

[54] **MODULAR SUPPORT FOR CARRYING
CERAMIC PRODUCTS DURING BAKING**

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[56] **References Cited**

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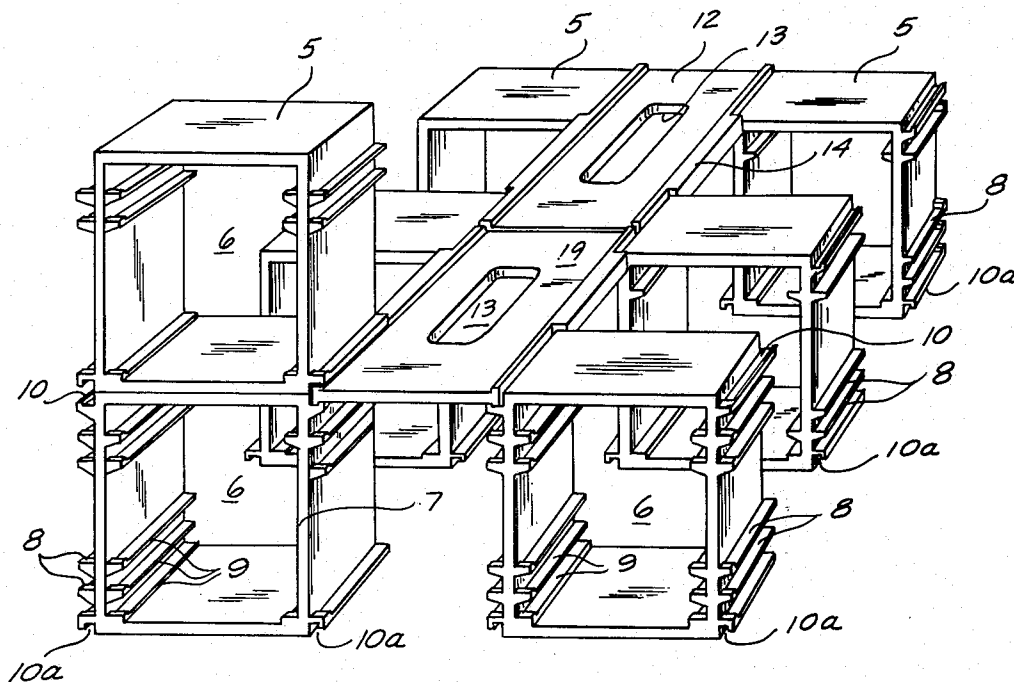
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[57] **ABSTRACT**

A support formed of modular elements made of refractory material. Each modular element is a rectangular case open at both ends and having horizontally extending teeth projecting from the inner and outer faces of two vertical sides. The teeth are adapted to carry horizontal plates upon which products to be baked are supported while the support moves through a furnace. Plate-like interconnecting elements are provided for assembling the modular elements.

6 Claims, 3 Drawing Figures



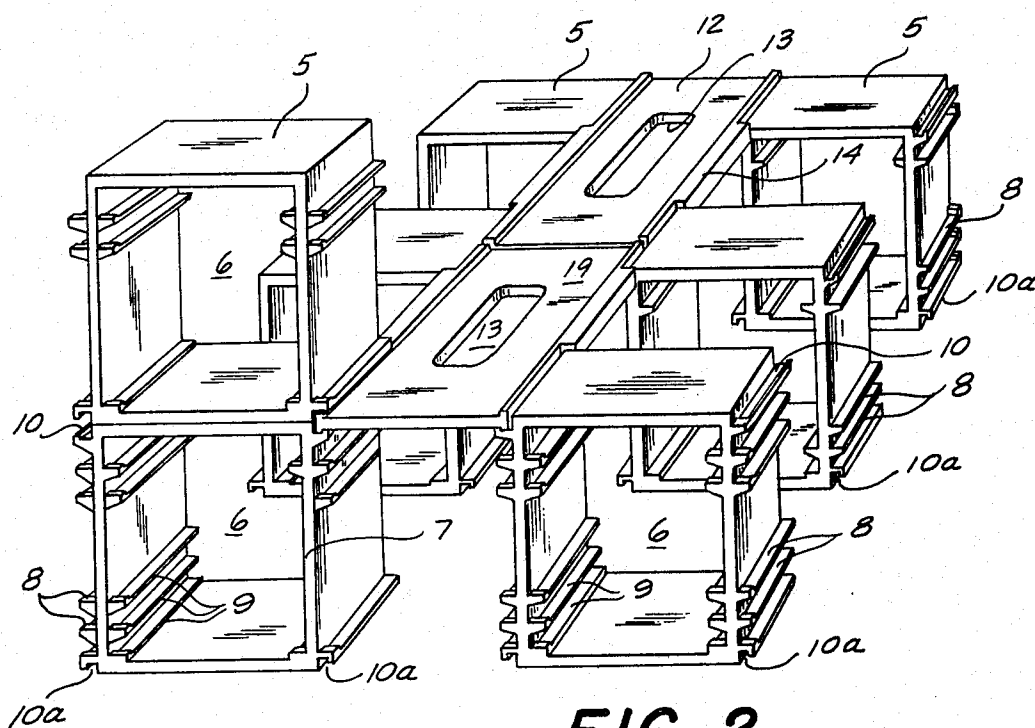


FIG. 1

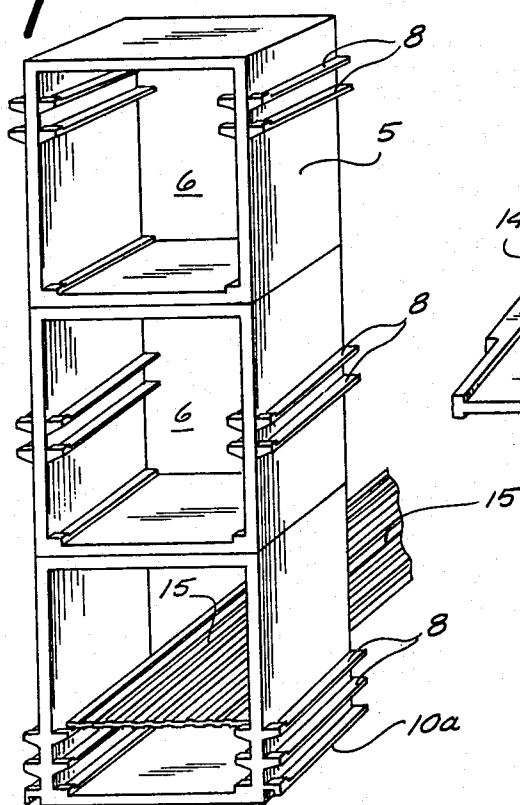
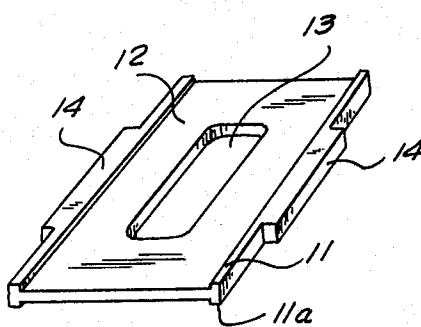


FIG. 3



MODULAR SUPPORT FOR CARRYING CERAMIC PRODUCTS DURING BAKING

In the baking of ceramic products, subjected either to a double-baking or a single-baking process, in some cases supports of refractory material generally known as "toothed boxes" are used. These boxes have a quadrangular box shape, with open ends, and may be stacked one upon another. The boxes are provided on their vertical sides with protruding teeth symmetrically opposed on both faces in order to provide bearings for plates of refractory material intended to support the ceramic materials, particularly glazed products, which are to be baked.

It is also known that the toothed boxes, arranged in coaxial rows and possibly superimposed one upon another, are supported by a loading platform formed of suitable carriages. After the boxes are filled with the ceramic products to be baked, they are moved to the furnace.

The carriages pass through the tunnel of the furnace in a predetermined time sufficient to bake the ceramic products being transported.

The actual baking method mentioned above entails some drawbacks resulting from the structure of the toothed boxes. Due to their shape, when the boxes are arranged in coaxial rows, they form cuniculi with a quadrangular cavity and a length generally equal to the length of the carriage platform. The cuniculi are longitudinally subdivided in spaces delimited by the parallel refractory plates which support the products to be baked. The hot air circulates through these spaces in an insufficient manner, so that while the ceramic products facing the opposed ends of the cuniculi which contain them are subjected to a mass of hot air sufficient to completely bake them, complete baking of the ceramic products located towards the center of said cuniculi, namely, in the innermost zone of the corresponding alveoli does not occur. In effect, in the innermost zone the thermal transmission is insufficient, and therefore it is necessary to extend the time each carriage remains within the furnace, with a considerable waste of thermal energy and without the complete elimination of the risk of incomplete baking for some ceramic products.

The main object of present invention is to provide toothed supporting cases, made of a refractory material, for ceramic products and particularly for glazed products to be submitted to a single-baking. The cases are formed by modular elements which can be assembled and made interdependent by removable interconnecting members which provide wide empty zones through which the hot air of the furnace circulates freely. As a result, all the ceramic products are subjected to the hot air regardless of where they are located with respect to the longitudinal order of the supports on which they are carried.

Another object of the invention is to reduce the weight of the supporting frames for the ceramic products, that is, to attain a reduction of the passive load located within the furnace and to correspondingly increase the useful load, the total weight being equal as compared to the known toothed boxes heretofore used.

Still another object of the invention is to provide refractory supports of variable length resulting from the assembly of more or fewer of the modular elements forming the supports.

A further object of the invention is to provide refractory supports comprising plates which may be superimposed, with dimensional tolerances considerably smaller between the various elements, due to the reduction of the length of each box.

With the above-mentioned objects in view, the subject matter of the invention is a support, made of refractory material, for the baking of ceramic products, particularly but not exclusively glazed products, characterized in that the support is formed by cases having sides which constitute modular elements which may be assembled in longitudinal batteries; the batteries may be superimposed. The modular elements are interconnectable by the use of separate removable interconnecting elements suitable to effect the formation of supporting frames of refractory material. The supporting frames comprise spaces occupied by parallel and superimposed bearing plates for the ceramic products, alternating with vacant or partially vacant spaces, suitable to allow the free circulation of the air within the furnace and, hence, the best thermal distribution with respect to the ceramic products being baked.

Additional features of the support will be seen from the following specification in which reference is made to the annexed drawings, only as an illustrative and non-limiting example wherein:

FIG. 1 shows three superimposed modular elements;

FIG. 2 illustrates one of the many possibilities of the modular element assembly according to the invention; and

FIG. 3 illustrates one of the possible embodiments of the interconnecting element for removably interconnecting a plurality of cases.

As shown on the drawing, each toothed case 5 comprises a preferably quadrangular frame, of a refractory material, with open ends 6 and vertical sides 7 provided with longitudinal outer teeth 8 and inner teeth 9, symmetrically arranged on the opposite faces of each side.

Each series of outer teeth begins and terminates, considering the outer face of each vertical side of each case 5, with two teeth 10, 10a, having a substantially tile-shaped profile. The profile defines a cavity suitable to accommodate the half-profile 11 or 11a of one of the terminal side edges of an element 12 (FIG. 3) made of a refractory material. When element 12 is mounted together with cases 5, as shown in FIG. 2, it provides an intermediate connection between four toothed cases 5 substantially arranged at the vertices of a cube.

As may be seen clearly from FIG. 2, the modular arrangements which may be obtained with cases 5 and elements 12 is practically unlimited, in terms of the three dimensions; length, width, and height. At the same time, the various elements are maintained perfectly stable and mutually spaced, but since the elements 12 are easily removable, disassembly of the frame is made rapid and easy.

As a non-limiting example, each connecting element 12 is preferably substantially plate-like and provided with a wide central aperture 13 for the circulation of air and with opposed intermediate edges 14 which fit between the edges of two, three, or four cases 5.

A very important particular feature of each connecting element 12 is the perfectly symmetrical structure of it, due to which the element does not require any particular mounting position with respect to cases 5 and therefore, once arranged in its horizontal position it

may be turned through 180° either in the longitudinal or in the transverse direction.

In the drawing, for the sake of clarity, some of the teeth 8, 9 on the vertical sides of cases 5 have been omitted, but it is understood that the vertical inner and outer teeth are uninterrupted along the whole height of each side. Resting on pairs of inwardly opposed teeth are plates 15 (FIG. 1) of a refractory material intended to support the ceramic products which are to be subjected to single-baking and/or double-baking cycles.

From the foregoing, the advantages deriving from the use of a support according to the invention, formed by modular elements, appear clearly and, on the whole, they may be summarized as follows:

The increase of the circulation of air in the furnace during the baking of the ceramic products and consequent improvement of the baking of the products; this fact is particularly important for glazed products submitted to a single-baking;

A considerable reduction of the refractory frame weight, since the walls corresponding to every other case in a horizontal line are eliminated, while the connecting elements 12 are lightened by the wide central apertures 13. The reduction of the passive weight due to the frame provides the advantage of a corresponding increase of the capacity of the useful load of products to be baked;

The possibility of obtaining dimensional tolerances considerably smaller than those of the prior art frames;

The possibility of obtaining frames of the required dimensions, as to width, height, and depth, due to the modular nature of the elements, and their stability, and the rapidity of the assembling and the disassembling of the modular elements used; and

The reduction of the operating cost deriving from the stated features.

Obviously, the particular shapes of the modular elements represented and described as an illustrative example are not essential and, without changing the principle of the refractory frame, formed by assembled modular elements, providing mutual engagements which may be rapidly obtained and rapidly released, the shapes may change while remaining within the scope of the invention.

What is claimed is:

1. A support for holding ceramic products during baking, comprising:

a. a plurality of open-ended rectangular cases each

having a top wall, a bottom wall, and two vertical side walls,

b. a series of vertically spaced apart horizontal teeth projecting from each of the inner and outer faces of each of said side walls,

c. each of the extreme upper and lower teeth of each outer series of teeth being profiled to define, together with an extreme tooth of a similar case stacked above or below its case, respectively, a partially enclosed horizontally extending cavity,

d. a plate-like connector element having two parallel side edges, the end portion of each of said edges being profiled to be accommodated by one of said cavities and not removable from said cavity by relative movement between said connector element and the teeth defining said cavity in a direction perpendicular to the side walls of the cases carrying said teeth, so that said connector element can maintain a predetermined spacing between two cases arranged side-by-side, and

e. an enlargement carried by each connector element side edge between the two end portions of that side edge, said enlargement being profiled so that it cannot be accommodated by one of said cavities, whereby said enlargement can maintain a horizontal spacing between two successive horizontally aligned cases which are engaged by said connector element.

2. A support as defined in claim 1 wherein each of said cavities has a T-shaped cross-sectional shape, and each of said end portions of said connector element side edges has a T-shaped profile.

3. A support as defined in claim 1 wherein said connector element engages eight of said cases.

4. A support as defined in claim 1 including a plurality of said connector elements, each of said connector elements being arranged between two parallel rows of said cases, so as to space the rows apart, and between two successive cases in each row, so as to space said cases apart.

5. A support as defined in claim 1 wherein said connector element is formed with at least one aperture extending completely through its thickness.

6. A support as defined in claim 1 wherein said cases and connector element are all formed of refractory material.

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