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ROOF STRUCTURE FOR METALLURGICAL FURNACE

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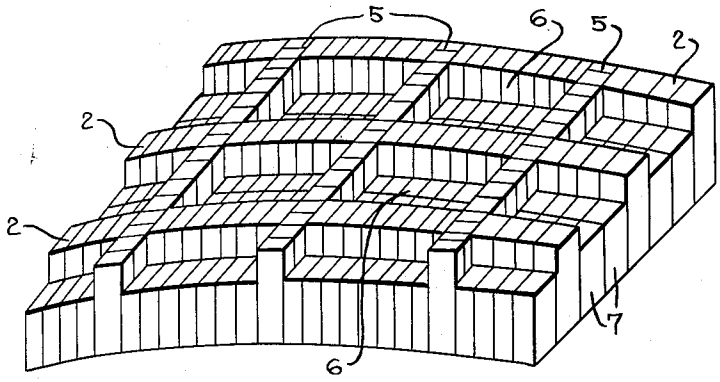


Fig 1

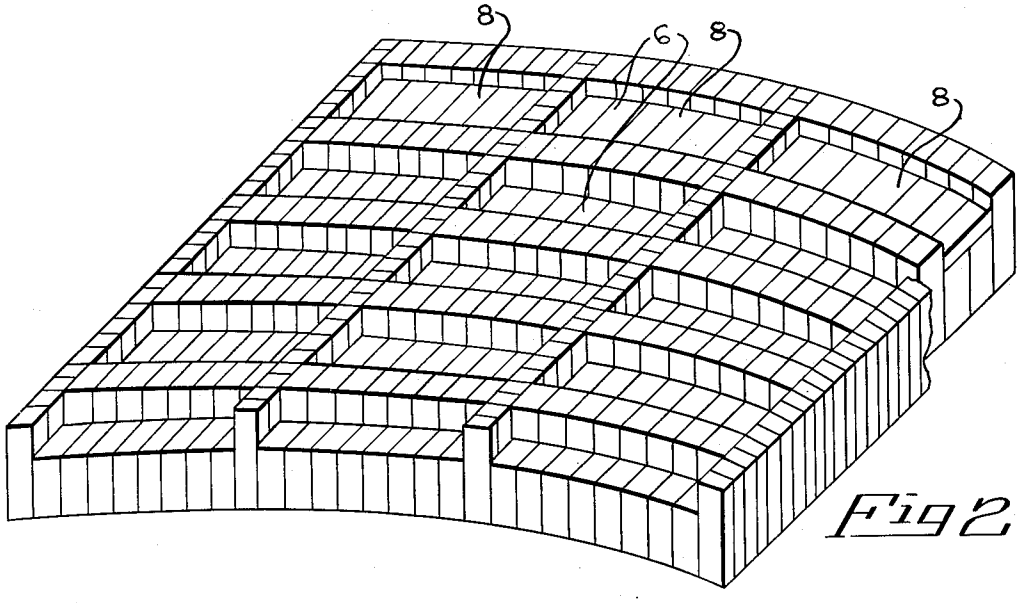


Fig 2

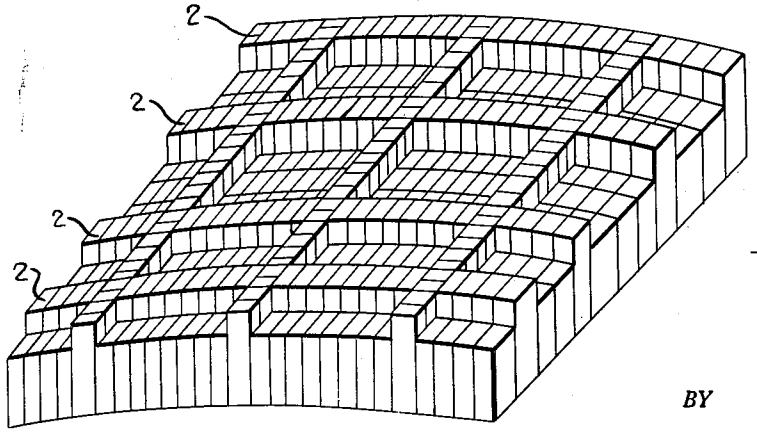


Fig 3

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HIS AGENT.

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ROOF STRUCTURE FOR METALLURGICAL FURNACES

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2 Claims. (Cl. 110—99)

The invention relates to improvements in roof structures for metallurgical furnaces and particularly for open-hearth furnaces.

In furnaces of this type the highest temperature and intensified wear prevails in the vicinity of that portion of the roof which is located above the tap hole whereas the part of the furnace roof located on the charging side or near to it is less exposed to heat and therefore to wear. As a consequence thereof the less attacked and therefore thicker and heavier portions of the arched roof structure have the tendency to sink off and press due to this tendency on the worn off and thinner parts of the arched roof structure which are located above the tap hole.

In order to prevent a crack down of the arched furnace roof the operation of the furnace must be prematurely stopped and the damaged parts repaired which causes a long work stoppage. In addition thereto the further disadvantage arises, that not only the worn but also the adjacent parts of the arched roof are involved in the crash; consequently the repair work must be extended far over the envisaged range. Naturally these long interruptions of the furnace operation are highly undesirable because the furnace cools off and needs reheating; moreover, the furnace output is unfavorably influenced by these long stoppages.

Suggestions have been made to extend the lifetime of arched furnace roofs by the use of large fire bricks at those places which are particularly exposed to wear. Due to the inferior heat conductivity of these large bricks an even more intensive wear resulted and no improvement with regard to an improved wear resistance of the arched roof structure was obtained.

Another attempt in this direction involves the application of transverse arch reinforcing ridges.

To prevent a premature collapse of the intermediary lower portions of the roofs attempts have been made to suspend the same or to extend their wear-resistance by entering into the same layers of additional bricks. These measures have proved to be not successful enough because by the enlargement of the thickness of the intermediary arch sections their cooling capacity was reduced, which only caused a wear increase, whereafter the long transverse ridges proved incapable of satisfactorily supporting the arched furnace roof.

It is the primary object of this invention to eliminate the shortcomings of the above-recited roof strengthening and supporting measures.

It is an equally important object of my invention to establish an arched roof strengthening structure which eliminates local wear and converts the entire arched roof into one supporting body of uniform wear resistance.

It is another object of the invention to provide the basis for a simplified roof repair work.

With these and additional objects in view which will become apparent as this specification proceeds, the invention is based on the recognition that a uniform or equally divided strengthening and support of the arched

furnace roof must be provided which extends over the entire arched area, creates a wear resistant cooperation of its parts and hereby extends its usefulness in a practically undiminished manner. In compliance with this purpose the arch structure forming the subject matter of this invention is provided with a uniform network of reinforcing ridges whereby box-shaped elements are created which are equally distributed over the entire operative arch area. If reinforcing bricks are applied to the intermediate box-shaped sections of this network structure a reliable support is provided for these reinforcing elements in spite of early wear.

The invention will now be described more in detail and with reference to the accompanying drawings showing a preferred embodiment thereof.

In the drawings,

Fig. 1 is a perspective view of the box type roof constructed in conformity with the invention,

Fig. 2 illustrates a mode of repairing this roof; and

Fig. 3 represents a perspective view of a modified roof structure.

The disadvantages of the hitherto customary arched roof structures are eliminated by the structure shown in Fig. 1 where a network of parallel transversal ridges **5** and longitudinal ridges **2** is provided which results in a network type arched roof the transverse and the longitudinal ridges crossing each other at about an angle of 90° and forming in cooperation with the roof bricks **7** box-shaped roof portions. The bricks **7** retain even after partial wear their position within the roof boxes **6**, Fig. 1.

The repair work of damaged parts of the arched roof is simplified and rendered more effective due to this invention, as clearly apparent from Fig. 2 where some of the boxes **6** are shown to be reinforced with top bricks **8**. As a consequence of the box shaped configuration of the arch which extends uniformly over its entire surface the reinforcing work may be locally applied at the desired places and independently upon the adjacent boxes. Instead of applying reinforcing bricks onto the box bottom the refractory may be stamped onto the same.

The boxes **6** may be individually cooled which enables a selective increase of their wear resistance; this individual cooling measure can be applied to an arch built in conformity with this invention in a very efficient manner, whereas the cooling of locally restricted areas of the same is excluded with the hitherto customary one-directional ridge systems.

The invention increases the lifetime of the arch structure by 20 to 50 per cent because the wear resistance of the ridge forming bricks is utilized in a far more efficient manner. The instant arch will always possess sufficient stability to permit stoppage of the furnace operation for repairs and its reheating without increasing the danger of collapse.

The subdivision of the arch structure in boxes renders it possible to confine the repair work to those parts of the arch of which the wear is dangerously advanced, the furnace operation being continued with the adjacent more or less intact boxes until the necessity for a general repair becomes necessary. However, the hitherto experienced great disadvantage that more or less intact parts of the arch are affected by the worn-off sections is entirely eliminated.

By locating the box forming ridges **2**, **5** at the more exposed parts of the arch at a smaller mutual distance and by the creation at these places of smaller boxes the danger of uneven wear may be further met. In conformity with the embodiment of the invention illustrated in Fig. 3 the distance between the ridge forming brick rows **2** is smaller in some parts of the roof than in the remaining parts thereof.

The invention has been described with reference to a preferred embodiment and it will be understood that many variations and modifications thereof may be resorted to without departure from the scope of the invention as defined in the following claims.

What I claim is:

1. In a roof structure, a brick roof composed of parallel rows of successive bricks, said rows extending in directions longitudinally and transversely of said roof at angles of substantially 90 degrees with each other, the bricks of at least three of said transverse and at least three of said longitudinal rows being comprised of ridge forming bricks, the rows of ridge forming bricks which extend in each direction being spaced apart from each other, all of said rows of ridge forming bricks being approximately one-third higher than the bricks intermediate said rows, and extending outwardly from the outer surfaces of the bricks intermediate said rows.

2. In a roof structure as claimed in claim 1, the distances between said ridge forming brick rows being smaller in some portions of said roof than in the remainder of said roof.

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