United States Patent [19]

Werych

[11] **3,870,463**

[45] **Mar. 11, 1975**

[54] **IN-SITU MOLDED REINFORCED FURNACE PANELS**

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[22] Filed: **Mar. 27, 1974**

[21] Appl. No.: **455,336**

[52] **U.S. Cl.** **432/247**, 13/22, 13/35, 34/1

[51] **Int. Cl.** **F23m 5/00**

[58] **Field of Search** 432/247; 13/22, 35; 34/1

[56] **References Cited**

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1,444,940 2/1923 Reid ..... 13/35 X

3,541,293 11/1970 MacDonald ..... 13/22 X

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Attorney, Agent, or Firm—Smythe & Moore

[57] **ABSTRACT**

An industrial oven comprises a heating chamber enclosed by side walls between which is positioned a top wall element comprising elements embedded therein and in a portion that fits closely between the side walls and an upper portion which projects laterally from both edges of the heating element portion, the projecting edges resting upon shoulders formed in the top inner edges of the side walls. The reinforcing elements are a plurality of ceramic tubes which extend the breadth of the top plate.

8 Claims, 3 Drawing Figures

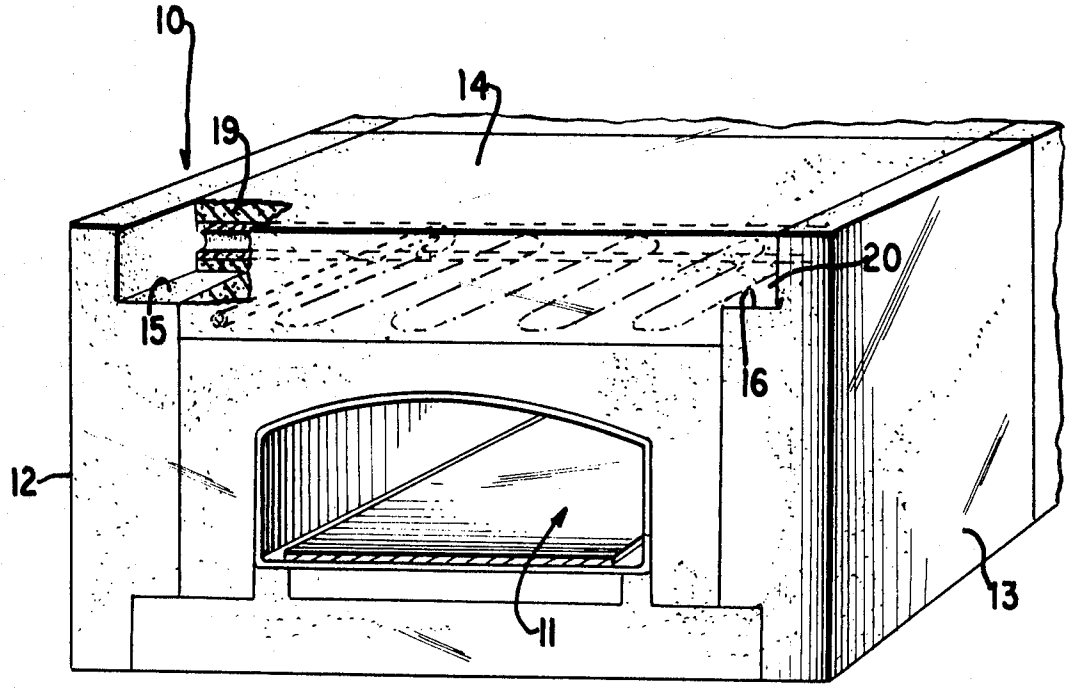


FIG. 1

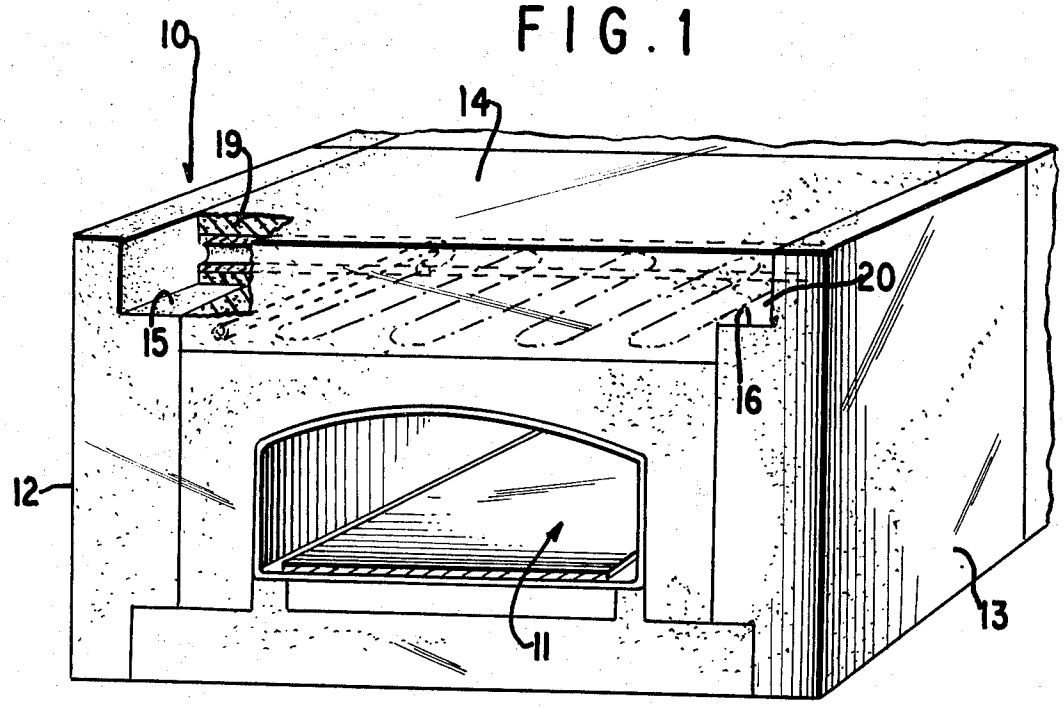
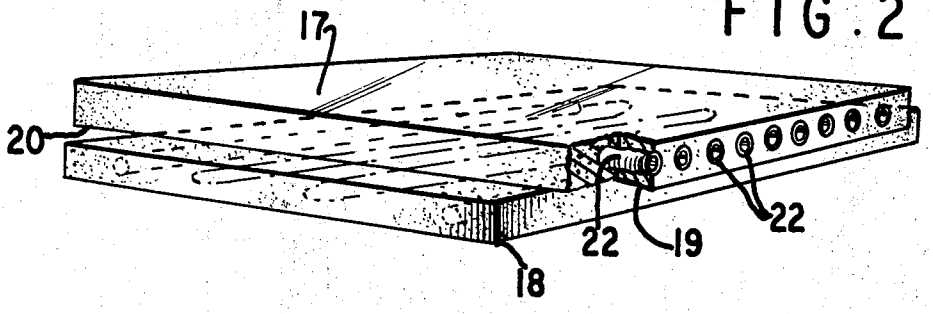


FIG. 2



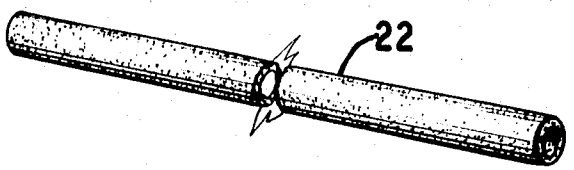


FIG. 3

IN-SITU MOLDED REINFORCED FURNACE PANELS

The present invention relates to industrial furnaces and the like and, more particularly, to the construction of the top wall element of such a furnace in which are embedded heating elements.

Industrial furnaces, which include laboratory ovens and other similar heating units, generally comprise a heating chamber enclosed by side and top walls which may be formed of a ceramic composition. The top walls may include a heating element which is disposed in a heating relationship to the heating chamber. The top wall is generally positioned across the side walls and may be seated in notches or grooves formed in the side walls. When the ovens are increased to a relatively large size, a top wall in which are embedded the heating elements must be strengthened in order to support itself together with the heating elements. While it has been proposed to strengthen the top walls by increasing the thickness of the wall, this proposal has not been entirely satisfactory since it unduly increased the weight and construction costs of the oven. It was then proposed to introduce various reinforcing structures in the top wall. However, difficulties were encountered in molding a top wall from a refractory substance into which both the heating elements and various reinforcing members were embedded.

One of the objects of the present invention is to provide an improved top wall element of an enclosure for a heating chamber of an industrial oven and the like.

Another object of the invention is to provide a top wall element for an industrial oven containing both heating elements and reinforcing structure embedded therein.

According to one aspect of the present invention, there is a top wall element for an industrial oven and the like having the heating chamber enclosed by side walls. The top wall element is positioned across the side walls and comprises the heating element means embedded therein in a heating relationship to the heating chamber and reinforcing means embedded therein above the heating element means and coextensive with the breadth of the top wall element so as to strengthen considerably the top element when it is in position. The reinforcing means may comprise a plurality of ceramic tubular elements having lengths coextensive with the breadth of the top wall element. The elements may be formed of an inorganic refractory fiber with the elements molded in situ by vacuum molding. The reinforcing member may be cylindrical, rectangular or other shapes, hollow or solid. An I, H or rectangle on edge section could also be used.

Other objects, advantages and features of the present invention will become apparent from the accompanying description and drawings, which are merely exemplary.

In the drawings:

FIG. 1 is an overall perspective view of the front of an industrial furnace incorporating the present invention with a portion of the top wall cut away;

FIG. 2 is an overall exploded perspective view of the components of the top wall element of FIG. 1 and a corner of one component being cut away; and

FIG. 3 is an overall perspective view of a tubular reinforcing element employed in the top wall of FIG. 2.

Proceeding next to the drawings wherein like reference symbols indicate the same parts throughout the various views, a specific embodiment of the present invention will be described in detail.

In FIG. 1 there is indicated generally at **10** an industrial furnace which comprises a heating chamber **11** enclosed by side walls **12, 13** and top wall **14.** While this particular embodiment of the invention is concerned with an industrial furnace, it is to be understood that the invention may also be incorporated in laboratory ovens and other types of heating structures generally comprising a heating chamber enclosed by outer walls.

Along the upper inner edges of the side walls **12** and **13,** there are formed longitudinally extending shoulders **15** and **16.**

The top wall element **14,** as shown in greater detail in FIG. **2,** comprises a top plate **17** bonded to a bottom plate **18.** Top plate **17** has a width greater than that of bottom plate **18** so as to form laterally extending portions **19** and **20.**

Within bottom plate **18** are embedded heating elements **21** which may be in the form of heating coils as known in the art.

Embedded in the top plate **17** are a plurality of ceramic tubular elements **22** shown in greater detail in FIG. **3.** The lengths of the tubular elements **22** are such that they extend the entire width of the top plate, as may be seen in FIG. **1.** Thus, the reinforcing tubular elements extend into the top plate extensions **19** and **20.** The tubular elements **22** not only reinforce the top wall **14** but provide additional supporting strength. The reinforcing means may be a tubular member, cylindrical, an I, H or plain rectangle on edge.

The top wall **14** is positioned as shown in FIG. **1** such that the bottom plate **18** thereof fits closely between the inner faces of side walls **12** and **13** and the projections **19** and **20** of the top plate **17** are closely received upon the longitudinal shoulders **15** and **16** of the side walls. Since the ceramic tubular reinforcing members **22** span the complete breadth of the top plate **17** of the top element **14,** the tubular members not only reinforce the top element but support the element from the shoulders of the side walls.

The elements and reinforcing members are molded in situ using vacuum molding, such as described in copending Application Ser. No. 371,752, filed June 20, 1973. The teaching in Hesse U.S. Pat. No. 3,500,444 also can be employed.

It is therefore apparent that the top wall element disclosed herein provides a simple but effective structure within which is embedded both heating elements and reinforcing members. By forming the top wall element as a single unit, problems of assembly and disassembly of the structure are considerably facilitated.

It will be understood that changes in various details of construction and arrangement of parts may be made without departing from the spirit of the invention except as defined in the appended claims.

What is claimed is:

1. In an industrial furnace and the like having a heating chamber enclosed by side walls, a top insulating wall element positioned across said side walls comprising heating element means embedded in said top insulating wall element in heating relationship to said heating chamber and reinforcing means embedded in said top insulating wall means above said heating element means coextensive with the breadth of said top wall element.

2. In an industrial furnace as claimed in claim 1 wherein said top element comprises a first plate in which said heating element means is embedded and a second plate integral to said first plate in which said reinforcing means is embedded.

3. In an industrial furnace as claimed in claim 2 wherein the width of said second plate is greater than the width of said first plate.

4. In an industrial furnace as claimed in claim 1 wherein said reinforcing means comprises a plurality of tubular elements, each having a length equal to the width of the top element.

5. In an industrial furnace as claimed in claim 4 wherein said tubular elements are ceramic.

6. In an industrial furnace as claimed in claim 2 wherein each side wall has a longitudinally extending shoulder along the top inner edge thereof, portions of said second plate projecting outwardly of said first plate resting on said shoulders.

7. In an industrial furnace as claimed in claim 6 wherein said first plate fits closely between said side walls below said shoulders.

8. In an industrial furnace as claimed in claim 1 wherein there are molded-in-situ refractory fiber embedded heating element means and reinforcing means.

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