PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to Furnaces

We, SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ N.V., a company organised under the laws of the Netherlands, of 30 Carel van Bylandtlaan, The Hague, The Netherlands, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to furnaces, and particularly to a furnace provided with a combustion space and with pipes attached to its wall and/or roof through which a medium to be heated may be passed. The invention more particularly relates to a furnace of the above-mentioned type, in which the combustion space is laterally defined by elements each comprising a metal wall lined with a refractory material on the side facing the combustion space.

In known furnaces of the type provided with a combustion space and with pipes attached to its wall and/or roof through which a medium to be heated may be passed, the total weight of the elements constituting the wall of the combustion space, and also the weight of the roof and the liquid-filled pipes, is supported by a steel frame-work surrounding the furnace.

The object of the present invention is to provide a simple construction for the wall of the combustion space so as to permit rapid assembly of the furnace at lower costs than furnaces used hitherto.

According to the present invention a furnace comprises a plurality of wall elements laterally defining a combustion space, a roof for said combustion space and pipes attached to the wall and/or roof of said combustion space, said elements each comprising a closed metal circumferential wall which is lined with refractory material on the side facing said combustion space and has open, parallel end faces, and being stacked in self-supporting relation so that the total weight of said wall, said roof and said pipes is carried by the bottom element.

The steel framework used in known furnaces is omitted in the furnace according to the present invention, resulting in a simpler construction of a saving in materials. In addition, the absence of a steel framework provides for simpler assembly of the furnace.

A preferred construction of furnace will now be described by way of example with reference to the accompanying drawings, wherein

Fig. 1 is a diagrammatic perspective view of the furnace,

Fig. 2 is a cross-section taken on the line II—II of Fig. 1,

Fig. 3 is a cross-section (on a larger scale than Figures 1 and 2) taken on the line III—III of Fig. 1,

Fig. 4 is a cross-section (on the same scale as Fig. 3) taken on the line IV—IV of Fig. 1, and

Fig 5 is a cross-section showing a method of joining adjacent elements.

The furnace shown in Fig. 1 consists of a plurality of stacked elements 1, surrounding, together with a bottom plate 2 and a roof 3, a combustion space. The bottom plate 2 is provided with openings (not shown) for inserting burners, and may or may not be mounted on legs. The roof 3 is provided with an opening 4 for the discharge of combustion gases. Pipes 5 through which the medium to be heated is to be passed, are suspended from the roof 3 by any suitable suspension means 6 (Fig. 2).

Each element 1 consists of a closed circumferential metal wall 7 (Fig. 3 and 4) lined with a refractory layer 8 on the side facing the combustion space. The layer 8 may be bonded to the wall in any suitable manner; if desired, the layer 8 may be provided with a reinforcement (not shown).

The metal wall 7 is formed with ribs 9, which increase the resistance of the wall to

buckling under the load of the weight of the pipes, the roof and the wall. In addition, a wall of this type is also capable of allowing for differences in expansion caused by temperature changes.

To ensure a greater rigidity of the elements 1, the end faces of each element 1 are preferably provided with flanges 10 (Fig. 4). The flanges of adjoining elements may be secured to each other by means of bolts 11. In order to obtain a satisfactory sealing between the end faces 12 of adjacent refractory linings, the faces are of a tapering design as shown in Fig. 4, and the space between the linings is filled with a suitable sealing material 13.

The elements 1 are preferably made at the erection site of the furnace. To this end the four individual sides of the metal wall 7 are connected to form a unit having a closed outer circumference and are provided with flanges 10 adjacent the end faces 12. A reinforcement (not shown) is then fitted on the inside of the wall 7 and secured in situ by means of welds. A former is then arranged in spaced relation with respect to the inside of the wall 7 and the space between the former and wall is subsequently filled with concrete. Alternatively the lining may be provided by horizontally supporting each element on one of its side walls, pouring the lining on the inside of the horizontally placed wall and allowing it to harden. This procedure is repeated for the other side walls.

After the concrete has set and hardened, an element is obtained which can withstand high temperatures and can offer adequate resistance to pressure loads applied in a direction normal to the end faces.

Elements of this type may consequently be stacked in a self-supporting fashion to form a combustion space and the bottom element is capable of carrying the total weight of the roof, the pipes and the wall, without a framework being necessary.

After or during the stacking of the elements 1, they are secured to each other by means of bolts 11 passing through flanges 10, and the slits between the end faces 12 of adjacent elements are sealed by means of the material 13 (Fig. 4).

After positioning the roof 3, which may or may not consist of several parts, the pipes 5 are suspended therefrom by suspension means 6. Fig. 5 shows in cross-section two stacked elements 1 which are joined by a step type joint provided with sealing material 13 between the elements 1 and held in position by bolts (not shown) passing through the flanges 10.

WHAT WE CLAIM IS:—

1. A furnace comprising a plurality of wall elements laterally defining a combustion space, a roof for said combustion space and pipes attached to the wall elements and/or roof of said combustion space, said elements each comprising a closed metal circumferential wall which is lined with refractory material on the side facing said combustion space and has open, parallel end faces, and being stacked in self-supporting relation so that the total weight of said wall, said roof and said pipes is carried by the bottom element.

2. A furnace as claimed in claim 1, comprising ribs extending in a direction normal to the wall of each element.

3. A furnace as claimed in claim 1 or 2, comprising flanges adjacent the end faces of each element.

4. An element for constructing a furnace as claimed in any one of the preceding claims, comprising a circumferential metal wall lined on the inner surface with a refractory material and having two parallel open end faces.

5. A furnace substantially as described with reference to the accompanying drawings.

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