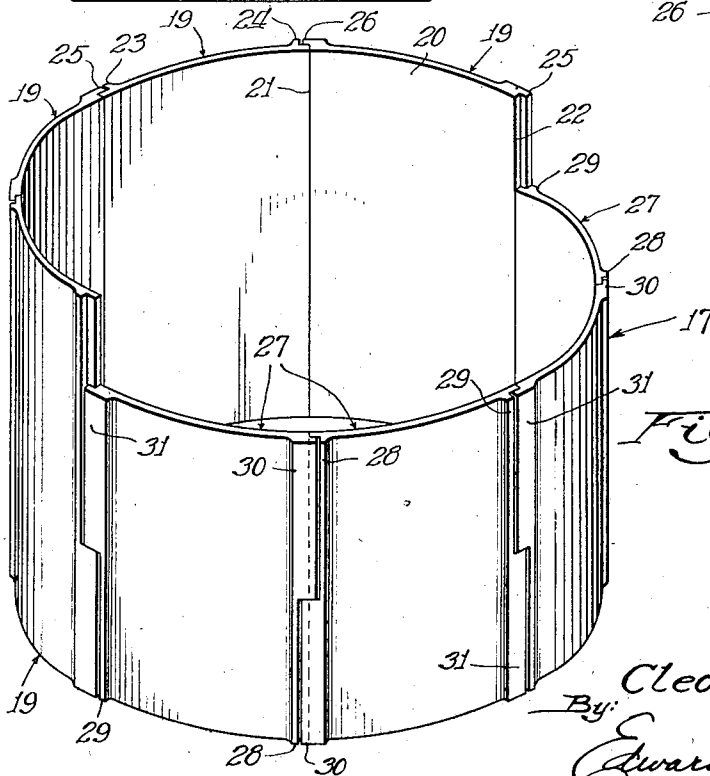


Fig. 2

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Att.

## UNITED STATES PATENT OFFICE

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## FURNACE

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6 Claims. (Cl. 126—151)

This invention relates to furnaces and particularly to a fire box therefor.

It is well known that the capacity of a furnace is, in general, dependent upon the diameter or cross-sectional area of its fire box. Because of the high temperatures which may be created in the fire box, it has been customary to line this portion of the furnace with refractory material such as fire brick. In order to withstand the heat and also the rough usage resulting from shaking the furnace and stirring the fire, the fire brick commonly used for this purpose was several inches thick. This resulted in a much larger furnace for a given cross-sectional area of the fire box which, of course, rendered the overall cost of the furnace higher than was necessary.

In order to reduce the size of the furnace without correspondingly decreasing its capacity, it has been suggested to use cast metal liners instead of fire brick in the fire box. Such liners may be made of heat-resisting alloy and may be considerably less than an inch thick. The problem, however, has been to devise a suitable means for retaining the liners in the fire box, the means being such that sections can be replaced if necessary, without a great deal of difficulty.

The principal object of this invention is to provide cast metal liners for a furnace, said liners being readily removable and replaceable when necessary.

Another object of this invention is to provide a lining for a fire box wherein the lining is comprised of a plurality of sections of curved cast metal plates, any one of which may be removed and replaced without destroying the remaining plates.

A still further object of this invention is to provide a lining for a fire box wherein the lining is comprised of a plurality of curved plates each of which is provided with means adapted to lock one plate with another.

These and other objects and features of this invention will become apparent from the following detailed description when taken together with the drawing in which:

Fig. 1 is a perspective elevation partly in section of a furnace showing the cast metal liners in place;

Fig. 2 is an enlarged perspective of the assembled liners; and

Fig. 3 is a perspective of two liners which are separated to show the interlock between them.

Referring to the drawing for a detailed description of the invention, the furnace 10 may be com-

prised of a steel or cast iron shell 11, the upper portion of which constitutes the combustion chamber and the lower portion of which provides a support for a grate mechanism 12 on which combustible material is supported. The furnace is surrounded by an outer shell 13 which is spaced from inner shell 11 to provide an air space for heating air which is to be conducted to the rooms to be heated. An opening 14 is provided in inner shell 11, and an aligned opening 15 is provided in outer shell 13, for the insertion of fuel into the furnace. A shelf 16 bridges the gap between outer shell 13 and the interior of inner shell 11. The fire box is, in general, below shelf 16 and is lined as shown at 17 to prevent the heat in the fire box from contacting inner shell 11 and thereby seriously damaging the furnace. To prevent overheating of the lining, an air space 18 is provided between the lining and inner shell 11, the cooling air being derived from below grate 12 (the ash pit) and passing up between the lining 17 and shell 11 to the combustion chamber above the fire box.

The lining 17 is shown in detail in Figs. 2 and 3. In the form shown, the lining is comprised of four relatively tall curved plates 19 located to the rear of the furnace (away from openings 14, 15) and four relatively shorter curved plates 27 which are designed to fit below shelf 16 so as not to interfere with the insertion of fuel into the fire box. The number of plates used may of course, be varied within wide limits. Each curved plate 19 is provided with a smooth inner surface 20 terminating in straight sides 21 and 22 and with a pair of ribs 23 and 24 spaced a short distance inward from the edges of the plate. Said ribs 23 and 24 terminate in ears 25 and 26 respectively, which extend outwardly beyond edges 22 and 21 a distance slightly less than the distance from the ribs to their respective edges.

Similarly, plates 27 are provided with straight sides, a smooth inner surface, and outer spaced ribs 28, 29 terminating in ears 30, 31 which extend outwardly beyond the straight edges. The length of ears 25 and 26 on plate 19 is identical with the length of ears 30 and 31 on plates 27. The length of the ears 30 and 31 is substantially one-half the total length of a plate 27.

It will be observed that plates 19 are identical in every respect and similarly plates 27 are identical in every respect so that plates 19 are absolutely interchangeable and plates 27 are likewise absolutely interchangeable.

When assembled, alternate plates are inverted

so that the ears on one plate are on top and the ears on the adjacent plate are on the bottom. This causes the ears of one plate to overlap the vertical edges 21 and 22 of the adjacent plates and form an interlocking connection. It will be apparent that with such an interlocking connection, the lining cannot collapse even though no exterior fastener is used. To assemble the lining, the plates are stood up on end in the furnace in interlocked arrangement in about the position they occupy when fully assembled and then the last plate is slid vertically downward into place. The plates should be so arranged that the last plate to be inserted will be positioned with the ears on top.

It will be observed that the outward extension of the ribs creates an air space between the main body of a plate and the adjacent furnace wall. If such ribs were not present, it would be possible to position one or more of the plates either at a slight inclination to the furnace wall or in too close proximity to the wall, thereby cutting off the flow of air behind the plates and rendering them subject to destruction by overheating.

It is to be understood that the distance which ears 25 and 26 extend laterally may be varied to suit particular requirements as may likewise the length of said ears. It is desirable, however, to make the ears as long as possible to minimize play between adjacent plates. It is understood further that the foregoing description is merely illustrative of a preferred embodiment of the invention and that the scope of the invention therefore is not to be limited thereto but is to be determined by the appended claims.

I claim:

1. A lining for a fire box of a furnace, said lining comprising a plurality of curved plates disposed in side edge to side edge relationship, each of said plates being provided with a pair of ears adjacent the same end of the plate and extending beyond the side edges of the plate, said plates being disposed with their ends adjacent their ears alternatively on the top edge and lower edge of the fire box lining and with the ears of each plate overlapping the outer convex sides of the adjacent plates.

2. A lining for a fire box of a furnace, said lining comprising a plurality of curved plates disposed in side edge to side edge relationship, each of said plates being provided with a pair of ears extending along opposite side edges of the plate from the same end of the plate for a distance substantially one-half the length of the plate, each of said plates being disposed with its end carrying the ears disposed oppositely from the similar ends of adjacent plates, said ears on each of said plates being disposed outwardly from the outer face of the plate and extending beyond the side edges of the plate whereby the ears on the plate overlap adjacent plates and are adapted to maintain the fire box lining spaced from a furnace wall.

3. A lining for a fire box of a furnace, said lining comprising a plurality of curved plates disposed in side edge to side edge relationship, each of said plates being provided with ribs on its outer face adjacent its side edges and with the ribs on each plate comprising ear portions adjacent the same end of the plate and extending beyond the side edges of the plate, said plates being disposed with their ends adjacent their ear portions alternatively on the top edge and lower edge of the fire box lining and with the ear portions of each plate overlapping adjacent plates.

4. A lining for a fire box of a furnace, said lining comprising two groups of curved plates of different lengths with the plates being disposed in side edge to side edge relationship, each of said plates being provided with a pair of ears on opposite side edges of the plate and adjacent the same end of the plate, each of said plates being disposed with its end adjacent its ears disposed oppositely from the similar ends of adjacent plates, said ears on each of said plates being disposed outwardly from the outer face of the plate and extending beyond the side edges of the plate whereby the ears on the plate overlap adjacent plates and are adapted to maintain the fire box lining spaced from a furnace wall, said ears on each of said plates extending from said same end of the plate for distances no greater than half the length of a shorter plate whereby any shorter plate is engageable with any longer plate.

5. A lining for a fire box of a furnace, said lining comprising two groups of curved plates of different lengths with the plates being disposed in side edge to side edge relationship, each of said plates being provided with ribs on its outer face adjacent its side edges and with the ribs on each plate comprising ear portions adjacent the same end of the plate and extending beyond the side edges of the plate, said plates being disposed with their ends adjacent their ear portions alternatively on the top edge and lower edge of the fire box lining and with the ear portions of each plate overlapping adjacent plates, said ear portions on each of said plates extending from said same end of the plate for a distance substantially half the length of a shorter plate whereby any shorter plate is engageable with any longer plate.

6. A lining for a fire box of a furnace comprising two fire box lining sections, said sections each comprising a curved plate and being disposed in upright position and in side edge to side edge relationship, each of said plates being provided with an ear disposed outwardly from its outer face and extending beyond the side edge of the plate to overlap the other plate, the ear on one of said plates being disposed adjacent the upper end of the plate and the ear on the other of said plates being disposed adjacent the lower end of the latter plate.

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