

April 12, 1927.

1,624,217

F. T. COPE

ELECTRIC FURNACE

Filed Nov. 9, 1925

4 Sheets-Sheet 1

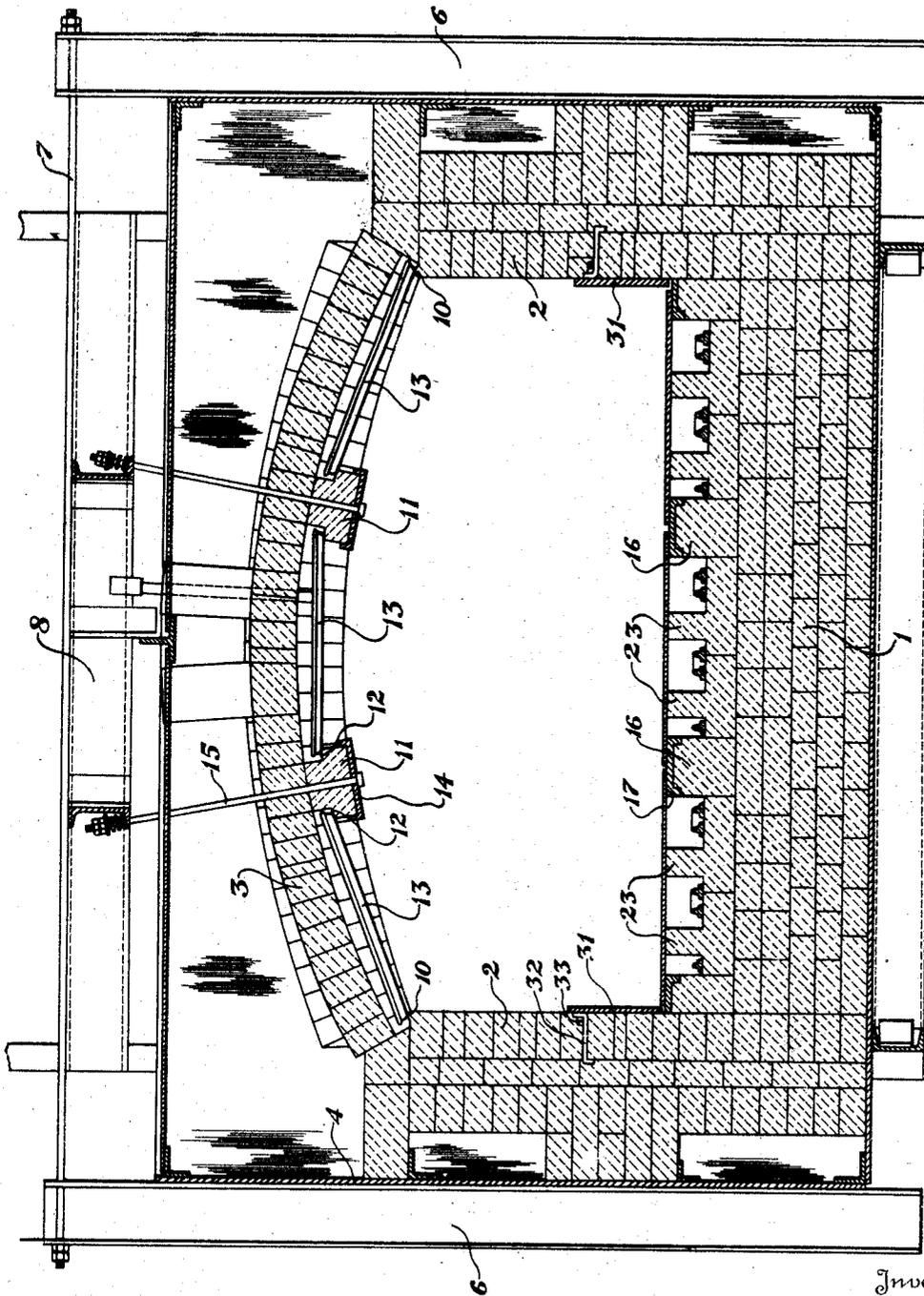


Fig. 1

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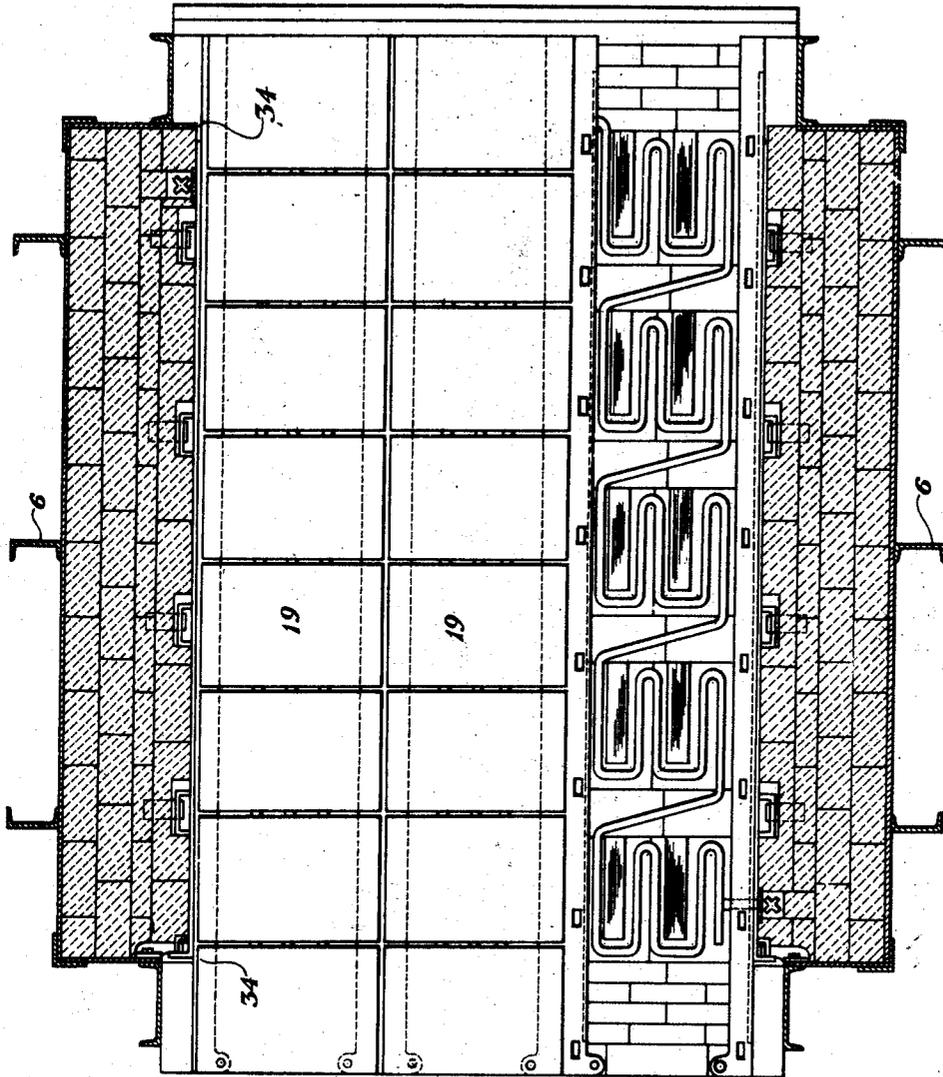


Fig. 2.

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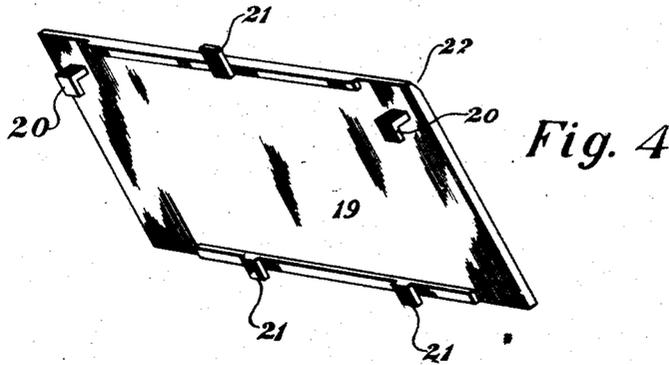


Fig. 4

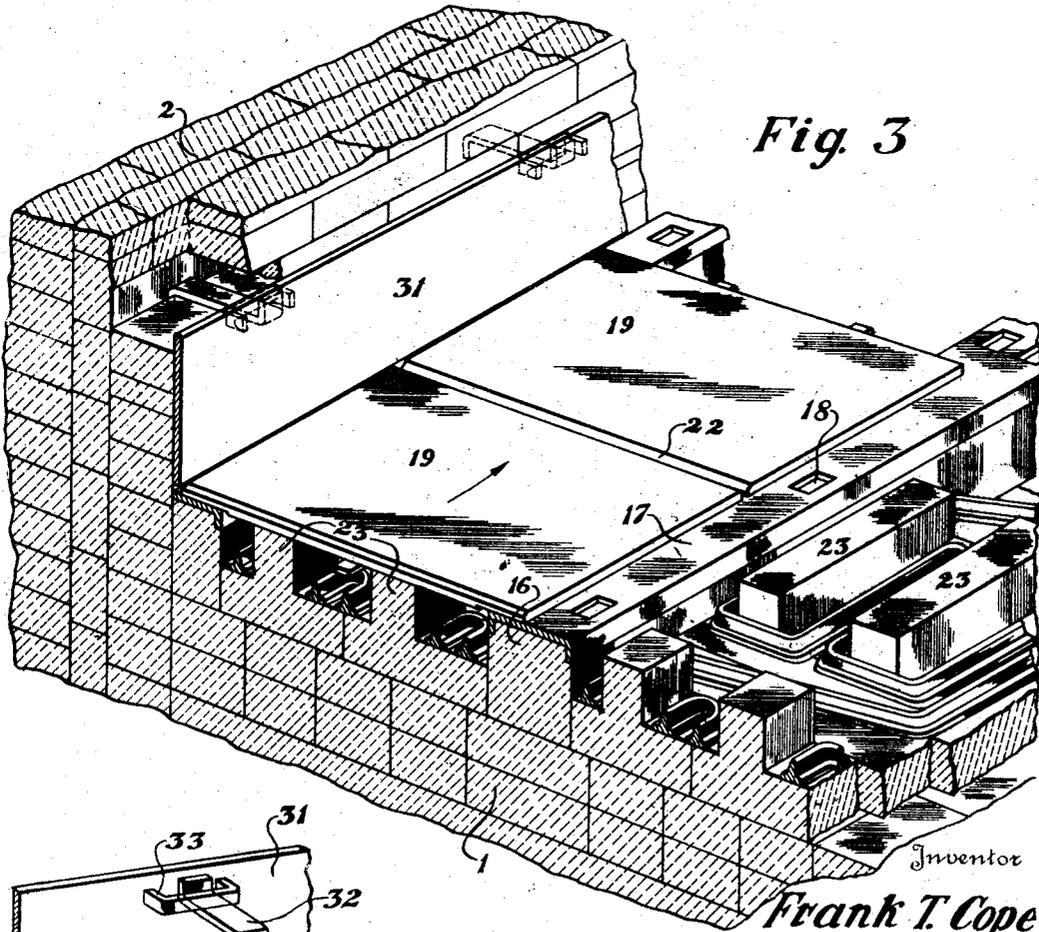


Fig. 3

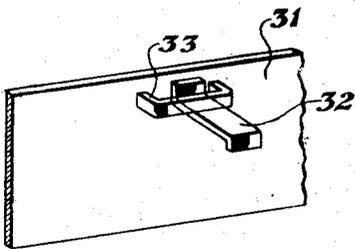


Fig. 5

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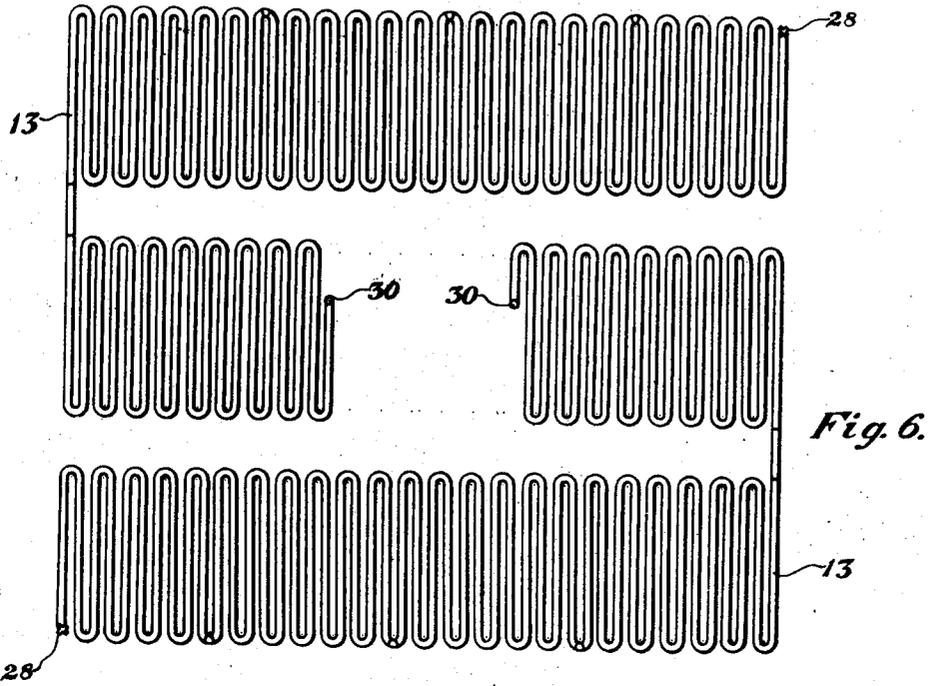


Fig. 6.

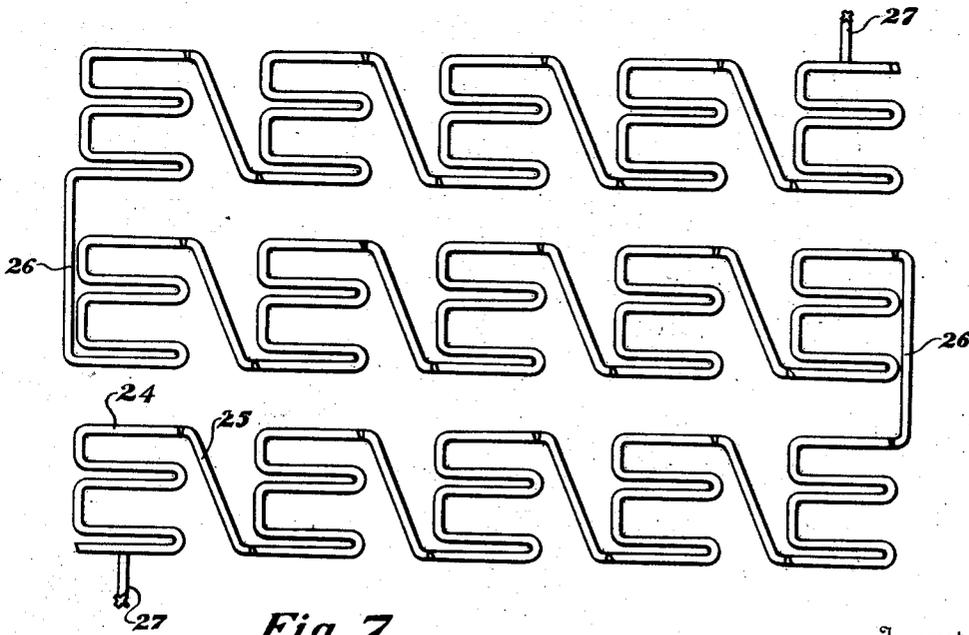


Fig. 7.

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UNITED STATES PATENT OFFICE.

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ELECTRIC FURNACE.

Application filed November 9, 1925. Serial No. 67,810.

The invention relates to that class of furnaces in which the heat is derived from resistor grids, and more particularly to furnaces of this general type in which resistor grids are located in the floor and roof of the furnace in order to give up heat to the top and bottom portions of the material to be treated.

A common objection to furnaces of this type is that the resistors, by means of which heat is liberated, have heretofore been made of a drawn or rolled wire or ribbon having comparatively small cross-section and consequently low mechanical strength, the result being that when such a resistor is used insulating spacers are required for the purpose of preventing contact between adjacent strands of the resistor due to deformation of the same when heated.

The object of the present improvement is to provide a furnace having rigid resistors, which may be of structural shape and preferably cast of heat resisting metal, in the roof and beneath the working hearth of the furnace; to provide novel means for supporting the roof resistor grids, and to provide a new and novel construction of working hearth beneath which the lower resistor grids are located.

Experience has shown that with such a construction of rigid resistor grids insulating spacers or separators between adjacent strands of the grid are unnecessary because the grid has sufficient rigidity and mechanical strength at high temperatures to prevent distortion and consequent short circuiting of the resistors, thus eliminating the insulating separators which are a very fragile and expensive part.

An embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a transverse sectional view of the improved furnace;

Fig. 2, a bottom plan sectional view of the same, a portion of the working hearth being removed to illustrate the construction of bottom grid;

Fig. 3, a fragmentary perspective view of a portion of the bottom of the furnace;

Fig. 4, a detail perspective view of one

of the plates forming the working hearth;

Fig. 5, a detail perspective view showing the means of attaching the side plates;

Fig. 6, a plan view of the roof grids, and

Fig. 7, a similar view of the bottom grid.

Similar numerals of reference indicate corresponding parts throughout the drawings.

The improved furnace may comprise the bottom or base 1, side walls 2 and the roof 3, formed of suitable brick work and inclosed as by the metal casing 4. This brick work may be supported upon the horizontal structural members 5, and reinforced by the vertical structural members 6, connected at their upper ends as by the tie bolts 7, and carrying the roof supporting structure 8.

For the purpose of supporting resistor grids in the roof of the furnace, a ledge 10 is formed at each side edge of the roof, and blocks 11, located at spaced intervals across the span of the roof, are provided with ledges 12 for supporting the end portions of the resistor grids 13.

Each of these blocks 11 may be removable and is preferably reinforced upon its under side with a metal channel 14, and a bolt 15 may be located through the same and suspended from the roof structure 8.

Each of the grids 13 may be of structural shape, as best shown in Fig. 3, and is preferably a casting, and may consist of a plurality of straight parallel portions connected together at alternate ends, producing a continuous resistor. Each of these grids may be placed in position by supporting the same between the ledges 10 and 12, the end portions of the grids resting thereon.

The working hearth of the furnace is composed of a plurality of metal plates 19, supported upon piers which extend upward from the brick work 1. These piers, as shown in the drawings, may comprise the longitudinal main piers 16, extending substantially the length of the furnace and provided with heat resisting alloy caps, such as the channels 17.

The principal purpose of these alloy caps or channels is to provide a support and anchorage for the plates 19, the side edge portions of which rest upon said piers, de-

pending hooks 20, near one end of each plate, engaging the apertures 18 in the channel caps 17.

Disposed between the main piers 16 are the secondary piers 23, placed so as to reduce the plate span between the main piers, in order to overcome distortion or sagging of the plates when heavily loaded in a high temperature.

It will be seen that with this construction of main and secondary piers a space is left between the piers as well as between the hearth plates and the brick work 1. The lower resistor, which may be formed in a single grid, as shown in Fig. 7, is placed in this space, the convolutions of the grid being so shaped that the piers will not interfere with the same, no portion of the grid contacting with the piers.

Thus it is obvious that the piers 16 and 23 function solely as supports for the hearth plates and do not act in any way as insulating spacers for the grid, since the same being of rigid construction insulation spacers are not necessary.

This lower resistor, as shown in Fig. 7, may comprise spaced rows of sinuous units 24 joined by the angular strands 25, the rows of units being connected at their ends as by the strands 26. This grid, as well as the upper resistors is preferably cast of heat resisting alloy metal; and may be of any structural cross sectional shape, such as the T-shaped grids shown in the drawings.

The opposite ends 27 of the lower grid may be electrically connected to the outer ends 28 of the upper grids, while the inner ends 30 thereof may be connected to opposite sides of a circuit whereby the upper and lower grids are located in the same circuit.

Lugs 21 are provided at the ends of the hearth plates 19, for engagement under the end edges of the adjoining plates. In event the articles to be heated in the furnace are moved across the hearth by a pusher or the like, this movement will be in the direction of the arrow shown in Fig. 3. As the hooks 20 extend rearwardly it will be seen that this movement, across the hearth, will not disturb the position of the plates, and in order to prevent the possibility of any of the articles catching upon the forward edges of the plates, the same may be beveled as indicated at 22.

Side plates 31, which, as well as the hearth plates 19, may be formed of abrasion resisting metal, are connected to the lower portions of the side walls of the heating chamber as by the hooks 32 which engage the loops 33 thereon.

This construction is especially adaptable where material is continuously pushed through the furnace, and for this purpose the door openings, as shown at 34, are flush

with the sides and hearth of the heating chamber, providing an unobstructed passage entirely through the furnace.

From the above description and an inspection of the accompanying drawings it will be evident that a novel construction of both the roof grids and bottom grids is provided, the grids being of such rigid construction that no insulating spacers or supports are provided for either grid to prevent distortion under high temperatures, the roof grids being self-sustained and supported only at their ends upon the ledges provided in the roof; no intermediate supports or spacers being necessary.

I claim:

1. An electric furnace including a refractory base, a hearth spaced above said base and comprising a plurality of plates having lugs at opposite edges for engagement under the edges of adjoining plates and a resistor mounted in the space between the hearth and base.
2. An electric furnace including a refractory base, piers extended upward from the base, a hearth comprising a plurality of plates having hooks engaging said piers and a rigid resistor mounted upon the base and spaced from the piers.
3. An electric furnace including a refractory base, piers extended upward from the base, a hearth comprising a plurality of plates having hooks at their side edge portions engaging said piers, lugs at each end edge of each plate for engagement under the edges of adjoining plates, and a rigid resistor mounted upon the base and spaced from the piers.
4. An electric furnace including a refractory base, refractory piers upon said base, metal caps upon the upper faces of said piers and provided with spaced apertures, a hearth comprising a plurality of plates having hooks at one end for engagement with the apertures in said caps and a rigid resistor grid mounted upon the base and spaced from said piers.
5. An electric furnace including a refractory base, refractory piers upon the base, metal caps upon the upper faces of the piers and provided with spaced apertures, a hearth comprising a plurality of plates having hooks at one end for engagement with the apertures in said caps and having lugs at each end edge for engagement under the edges of adjoining plates, and a rigid resistor grid mounted upon the base and spaced from said piers.
6. An electric furnace including a refractory base, main piers extended up from the base, a hearth comprising a plurality of plates connected at their edges to said piers, secondary piers upon the base supporting intermediate portions of the hearth plates and a rigid resistor grid of sinuous shape

mounted upon the base and located around and spaced from all of said piers.

7. An electric furnace having a floor, an abrasion resisting hearth spaced above the floor, abrasion resisting side walls rising from each side of the hearth, the furnace having door openings at its ends, flush with the hearth and side walls, permitting an unobstructed passage of material entirely through the furnace, and heating means, beneath the hearth.

8. An electric furnace including a refractory base, main piers extended up from said base, a hearth comprising a plurality of plates supported at their edges upon said piers, secondary piers upon the base sup-

porting intermediate portions of the hearth plates, and a rigid resistor grid of sinuous shape mounted upon the base and located around and spaced from all of said piers. 20

9. An electric furnace including a refractory base, main piers extended up from said base, a hearth plate supported at its edges upon said piers, secondary piers upon the base supporting intermediate portions of the hearth plate, and a rigid resistor grid of sinuous shape mounted upon the base and located around and spaced from all of said piers. 25

In testimony that I claim the above, I have hereunto subscribed my name. 30

FRANK T. COPE.