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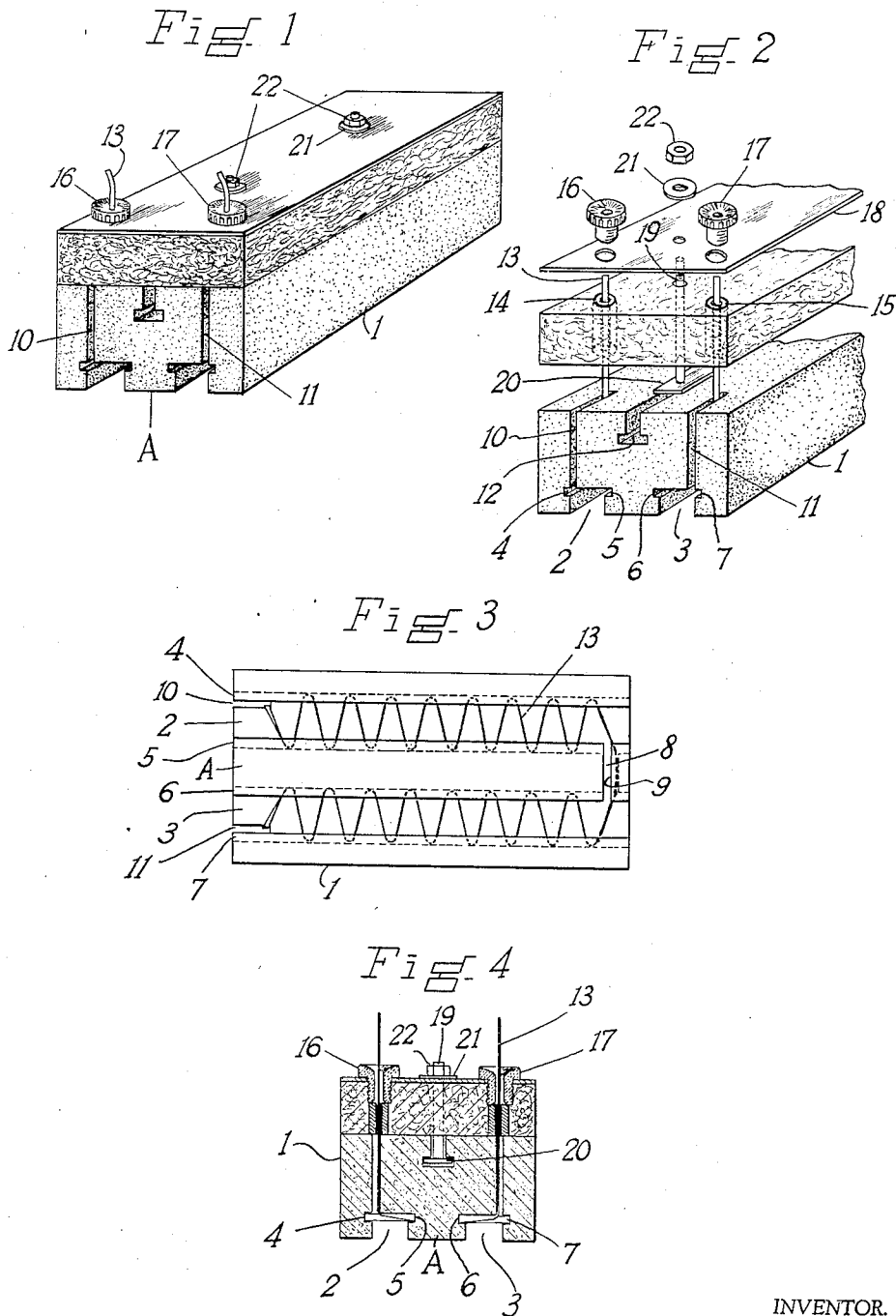
F. H. NORTON

2,255,518

ELECTRIC FURNACE

Filed Nov. 15, 1938

3 Sheets-Sheet 1



INVENTOR.

Frederick H. Norton

BY *Frederick H. Norton*
ATTORNEY.

Sept. 9, 1941.

F. H. NORTON

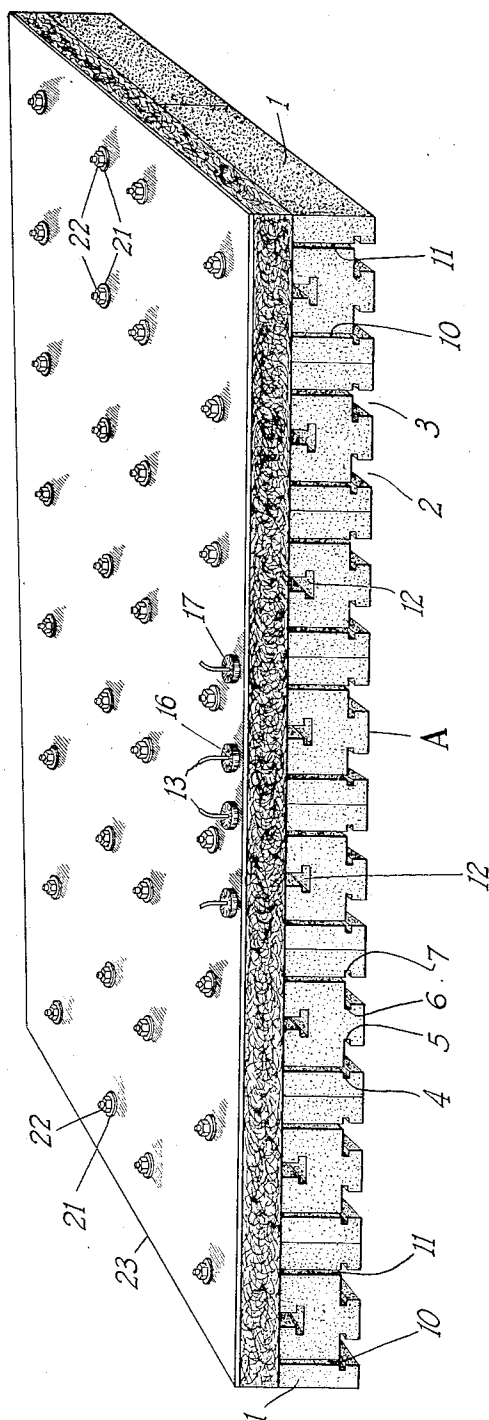
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Fig. 5



INVENTOR.
Frederick H. Norton
BY *Paul R. Newcomb*
ATTORNEY

Sept. 9, 1941.

F. H. NORTON

2,255,518

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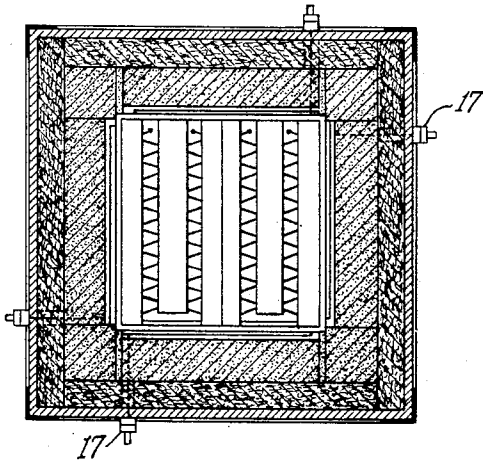


Fig. 7

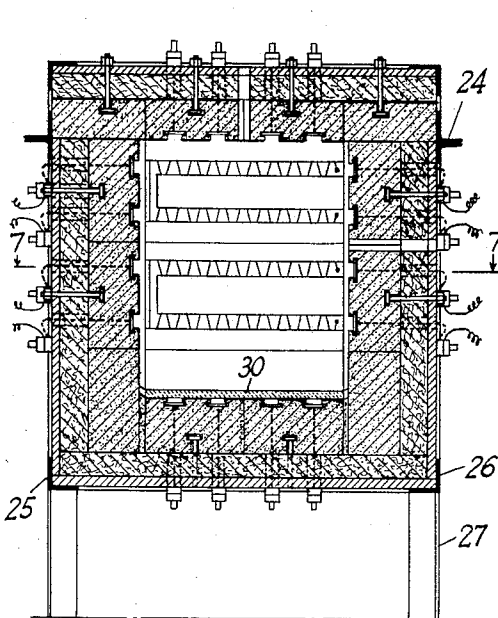


Fig. 6

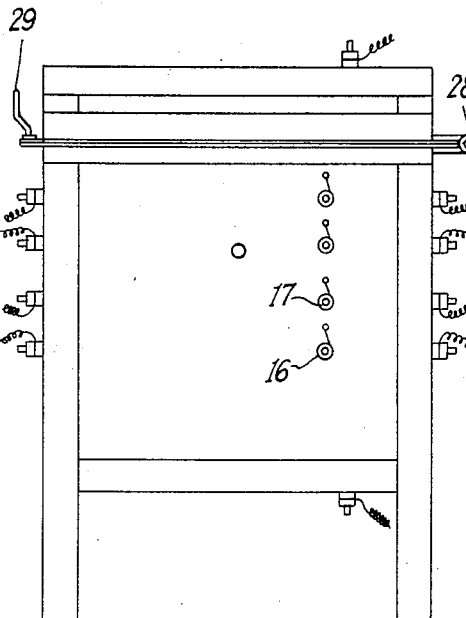


Fig. 8

INVENTOR.
Frederick H. Norton
BY *Frederick H. Norton*
ATTORNEY.

UNITED STATES PATENT OFFICE

2,255,518

ELECTRIC FURNACE

Frederick H. Norton, Winchester, Mass., assignor
to The Babcock & Wilcox Company, Newark,
N. J., a corporation of New Jersey

Application November 15, 1938, Serial No. 240,430

2 Claims. (Cl. 219—19)

This invention is an electric furnace of the type in which the primary source of heat is radiation from an electrically heated resistance ribbon backed by a refractory substance.

In furnaces of the character mentioned, the construction usually is such that the arrangement of electric heating elements, and the manner of connecting the same, is not readily susceptible of alteration; and furthermore, the disadvantage of mounting the resistance heating elements on dense type refractories through which heat is easily transmitted is also customary.

Such dense types of hard refractories are necessarily molded to shape and fired. Shrinking and warping occur when the molded shape is fired and the subsequent hardness and irregularity of shape are a somewhat limiting factor in the arrangement and construction of an electric furnace.

This present invention has as one of its salient features the use of a refractory which may be accurately machined to shape. It has as another feature the machining of the refractory on one face in a manner to act as a support for a ribbon resistance element and the machining of the refractory on the obverse face in a manner to effect the support and arrangement of the refractory in connection with a foundation plate which acts as the support.

A further feature is the undercutting of the refractory in reference to the shape of a sinuous ribbon resistance element such that the least portion of the ribbon resistance element required for support is concealed in the supporting means and hence its greatest area is exposed for radiation and re-radiation to the furnace.

In the drawings attached hereto and forming a part of this specification:

Fig. 1 is a view in perspective of a resistance type electric heating unit according to the present invention;

Fig. 2 is a perspective dissembled view of the element of Fig. 1;

Fig. 3 is a bottom plan view;

Fig. 4 is a transverse sectional view in end elevation;

Fig. 5 is a perspective view showing a number of units attached to a single foundation plate;

Fig. 6 is a transverse sectional view and elevation of a furnace constructed with units of the present invention;

Fig. 7 is a sectional view of the furnace of Fig. 6 on the line 7—7 of Fig. 6; and

Fig. 8 is an outside side elevation of the furnace.

In detail, a single element of the present invention comprises a light-weight refractory brick or

element 1 of the character described in the co-pending application of C. L. Norton, Serial No. 338,621, filed February 8, 1929, which is readily machinable. In one face of this refractory brick parallel slots 2 and 3 are machined, these slots are undercut, as shown at 4, 5, 6 and 7 respectively, to provide an inverted T shape central portion A, as indicated, and opposite supporting ledges adjacent the bottom of the slot. The inverted T shape portion A is cut through as at 8 and undercut as at 9.

Extending upwardly and longitudinally of the refractory element 1 are slots 10 and 11 connecting with slots 2 and 3, as shown. In the upper or obverse face of the refractory element 1 is an inverted T shape slot 12 preferably centered between the slots 2 and 3.

A ribbon resistance element 13, thin in cross section, and of a width not quite as great as the depth of the undercut 4 shaped longitudinally in a U, with each leg of the U being sinuous in leg loops, is mounted in the slots on the underface of the refractory element 1. To hold the element 13 in position it is inserted in the brick in the manner shown in Fig. 3, with the loops lying edgewise in the undercuts 4, 5, 6 and 7 and the end loop supported in the undercut 9 adjacent the slot 2.

The terminals of the ribbon resistance heating element 13 are entered in the slots 10 and 11 of the refractory element and extend upwardly through holes 14 and 15 in a block 31 of cheaper low grade secondary insulating material, such as diatomaceous earth or the like, and pass through porcelain bushings and tubes 16 and 17 in both a stiff backing plate, such as a metal plate 18, and the diatomaceous earth. The metal plate 18 is secured in assembled relation with the element 1, and the low grade insulating material, by bolts or studs 19 which pass through a tie plate 20 seated in the larger portion of the inverted T shape slot 12 and extending upwardly through the low grade insulation and secured by washers 21 and nuts 22.

It will be apparent from the construction that the refractory element 1 may be slid over the tie plate 20 very readily and the ribbon resistance element 13 placed in position. The efficiency of such a heating element 13 as is here described depends upon the large area of the surface of heating element exposed and radiating its heat both by re-radiation from the surface of the refractory and by direct radiation.

In assembling the elements into a furnace, a single backing plate 23 of asbestos board may

be used, as shown in Fig. 5, and to which there is secured a plurality of elements 1 as shown, or the elements may be individually assembled into a furnace. In Figs. 5, 6, 7 and 8 of the attached drawings, there is shown a furnace built up of the character of elements herein described, and in which the side pieces are combined with angle irons 24 and 25 in such a manner as to provide adequate support for the elements, suitable angle iron legs 27 being also incorporated to provide support. In the furnace shown in these figures, the lid which also carries heating elements is hinged as at 28 and provided with a handle 29 by which it may be lifted or raised to the open position, while the bottom of the furnace is covered by a refractory slab of hard texture 30, if desired, to withstand wear.

While in the foregoing I have described the invention with reference to a particular construction, it nevertheless is to be understood that, in practicing the invention, I may resort to any and all modifications falling within the scope of the appended claims defining the invention.

I claim:

1. An electric resistor heating unit comprising a refractory holder block, a pair of T-shaped slots in the inner face of said block, a U-shaped resistance heating element having sinuous leg portions supported in the sides of said slots and terminating in outwardly extending end por-

tions, a T-shaped slot in the outer face of said holder block, an insulator block of low grade heat insulating material covering the outer face of said holder block, a backing plate, means engaging in said outer face T-shaped slot and detachably connecting said holder block and insulator block to said backing plate, and passages through said holder block, insulator block, and backing plate for the end portions of said heating element.

2. An electric resistor heating unit comprising a light-weight refractory holder block of low thermal conductivity, a pair of T-shaped slots in the inner face of said block, a U-shaped resistance heating element having sinuous leg portions supported in the sides of said slots and terminating in outwardly extending end portions, a T-shaped slot in the outer face of said holder block, an insulator block of lower grade heat insulating material covering the outer face of said holder block, a backing plate, means engaging in said outer face T-shaped slot and detachably connecting said holder block and insulator block to said backing plate, passages through said holder block, insulator block and backing plate for the end portions of said heating element, and heat insulating bushings surrounding and separating the end portions of said heating element from said insulator block.

FREDERICK H. NORTON.