

March 11, 1924.

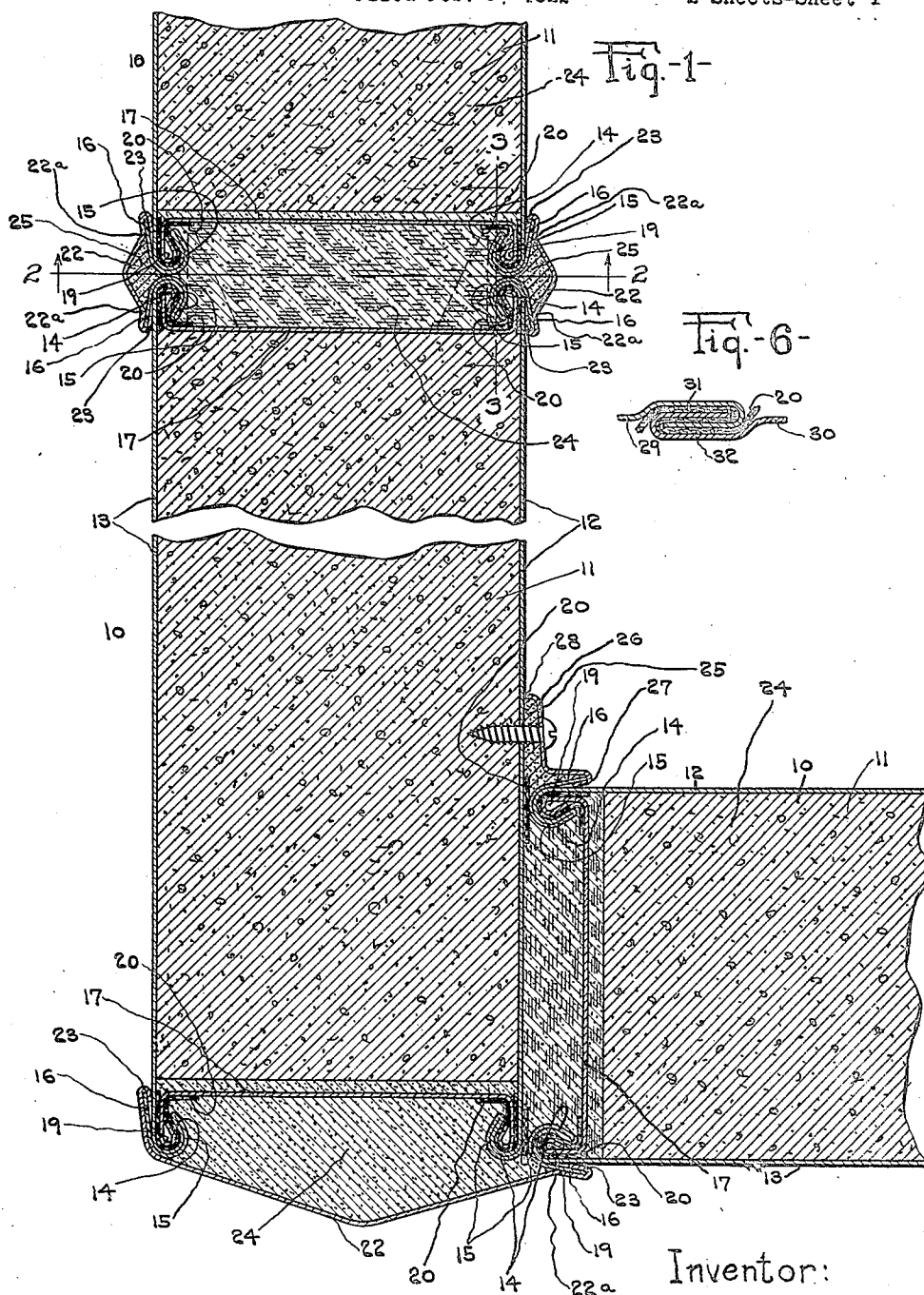
1,486,528

G. R. LAWRENCE

OVEN

Filed Feb. 3, 1922

2 Sheets-Sheet 1



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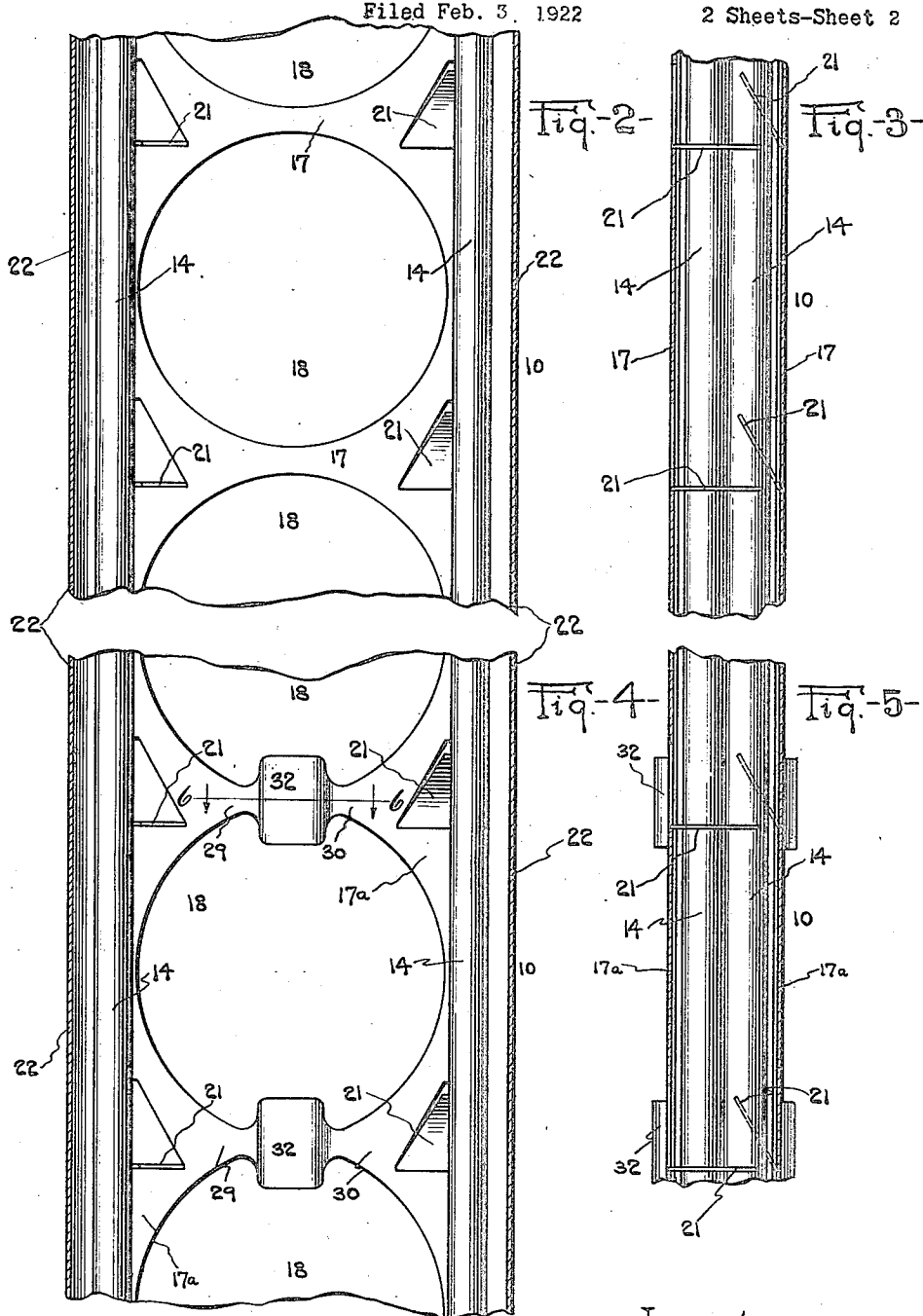
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UNITED STATES PATENT OFFICE.

GEORGE R. LAWRENCE, OF CHICAGO, ILLINOIS.

OVEN.

Application filed February 3, 1922. Serial No. 533,860.

To all whom it may concern:

Be it known that I, GEORGE R. LAWRENCE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Ovens, of which the following is a specification.

This invention relates to improvements in ovens, and while it is more particularly intended for use in high temperature type of ovens, such as are employed in enameling and analogous plants, yet it is applicable for use in other kinds of ovens, and for this reason I do not wish to be limited in its application to any particular kind of oven, but may employ it wherever it may be found desirable, without departing from the spirit of the invention.

The invention consists in certain peculiarities of the construction, novel arrangement and combination of the various parts thereof as will be hereinafter more fully set forth and specifically claimed.

As is well known to those skilled in the art of enameling, great loss of heat from ovens of the construction heretofore in general use in such establishments has been experienced by reason of the construction and the heat conducting qualities of the material out of which the ovens are made, which material conducts the heat from the interior of the oven and radiates it outwardly therefrom, to the atmosphere, where it is dissipated to no useful purpose. This great loss of heat, it is manifest, requires the consumption of an excessive amount of fuel to cause the ovens to perform their functions, thereby entailing much unnecessary expense, besides time and labor, as well as discomfort to workmen employed in the vicinity of the ovens.

In the above mentioned plants, it is often desirable to move the ovens from one place to another, or from one plant to another or a new one, and as heretofore generally constructed, this could not be done without practically demolishing the ovens and then rebuilding them, in which operation, but little, if any, of the material of the original ovens could be used in the rebuilt ones.

The principal object of the invention, is to provide an oven of such construction and arrangement of its parts, and of such materials, that the escape or loss of heat from its

interior will be reduced to a minimum, in fact, practically eliminated.

Another important object, is, to furnish an oven of the above mentioned general character, which shall be portable, that is, made up of detachable units or panels, to the end, that they can be readily disconnected one from another, transported, and re-assembled with but trifling loss in material and little expense, it being understood that in said operation all of the parts of the original oven may be utilized, except the frangible filling used at the juncture of the units, which filling may be reduced to plastic form and re-used.

Still another object is the provision of an oven of such characteristics that it may be manufactured in an equipped shop at less expense and in a better manner than where assembled.

Other objects and advantages of the invention will be disclosed in the following description and explanation.

The ovens constructed according to this invention, are substantially rectangular or box-like in shape, and the walls thereof, by which is meant the side and end walls, as well as, the floor and top or ceiling, are of like construction, and heat may be supplied to the ovens in the ordinary or any preferred way.

In the accompanying drawings,—

Fig. 1 is a plan sectional view of one of the corner portions of an oven embodying one form of the invention, showing the means for connecting together the units or sections comprising the walls of the oven and illustrating, in part, the means for insulating elements of the structure against the passage of heat from one to another.

Fig. 2 is a vertical sectional view taken on line 2—2 of Fig. 1 looking in the direction indicated by the arrows, showing a portion of the casing or shell of one of the wall sections of the oven, with the heat insulating material and filling for said casing omitted.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1 looking in the direction indicated by the arrows.

Fig. 4 is a similar view to Fig. 2 showing a slight modification in the construction of the elements which connect the sides of each unit or section at or near its perimeter.

Fig. 5 is a sectional view taken on line

3—3 of Fig. 1, showing the modification of Fig. 4.

Fig. 6 is a cross-sectional view taken on line 6—6 of Fig. 4 showing means for insulating and detachably connecting parts comprising the perimetric connecting elements of each unit.

Like numerals of reference refer to corresponding parts throughout the different views of the drawings.

Referring now more particularly to Figs. 1 to 3 inclusive of the drawings, the reference numeral 10 designates as a whole one of the units or sections which comprise the walls of the oven. These units may be made of any suitable size but rectangular in shape. By preference, they are made of lengths equal to that of the height of the oven and are located side by side to form the walls thereof, but may be made of less lengths and placed in tiers one on the other so that the superimposed units or panels will be vertically aligned, and so that each vertical row of the units will abut against the units of the vertical row or rows of units adjacent thereto.

Each unit comprises a rectangular block 11, of non-heat-conducting material, which blocks may be molded or otherwise fashioned into desired sizes, and a casing, the inner and outer sides 12 and 13 respectively of which are made of imperforate sheet metal and somewhat larger in dimensions than the block 11 which fits between said sides of the casing.

At each of its edges, each of the sides of the casing is provided with an in-turned hook-like portion 14, by suitably curving the edges of the metal side piece. As shown in Fig. 1, the inner or free end of this hook-like portion of each of the edges of the metallic sides approaches the inner surface of the side member on which it is formed, and a portion 15 of the metal comprising a part of the hook-shaped portion 14 is folded back upon itself for reinforcement and is then extended outwardly from the outer surface of the side member of the casing at an angle thereto as is shown at 16, see Fig. 1 of the drawings.

By this construction it will be apparent and readily understood that the sides 12 and 13 of each unit will have at each of their edges an in-turned hook portion 14 the free inner edges of which portions will be spaced from their respective side members of the casing and located parallel with and in spaced relation to one another. Between each of the sides 12 and 13 near the perimeter thereof at each of their corresponding edges is located a connecting or tying element or plate 17 for the sides 12 and 13 of each casing. Each of the tying plates 17 is made of sheet metal and provided with a plurality of openings 18 of any suitable

shape, but preferably circular, for largely reducing the conductivity thereof, and of such dimensions and disposition as to extend from near the side edges of the plate and close to each other in order that the plate will constitute a spider-like element, yet with enough material therein to provide sufficient rigidity for securely connecting the sides 12 and 13 of the casing for the purpose of holding them against the sides of the non-heat-conducting block 11 there-between. Each of the tie plate 17 is provided at each of its side edges with deflected loops 19 which are engaged by the hooked flanges or portions 14 on the edges of the side pieces 12 and 13 of each casing.

Located between each of the deflected loops 19 and the hooked portion 14 with which it engages, is a strip of asbestos 20 or other suitable heat insulating material, which it will be observed by reference to Fig. 1, are of sufficient widths, so that when positioned as above mentioned, they will prevent any portions of the loops 19 and the plates 17 on which they are formed contacting with the in-turned or hooked flanges 14 of the side pieces of the casing with which said loops engage. By this arrangement and by reason of the fact that each of the tie plates 17 is rendered spider-like by reason of the cut-away portions or openings 18 formed therein, it is manifest that the heat conductivity of said plates will be eliminated or reduced to a minimum, to the end that heat from the interior of the oven will be prevented passing through the oven walls by reason of the said tie plates. Each of the tie plates 17 is provided near each of its side edges with a plurality of projections 21 which are partially cut out of the metal composing the plates 17, and extended inwardly therefrom. These projections are by preference located between the openings 18 of each of the plates 17, and as before stated, near the sides thereof, and are substantially triangular in shape as shown in Fig. 2 of the drawings. These projections or arms 21 are deflected outwardly of the casing on which their plates are mounted and are employed to rest against the adjacent surfaces of the hooks 14 of the sides of the casing.

By reference to Fig. 1, it will be seen and understood that the angularly disposed extensions 16 of the portion 14 of one of the sections or units 10 are directed in the opposite direction from the portions 16 of the adjacent unit and that these angular extensions lie alongside the outer surfaces of the sides 12 and 13 of each unit. To detachably secure the units together, a spring clip or strip 22 of metal having at each of its side edges an in-turned flange 23 to engage the angular extensions 16 is employed. By this means it is obvious that as the clips or strips 22 are made of resilient

material and are outwardly bowed, they can be readily placed in engagement with the extensions 16 at one of the ends thereof by pressing the bowed portions of said spring inwardly which will cause the in-turned flanges 23 to be separated sufficiently to freely slide on said extensions. After the pressure has been removed from the body portions of the clips 22, the in-turned flanges 23 will be caused to grip the extensions and thus securely unite the adjacent surfaces of the two units. When thus united, the space between the tie plates 17 on the adjacent surface of the connected units is supplied with plastic material 24 of non-heat-conducting quality such as asbestos-cement, which material will fill the openings 18 in the plates 17, and any spaces there may be between said plates and the blocks 11, of the casings. The material used for the above mentioned filling purpose, is not only of a non-heat-conducting nature, but is also of such character as to be easily disintegrated or crumbled after it becomes "set" or hardened, yet, when not disturbed, affords a compact body in which the arms 21 will be imbedded, it being understood that said arms are deflected from the plane of the plates 17, before the material 24 is placed between said plates.

The space between the clip or locking strip 22 on each side of the juncture of the casings and the extensions 16 with which said clip engages, is filled with plastic material 25 such as plaster of Paris or other suitable material which is frangible when it becomes set or hardened.

At each corner within the oven a clip or locking strip 26 of substantially the shape shown in Fig. 1 of the drawings, and of sufficient length to extend from corner to corner of the oven, is employed for connecting one of the units of the end wall to one of the units of the side, top or bottom wall. As shown, the clip 26 is provided at one of its edges with an in-turned flange 27 to engage the angular extension 16 and at its opposite edge with a substantially right angled flange 28 to rest against the inner surface of one of the units of the side wall, in such a way as to furnish a compartment or vertical chamber between the clip 26 and the wall of the last named unit which space or compartment is filled with plastic material 25 such as plaster of Paris or any other suitable material which is frangible after becoming set or hardened.

At each outer corner of the oven a clip 22 of substantially the same construction as those used at the juncture of the units or sections and above described is employed to engage the oppositely and angularly disposed extensions 16 on the outer walls of the abutting corner units. In each of the spaces between the clips 22 at each corner of the

oven and the casings is supplied plastic material 24 such as asbestos cement or any other material which is friable after having become set or hardened.

It will be noted in Fig. 1 that the unit 11 located at a right angle to and against another unit, which may be termed a unit of one of the side walls of the oven, has located between its hooked extensions 14 and the adjacent wall of the last named unit, strips 20 of asbestos or other heat insulating material.

In Figs. 4 to 6 inclusive is shown a modification in the construction of the tie plates which unite the side plates of each unit at their edges. In this modification one of said tie plates is designated as a whole by the numeral 17^a, and as in the other construction of such plates, is provided with a plurality of openings 18 and a plurality of arms 21 punched out of the plate near its sides to rest against the hooked flanges or portions 14 of the sides of the casing on which the plate is mounted so as to assist in holding the opposite adjoining plate in the proper position. As shown in Fig. 4, the plate 17^a is provided between the openings 18 therein with connecting portions 29 and 30, which lie nearly in the same plane and extend inwardly from the side edges of the plate. These connecting portions 29 and 30 are provided with loops 31 and 32 at their adjacent ends, which loops have their opposite ends open so as to permit them to be interlocked as shown in Fig. 6 of the drawings, in which view it will be observed that a strip of asbestos 20 or other non-heat-conducting material is interposed between the members of said loops so as to insulate them from each other.

By means of the modified construction shown in Figs. 4 to 6 inclusive and just above described, it will be understood that each of the tie plates 17^a is longitudinally divided at about its middle, and that when connected by means of the loops 31 and 32 on the inner portions of the connecting parts 29 and 30 respectively of the plate, the insulation 20, see Fig. 6, between the parts of said loops will still greatly reduce the conductivity of said plates.

From the foregoing, and by reference to the drawings, it will be readily understood and clearly seen that by my improvements, interchangeable sections or units are provided, thus permitting them to be used at any points or places in the wall or walls of the furnace and thereby avoiding the necessity of making them rights and lefts or male and female as has heretofore generally been done. It is further apparent that after the wall or walls have been built up as above set forth, and it should be desirable to move the furnace, all that is necessary in order to separate the sections or units one from

another for easy transportation, is to strike the clips or locking strips 22 several blows with a hammer, which will cause the plaster of Paris or filling 25 to be broken to such an extent that it can be readily removed from the spaces in which it is located, after which it is manifest the clips 22 or locking strips can be detached from the extensions 16 and thus detach or disconnect the units one from another. After this has been done, the material 24 between the units can be disintegrated and readily removed for use at another time or in rebuilding the furnace.

While the filling between the sides 12 and 13 of the unit casings has been above referred to as blocks 11, of non-heat-conducting material, yet I desire it to be understood that said filling, as well as the filling 24, may be in the form of a mass or body of powdered, ground or wool-like heat insulating on non-heat-conducting substance.

By the use of the locking clips or strips 22 and 26, at the junctures of the units, and at the outer and inner corners of the oven, respectively, it is apparent that not only very simple, strong and durable means for locking the parts together is provided, but also, by reason of the novel construction of said clips and the elements with which they engage, hermetically sealed joints will be provided, thereby preventing the passage of dust and the like into the oven, or outwardly from the cavities of said clips, for it is apparent that the interturned flanges 23 will bear against one of the surfaces of the extensions 16, while the bends 22^a, of the bowed portion of each clip will bear against the opposite surfaces of said extensions, thereby forming air-tight joints.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A section or unit for a wall of an oven comprising a casing, non-heat-conducting material between the sides of the casing and perforated tie plates transversely uniting said sides at edges thereof.

2. A section or unit for a wall of an oven comprising a casing, a block of non-heat-conducting material between the sides of the casing and perforated tie plates transversely uniting said sides at edges thereof.

3. A section or unit for a wall of an oven comprising a casing, non-heat-conducting material between the sides of the casing, and perforated tie plates transversely uniting said sides at edges thereof and insulated against heat therefrom.

4. A section or unit for a wall of an oven comprising a rectangular casing, a rectangular block of non-heat-conducting material between the sides of the casing and perforated tie plates transversely uniting said

sides at edges thereof and insulated against heat therefrom.

5. A section or unit for a wall of an oven comprising a casing having edges thereof provided with inwardly extended hooked portions, non-heat-conducting material between the sides of the casing, perforated tie plates transversely disposed between the sides of the casing provided with said hooked portions, said plates having at their side edges deflected loops engaging said hooked portions, and heat insulating material interposed between said loops and hooked portions.

6. A section or unit for a wall of an oven comprising a casing having edges thereof provided with inwardly extended hooked portions, each of said hooked portions being bent back upon itself and provided with an angular extension externally of the side of the casing on which said hooked portion is mounted, non-heat-conducting material between the sides of the casing, perforated tie plates transversely disposed between the sides of the casing provided with said hooked portions, said plates having at their side edges deflected loops engaging said hooked portions and heat insulating material interposed between said loops and hooked portions.

7. A section or unit for a wall of an oven comprising a casing having edges thereof provided with inwardly extended hooked portions, non-heat-conducting material between the sides of the casing, perforated tie plates transversely disposed between the sides of the casing provided with said hooked portions, each of said plates being centrally and longitudinally divided, said pieces of said plate having on their adjacent edges interlocking loops, insulating material interposed between the members of said loops, each of said pieces having at their outer edges deflected loops engaging said hooked portions, and heat insulating material interposed between said deflected loops and hooked portions.

8. A section or unit for a wall of an oven comprising a rectangular casing, a rectangular block of non-heat-conducting material between the sides of the casing and perforated tie plates transversely uniting said sides and insulated therefrom at edges thereof, each of said plates consisting of a pair of longitudinally disposed perforated portions having extended from their adjacent edges interlocking loops and insulating material interposed between the members of said loops.

9. An oven wall consisting of a plurality of sections detachably connected together at their meeting edges, each of said sections comprising a casing, non-heat-conducting material between the sides of the casing and perforated tie plates transversely unit-

ing said sides at edges thereof and insulated therefrom.

10. An oven wall consisting of a plurality of sections detachably connected together at their meeting edges, each of said sections comprising a rectangular casing having edges thereof provided with inwardly extended hooked portions, non-heat-conducting material between the sides of the casing, perforated tie plates transversely disposed between the sides of the casing provided with said hooked portions, said plates having at their side edges deflected loops engaging said hooked portions, and heat-insulating material interposed between said loops and hooked portions.

11. An oven wall consisting of a plurality of sections located side by side, each of said sections comprising a rectangular casing having its side edges provided with inwardly extended hooked portions, non-heat-conducting material between the sides of each casing, a perforated tie plate transversely disposed between the sides of each casing inwardly of said hooked portions thereof and having at its side edges outwardly deflected loops engaging said portions, insulating means interposed between said loops and hooked portions, means detachably connecting the sides of the sections at their junctures, and friable insulating material interposed between the adjacent tie plates of the adjoining sections.

12. An oven wall consisting of a plurality of sections located side by side, each of said sections comprising a rectangular casing having its side edges provided with inwardly extended hooked portions, each of said hooked portions being bent back upon itself and provided with an angular extension externally of the side of the casing on which said hooked portion is mounted, non-heat-conducting material between the sides of each casing, a perforated tie plate transversely disposed between the sides of each casing inwardly of said hooked portions thereof and having at its side edges outwardly deflected loops engaging said portions, insulating means interposed between said loops and hooked portions, an outwardly bent resilient clip or locking strip having intumed flanges at each of its side edges engaging the said angular extensions of the hooked portions on each side of the sections at the juncture thereof, friable insulating material interposed between the adjacent tie plates of the adjoining sections, and frangible material in the spaces between the said clips and said angular extensions.

13. An oven wall consisting of a plurality of sections located side by side, each of said sections comprising a rectangular casing having its side edges provided with inwardly extended hooked portions, each of said

hooked portions being bent back upon itself and provided with an angular extension externally of the side of the casing on which said hooked portion is mounted, non-heat-conducting material between the sides of each casing, a perforated tie plate transversely disposed between the sides of each casing inwardly of said hooked portions thereof and having at its side edges outwardly deflected loops engaging said hooked portions, each of said plates being centrally and longitudinally divided, said pieces of said plates having on their adjacent edges interlocking loops, insulating material interposed between the members of said loops, insulating material interposed between the loops and the hooked portions which said loops engage, an outwardly bent resilient clip or locking strip having intumed flanges at each of its edges engaging the said angular extensions of the hooked portions on each side of the sections at the juncture thereof, friable insulating material interposed between the adjacent tie plates of the adjoining sections, and frangible material in the spaces between the said clips and said angular extensions.

14. In an oven, the combination with a side wall thereof, of an end wall located at a right angle thereto, each of said walls consisting of a plurality of sections located side by side, each of said sections comprising a rectangular casing having its side edges provided with inwardly extended hooked portions, each of said hooked portions being bent back upon itself and provided with an angular extension externally of the side of the casing on which said hooked portion is mounted, non-heat-conducting material between the sides of each casing, a perforated tie plate transversely disposed between the sides of each casing inwardly of said hooked portions thereof and having at its side edges outwardly deflected loops engaging said portion, insulating means interposed between said loops and hooked portions, an outwardly bent resilient clip or locking strip having in-turned flanges at each of its side edges engaging the said angular extension of the hooked portions on each side of the sections at the juncture thereof, an outwardly bent resilient clip or locking strip having in-turned flanges at each of its edges engaging the angular extension of the hooked portion on the outer surface of the section at one end of the side wall and engaging the angular extension of the hooked portion on the outer surface of the section of the end wall adjacent the inner surface of the last named section of the side wall, a clip having an in-turned flange at one of its edges engaging the angular extensions of the hooked portion at the inner surface of the section of the end wall adjacent the outer section of the side wall and removably se-

cured to the last named section, friable insulating material interposed between the adjacent tie plates of the adjoining sections and between the tie plate of the section of the end wall adjacent the outer section of the side wall, and frangible material in the spaces formed by the said detachable clips. 5 of sections located side by side, each of said sections having at the edges of its sides an externally disposed extension, and an outwardly bent resilient clip having inturned flanges at each of its side edges engaging said extensions on each side of the sections at the juncture thereof. 10

15. An oven wall consisting of a plurality

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