

H. C. SCHULER
FURNACE ROOF CONSTRUCTION

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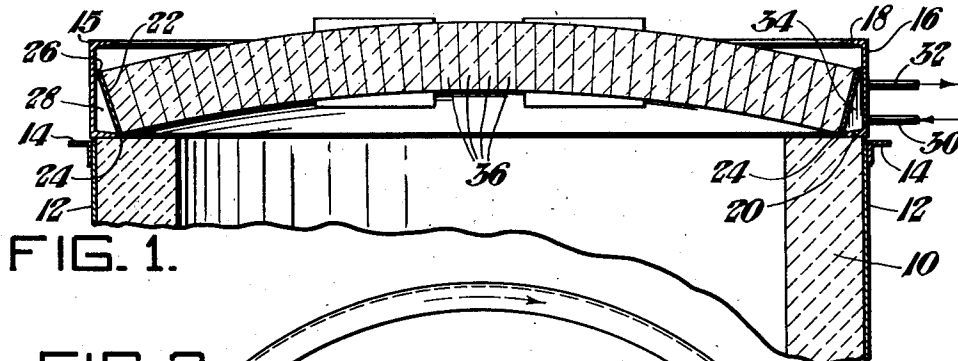


FIG. 1.

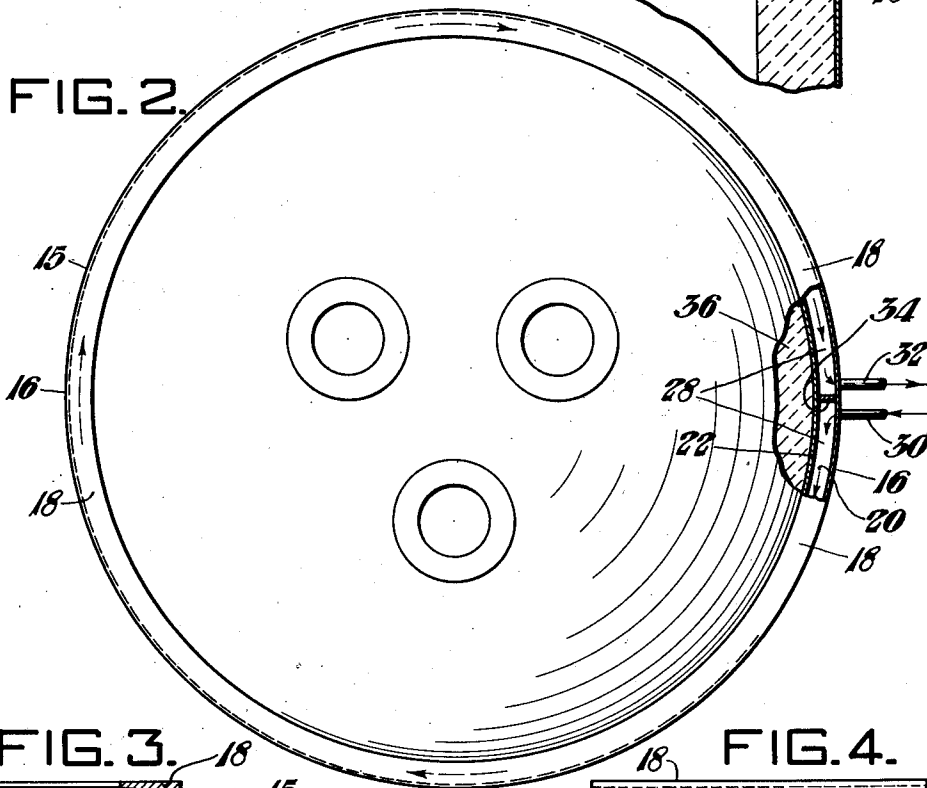


FIG. 2.

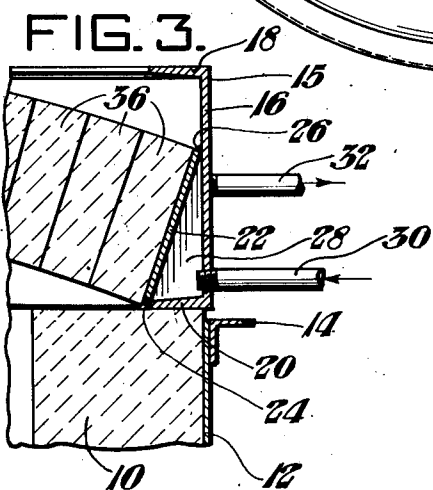


FIG. 3.

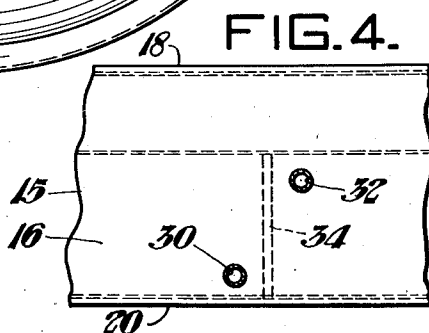


FIG. 4.

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FURNACE ROOF CONSTRUCTION

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5 Claims. (Cl. 127—6)

This invention relates to improvements in roof constructions peculiarly well suited for circular furnaces, such as electric furnaces. The roof of an electric furnace, or similar circular furnace, heretofore has usually been made up of a circular steel ring of channel or plate and an angular section with the web or plate vertical and the flanges of angular legs extending inwardly. Heretofore in such arrangements, specially designed brick, known as skewback brick, rested on the lower flanges of the ring and reacted against the inside of the vertical web thereof. These specially shaped bricks were shaped on the outside to conform to the contour of the inside of the steel ring and were beveled on their inside face to conform to the conical face of the spherical brick constituting the dome of the roof proper.

The prior furnace constructions were costly for the original installation and also costly to maintain. This was due in part to the requirement of using the special skewback brick referred to and in part to the rather expensive means heretofore utilized to compensate for the ever present cutting action of flame leaking between the top of the brickwork of the furnace shell and the bottom of the usual roof ring. Heretofore, the sectional area of the steel ring was made greater than necessary in order that a liberal amount of erosion could take place before there arose danger of failure of the ring, which would require replacement of the same. As a means of preventing, or at least retarding, the destruction of the vital sectional area of the ring, the same has been heretofore cooled by welding one or more circular water cooling pipes or tubes therein conforming with the periphery of the ring. While such an arrangement was effective, it was open to the objection that it was too fragile and the sizes of standard brick and other conditions placed a limitation on the pipe sizes which could be inserted between the under side of the roof ring and the top of the wall. This imposed a limitation on the volume of water which could be circulated for cooling purposes.

The present invention eliminates the above deficiencies by doing away with the necessity of using specially shaped and expensive skewback brick and by provision of means whereby a much larger volume of water can be circulated in direct heat exchange relation with the lower flange of the ring; also the general character of the novel roof construction endows the roof with a strength greater than that of roofs heretofore used, making it possible to reduce the sectional area and weight of the roof ring section, while

at the same time providing a roof ring of greater strength and longer life.

The above and further features of the invention will be readily apparent from the following detail description, when read in connection with the accompanying drawing, in which:

Figure 1 is a vertical longitudinal section through the upper portion of an electric furnace illustrating one embodiment of the invention;

Figure 2 is a plan thereof with a portion broken away in the interest of clearness;

Figure 3 is an enlarged fragmentary elevation, as viewed from the right of Figure 1; and

Figure 4 is an enlarged view showing the improved roof ring structure.

Referring in detail to the drawing, 10 represents a circular furnace wall surrounded by a suitable steel shell 12 which is encircled near the top by an annular angular member 14.

Supported by the side wall there is a circular roof ring structure, indicated generally at 15, which is of a construction especially well suited for use in supporting the roof brick of circular furnaces, such as electric furnaces and the like. This roof ring structure comprises an annular channel shaped member having a web 16, top flange 18 and a bottom flange 20. An inclined annular plate 22 is disposed between the flanges 18 and 20 in a manner clearly shown in Figure 3 by welding the lower end of the plate to the toe of the flange 20, as indicated by the welded joint 24. At its upper edge, the annular plate 22 is secured to the web of the ring by an annular welded joint 26. Thus there is provided an annular chamber 28 through which cooling water may be circulated, this water being fed in, for example, by way of a pipe 30 and passed off by way of a pipe 32. A suitable partition 34 is interposed between the pipes 30 and 32 so as to insure proper direction of flow of the cooling water.

The angle of inclination of the annular plate 22 is such that ordinary stock sizes and shapes of fire brick, generally used in the construction of partly spherical or dome shaped furnaces, can be employed. Such conventional bricks are indicated at 36 in Figures 1 and 2, wherein it is clear that the bricks contacting the plate 22 are substantially the same as the other bricks used in roofing. It is thus apparent that according to the present invention specially shaped skewback brick of expensive type heretofore required need not be used in the annular zone where the roof brickwork contacts the roof ring. It is also apparent from the drawings and description that

the cooling chamber 28 is of a generous size which will permit the circulation of a large volume of cooling water in direct heat exchange relation with the lower flange and a substantial portion of the upright web of the ring, as well as with the annular inclined plate 22.

From the foregoing it is apparent that the improved construction provides a roof ring well suited to receive the radial thrust set up by a roof of dome-like form corresponding approximately to a portion of a sphere. It will also be appreciated that the frusto conical inner bearing surface of the plate 22 will form a proper seat for the outer annular layer of bricks whose faces may be said to be substantially parallel and to extend inward in approximately a radial direction.

While I have described quite specifically the embodiment of the invention herein illustrated, it is to be understood that various modifications and substitutions of equivalents may be made by those skilled in the art without departure from the invention, as defined in the appended claims.

I claim:

1. In combination with a circular furnace having a dome shaped brick roof corresponding substantially to a portion of a sphere, a circular metallic structure for taking the lateral thrust of the roof comprising inner and outer walls, circular in plan, defining a closed annular chamber for the circulation of a cooling medium, inlet and outlet pipes connected therewith, said inner wall being inclined downwardly and inwardly so as to form a seat, and a lining seated thereagainst consisting of conventional stock size and shaped brick having approximately parallel radially extending faces, said outer wall having an inwardly extended lower flange and said inner wall being welded at its lower edge to said flange.

2. In combination with a circular furnace having a dome-like brick roof, a rolled structural section forming an annular roof ring including an outer web and inwardly extending flanges and an inclined annular plate having one end secured to the toe of one of the flanges and the other end secured to the web, thus defining an annular chamber for the circulation of water, and a roof composed of brickwork, the outer bricks being of stock size and shape which have approximately parallel radially extending faces,

the outer of which are seated on said inclined annular plate.

3. In combination with a circular furnace having a partly spherical or dome shaped brick roof whose outer bricks are of stock form and thus have substantially or approximately parallel radially extending faces and end faces substantially perpendicular thereto, an annular structure for resisting the lateral thrust from the roof comprising an annular rolled steel stock section having an upright web and a lower inwardly extending flange and an inclined annular wall secured at its lower end to said flange and at its upper end to said web, thus forming an annular space for the circulation of cooling water, and water inlets and outlets communicating with said annular space.

4. In combination with a circular furnace and a partly spherical or dome shaped roof thereof, the outer bricks of which are stock size and shape and have substantially or approximately parallel radially extending faces and inner and outer faces substantially perpendicular thereto, an annular structure for resisting the substantially lateral thrust from the roof comprising an annular rolled steel commercial sections having an upright web, a lower inwardly extending flange, an inclined annular wall welded at its lower end to said flange and at its upper end to said web, thus forming an annular space for the circulation of cooling water, and water inlets and outlets communicating with said annular space.

5. In combination with a circular furnace and a partly spherical or dome shaped roof thereof, the outer bricks of substantially rectangular prismatic form of stock size and shape which have substantially or approximately parallel radially extending faces, an annular structure for resisting the substantially lateral thrust from the roof comprising an annular rolled metal section of stock form having an upright web, a lower inwardly extending flange, an inclined annular wall welded at its lower end to said flange and at its upper end to said web, thus forming an annular space for the circulation of cooling water, water inlets and outlets communicating with said annular space, and a partition disposed between the latter for compelling circulation throughout the length of said annular chamber.

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