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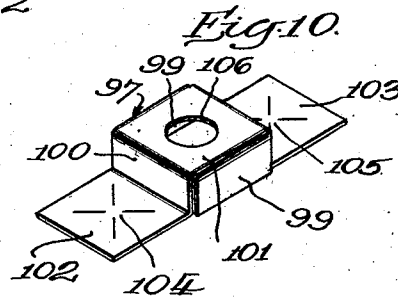
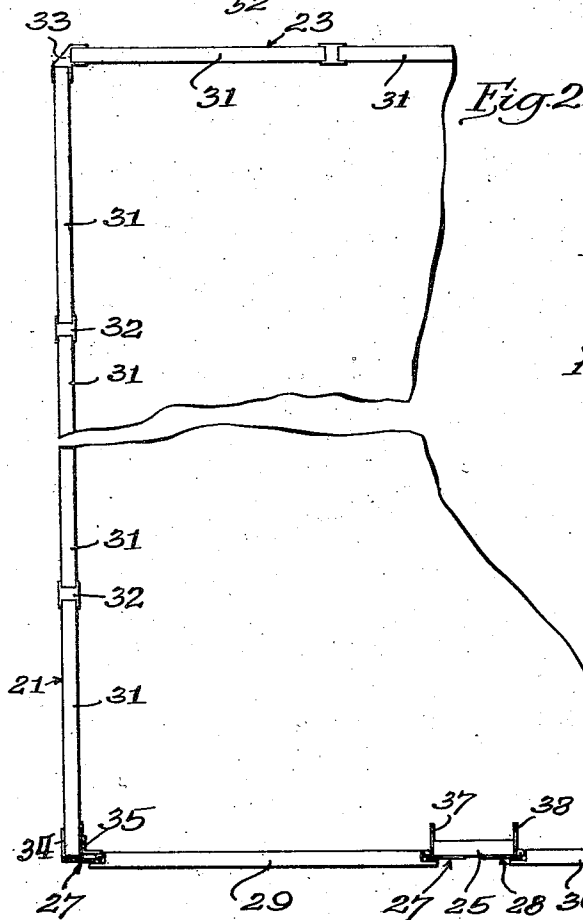
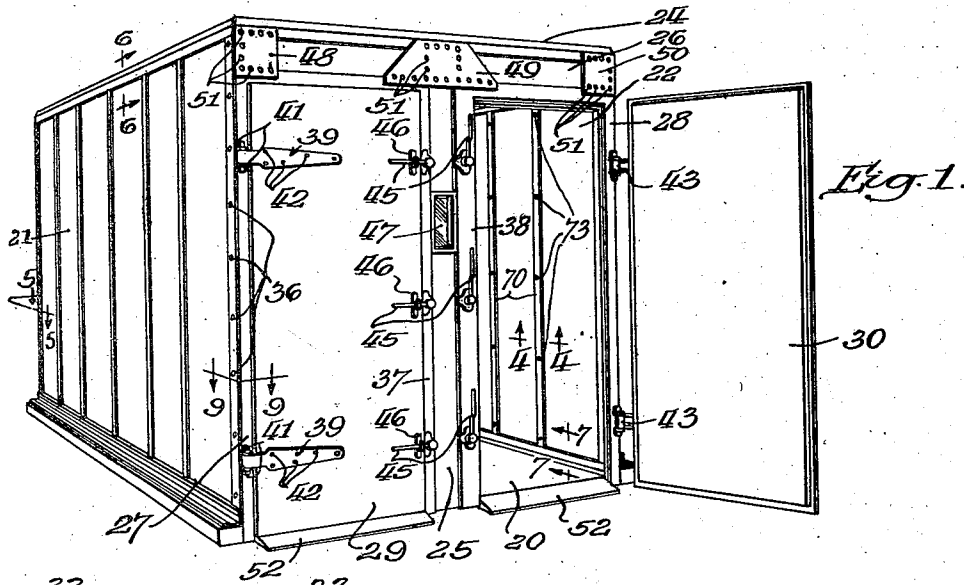
G. F. HAUF ET AL.

2,300,743

OVEN

Filed Sept. 22, 1938

2 Sheets-Sheet 1



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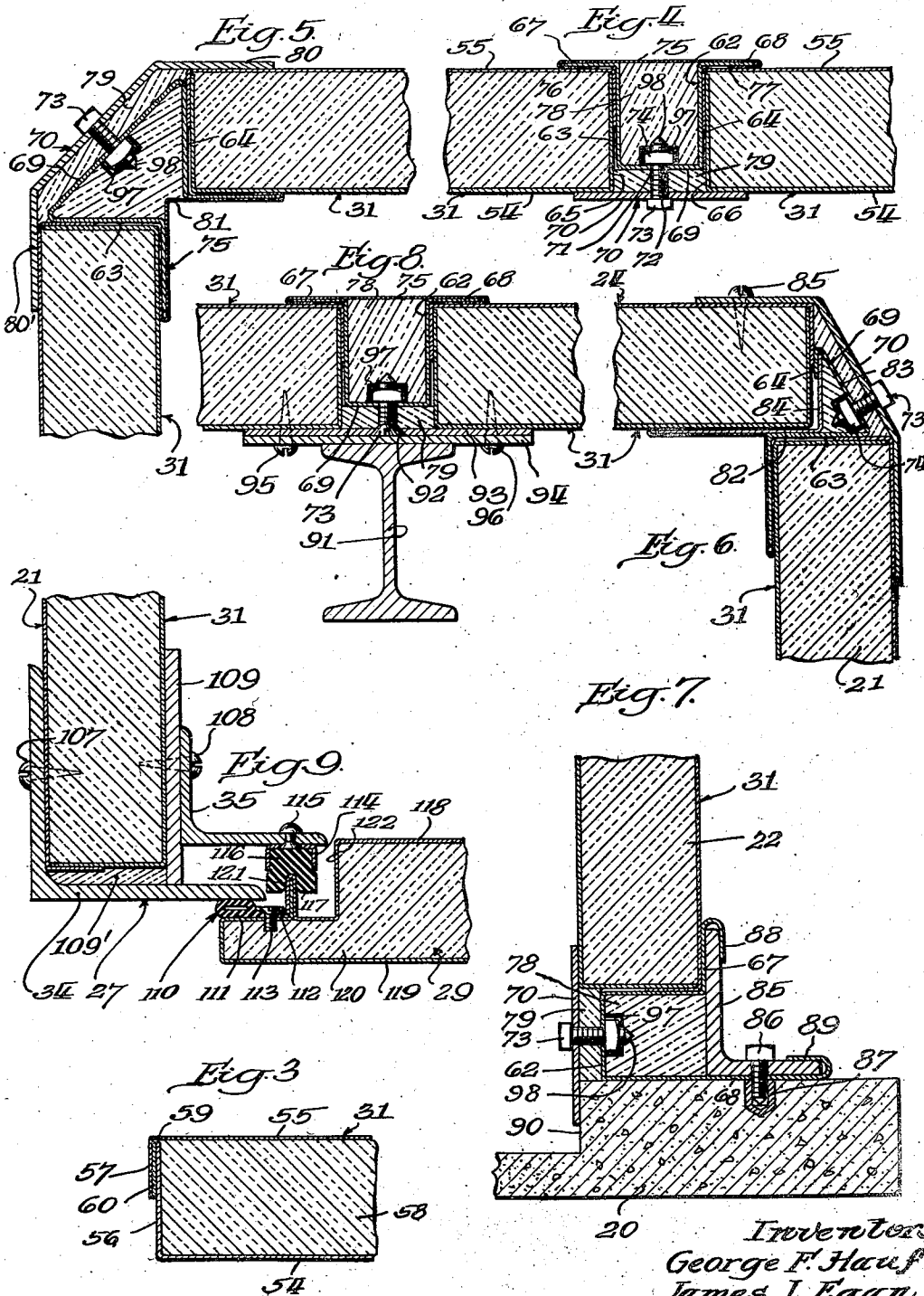
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OVEN

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,300,743

OVEN

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2 Claims. (Cl. 189-1)

Our invention relates generally to ovens, and more particularly to oven structures utilized in industrial and manufacturing processes such as the baking of finishes, products or chemicals or in low temperature heat treating where heat insulating structure is required, and also to structures utilized in the smoking and treatment of meat and the like where a structure having tightly sealed joints is desirable.

It is an object of our invention to provide an oven, the structure of which is adaptable to uses, such as baking, which require heat insulation, or to the smoking and treatment of meats and the like which requires a tightly sealed enclosure.

It is another object of our invention to provide an oven structure made up of prefabricated sections and parts adapted to be assembled at the place of use, which oven structure is easily assembled in such a way that the joints are tight and have good heat insulating properties.

Another object of our invention is to provide an oven made up of prefabricated sections and joints so constructed and arranged that all of the wall sections are flat and easily handled and shipped.

Another object of our invention is to provide an oven structure comprising wall sections adapted to be joined together and joint structures for joining the wall sections which not only provide tight joints, but also provide strong walls which are structurally rigid.

Another object of our invention is to provide a joint structure for joining the sections of an oven wall which presents a neat finished appearance when assembled.

Another object of our invention is to provide a joint structure for joining the sections of an oven wall which minimizes difficulty of aligning the joint fastening elements.

Another object of our invention is to provide a seal for an oven door which is effective upon closing of the door tightly to seal the joint between the door frame and the door.

The foregoing together with further objects, features and advantages of our invention are set forth in the following description of specific embodiments thereof, wherein:

Fig. 1 is a perspective view of an oven embodying a preferred form of our invention;

Fig. 2 is a fragmentary plan of the oven shown in Fig. 1;

Fig. 3 is a fragmentary sectional view of a preferred form of oven wall section;

Figs. 4, 5, 6, 7, and 9 are, respectively, fragmentary sectional views taken on the lines 4-4, 5-5, 6-6, 7-7, and 9-9 of Fig. 1 and in the direction of the respective arrows;

Fig. 8 is a fragmentary sectional view of an oven joint comprising a modification of the joint shown in Fig. 4 and particularly adapted for use where the walls are so large that some additional support is advisable; and

Fig. 10 is a perspective view of a preferred form of nut-holding cap utilized in our invention.

In the various figures of the drawings like reference numerals refer to similar parts that perform similar functions.

With particular reference to Figs. 1 and 2, an oven is generally illustrated which has a base or floor 20, side walls 21 and 22, an end wall 23, a roof or top 24, a front center panel 25, a front top panel 26 and door frames 27 and 28 that respectively fit doors 29 and 30. The side and end walls 21 and 23 and the top 24 are made up of prefabricated heat-insulating wall sections or panels 31 which are jointed together by gas and heat insulated joints such as 32 and 33, which are generally illustrated in Fig. 2, and will be more fully described with reference to Figs. 1 to 8, inclusive.

The door frames 27 and 28 preferably comprise metal angle members such as 34 and 35 secured to the ends of the side walls 21 and 22 and to the top panel 26 by bolts such as 36, or other suitable fastening means, and metal angle members 37 and 38 secured to the center panel 25. The door 29 is hung on hinges 39 which are secured to the side or door frame member 27 by screws or other suitable fastening means such as 41 and to the door by screws or other suitable fastening means, such as 42. The door 30 is similarly hung on hinges 43 which are secured to the opposite door frame member 28. When closed, the doors 29 and 30 are locked by manually operable latches 45 which are rotatably mounted on the upright angle members 37 and 38 of the door frames and engage sockets 46 on the doors 29 and 30.

A window 47, preferably of the double-pane type to eliminate moisture condensation, may be provided in the center panel 25 for looking into the oven without opening the doors. Reinforcing plates 48, 49 and 50 are secured to the front top panel 26 by screws or other suitable fastening means 51 to strengthen the structure above the doors 29 and 30. The base or floor 20 may be sloped to a suitable drain therein and a removable ramp 52 may be provided to give a gradual slope or rise at the doors which minimizes interference with the movement of material or conveyors into and out of the oven.

With particular reference to Fig. 3, the wall sections, such as 31 in Figs. 1 and 2, have substantially flat metal panels 54 and 55 which have integral side portions, such as 56 and 57, respectively, angularly disposed with respect to the panels. The metal panels 54 and 55 are separated by heat insulating material 58 that is adapted to the use for which the oven is made and which substantially fills the space between the panels 54 and 55. For instance, "Insulite" is a satisfactory heat insulating material for temperatures up to 180° F.; rock wool is satisfactory for temperatures up to 250° F., and magnesium block is satisfactory for temperatures up to 400° F.

The insulating material 58 is preferably thicker than the width of the side portions such as 56 so as to provide a space as at 59 and prevent direct metal contact between the side portions such as 56 and the metal panel 55. Also, strips of heat insulating material such as 60 preferably separate the side portions such as 56 and 57 to prevent direct metal to metal contact between those side portions. This type of wall section or panel structure is particularly desirable where the prevention of heat losses is important. The metal panels 54 and 55 are secured together by welding (preferably electric arc welding) the side portion 57 to the side portion 56 at spaced points or by spaced screws extending through the side portions 56 and 57.

Fig. 4 illustrates a preferred form of joint, such as 32 in Fig. 2, for joining wall sections or panels 31 in substantially the same plane. In Fig. 4, and also in Figs. 5, 6, 7, 8 and 9, the wall sections 31 are similar to that described with reference to Fig. 3, except that the strips of insulating material such as 60 in Fig. 3 are not shown. A channel member 62 has surfaces 63 and 64 that engage ends 65 and 66, respectively, of the adjacent wall sections and has flanges or extending portions 67 and 68 that are parallel to the plane surfaces of the wall sections 31. The channel member 62 also has a portion or surface 69 that is substantially parallel to a cover or plate 70 that covers the space between the adjacent wall sections or panels and engages the plane surfaces of the wall sections opposite the flanges or extending portions 67 and 68 on the channel member. The cover or plate 70 and the portion 69 of the channel member have aligned openings therein as at 71 and 72, respectively, through which fastening means such as bolts 73 extend. The bolts 73 are preferably spaced along the joint as shown in Fig. 1.

The portion 69 of the channel member is preferably spaced from the plate 70 and the bolts 73 are provided with cooperating nuts such as 74 so that tightening of the nuts 74 on the bolts 73 draws the channel member 62 and the plate toward each other to clamp the wall sections 31 between the flanges 67 and 68 and the plate 70.

To provide neat joints, to cover the channel portions of the channel member 62 and to retain the heat insulating material in place, a cover 75 is provided which has edges 76 and 77 folded around the flanges 67 and 68, respectively, and intermediate those flanges and wall sections 31. Heat insulating material 78, such as rock wool, substantially fills the space between the channel member 62 and the cover 75. A suitable high temperature heat insulating cement, which may be applied while plastic, is used to fill the space between the channel member 62 and the plate 70.

The joint illustrated in Fig. 5 is similar in principle to that illustrated in Fig. 4, but is

adapted to join angularly disposed wall sections 31, as illustrated at 33 in Fig. 2, at the corner of the oven. In this joint the portions 63 and 64 of the channel member are disposed at angles which differ from those of the similar portions of the channel member in Fig. 4, because of the difference in the angle between the adjacent wall sections. Also, the cover or plate 70 has portions 80 and 80' angularly disposed with respect to the mid-portion thereof and substantially parallel to the plane surfaces of the adjacent wall sections or panels. The cover 75 is bent at 81 to conform to the contour of the corner.

Fig. 6 illustrates a preferred type of joint for joining the top 24 of the oven to the side walls 21 and 22, end wall 23 and front top panel 26. To provide adequate support for the top 24, it preferably overlaps the side walls as at 82. The difference in the relative positions of the angularly disposed wall sections in Figs. 5 and 6 necessitates a different shape of section for the channel member 62.

To facilitate the manufacture of a channel member having a section of the form illustrated in Fig. 6, it preferably comprises separately formed portions 83 and 84 which are welded together. Screws 85 or other suitable fastening means extending through the plate 70 and into the wall sections may be employed, if desired, to insure that the edges of plates 70 remain tightly against the top and side walls.

Fig. 7 illustrates one type of joint for securing the wall sections of the side walls 21 and 22 and the end wall 23 to the curb or footing of the base or floor 20. The base or floor 20 is preferably made of concrete, as illustrated, but may be made of heat insulating metal covered sections similar to those used for the other walls of the oven. Also, the floor or base may have a flange of substantially the same thickness as the wall sections, so that a joint, such as that illustrated in Fig. 4, may be used to secure the wall sections to the base or floor. However, in the joint shown, the channel member 62 and an angle member 85 are secured to the base or floor 20 by bolts, such as 86, that are threaded into inserts such as 87 in the base or floor.

The channel member 62 preferably has extensions 88 and 89 on the flanges 67 and 68, which extensions are folded over the edges of the angle member 85. The plate 70 is preferably flat and engages a shoulder or curb 90 on the base or floor, as well as the plane surface of the wall section 31.

Fig. 8 illustrates a joint utilized in conjunction with an I-beam 91 or other support structure which may be necessary or advisable where the roof or side walls are so large that some additional strengthening is desired. In this joint the bolt 73 has a flat head which fits into a counter-sunk opening 92 in a plate 93 and extends through the plate 93 and the portion 69 of the channel member 62. The plate 93 is covered by a second plate 94, which plate 94 is adjacent and supported by the I-beam 91. The plates 93 and 94 are secured to the wall sections 31 by screws or other suitable fastening means, such as 95 and 96.

In the joints disclosed in Figs. 4 to 8, inclusive, the openings 71 and 72 in the channel member 62 and plate 70, respectively, are preferably somewhat larger than the bolts, such as 73, so as to reduce the difficulty of aligning the openings 71 and 72 to accommodate the bolts, such as 73. Also, housings or caps 97, shown in Fig. 10, loosely

fit the nuts 74 to hold those nuts in place and prevent their turning when the bolts are tightened. The nuts 74 preferably fit loosely within the housings or caps 97 so that when the bolts, which are preferably pointed at 98, are inserted in the openings, the nuts readily align themselves with the bolts. As shown in Fig. 10, the housings or caps 97 are preferably formed from a single piece of sheet metal having side portions 99 and 100 that are angularly disposed with respect to a central portion 101 and flanges 102 and 103 that are preferably spot-welded at 104 and 105 to the channel member. A central opening 106 is provided through which the bolts 73 extend.

With particular reference to Fig. 9 the angle members 34 and 35 are secured to the ends of the side wall section 31, as shown in Fig. 2, by screws, such as 107 and 108 or other suitable fastening means. A reinforcing plate 109 is preferably utilized intermediate the angle member 35 and the wall section 31, which reinforcing plate extends to the angle member 34 and serves to reinforce angle 35 and to retain the high temperature cement in space 109'. Resilient strips, such as 110, of rubber, or other suitable heat insulating material, preferably have hollow tubular portions, such as 111, and flange portions, such as 112. The resilient strips, such as 110, are secured to the inner surface of the door 29 near the edges thereof by screws, such as 113, extending through the flange portions, such as 112, and into the door. These strips extending along the edges of the door are adapted to be compressed between the doors and the door frames when the doors are shut to provide a tight secondary seal for the doors. Channel members, such as 114, are secured to the angle members, such as 35, by rivets, such as 115, or other suitable fastening means, and extend along the surfaces of the angle members, such as 35, adjacent the inner surface of the door. The primary seal is provided by strips of sponge rubber or other suitable resilient heat insulating material, such as 116, which are secured in the channel members, such as 114, and backed by those channel members so that resilient surfaces, such as 117, of the strips, such as 116, face the inner surface of the door. The door preferably has sheet metal panels 118 and 119 with insulating material 120 substantially filling the space between those panels. The panels 118 and 119 are preferably folded together as at 121, to provide ribs or flanges integral with the door and adjacent a shoulder 122. The ribs or flanges 121 engage the surfaces, such as 117, of the resilient strips, such as 116, and compress a portion of those strips as the doors are closed to provide the primary seals between the doors and door frames, and subsequently the secondary seal 110 comes into place to insure a more effective gas and heat-proof seal. Of course, a joint such as described between a movable door and a stationary door frame may, should it be desired to close an opening with two-sectioned or double doors, be used merely by utilizing strips similar to 110 and 116 at the joint between the double doors.

From the foregoing description, it is apparent that our oven structure is adaptable to uses such as the smoking and treatment of meat where a tightly sealed enclosure is desirable and quick temperature changes are required, or to the baking of products, chemicals or finishes where a good heat insulating and gas-leakage-proof structure is important. It is also apparent that by having the walls made up of flat sections, such

as 31, joined together by easily assembled joints which provide good heat insulation and seals, the oven is conveniently handled and shipped for assembly at the place of use. Also, the elimination of angular wall sections not only makes the wall sections convenient for handling and shipment, but also provides strong and durable corner structures by having substantially rigid and reinforced joints at the corners. The use of the channel members 62 in the joints between the wall sections 31 provides spaces between the wall sections for heat insulating and sealing materials and lends strength and rigidity to the wall structure. Each joint of our oven tightly clamps adjacent wall sections so that additional bracing and holding members are unnecessary to provide ample strength.

The wall sections 31, particularly those of the type shown in Fig. 3, have low thermal capacity because of the heat insulation between the metal panels 54 and 55 and because of the reduction of metal to metal contact between the panels 54 and 55. The tight sealing of the joints and the inclusion of heat insulating material therein effects good thermal efficiency at the joints.

Having thus illustrated and described the nature and preferred embodiment of our invention, what we claim and desire to secure by United States Letters Patent is as follows:

1. In an oven, the combination comprising a vertically disposed heat insulating wall section and a horizontally disposed heat insulating wall section adapted to be joined together with the end of the horizontal wall section resting over a portion of the top edge of the vertical wall section, said wall sections having ends and side surfaces, a cover plate having an intermediate portion angularly disposed with respect to each of the side surfaces and portions and a portion substantially parallel to and engaging the side surface of both the horizontal and the vertical wall section, a channel member having a surface substantially parallel to said intermediate portion of the cover plate and a portion engaging the edge and one surface of the horizontal wall section and the edge and one surface of the vertical wall section adapted to secure the channel member against movement relative to the said wall sections, and means for securing the cover plate to the channel member.

2. In an oven, the combination comprising angularly disposed heat insulating wall sections adapted to be joined together and having ends and side surfaces, the side surface of one wall section overlapping the end of the other wall section, a cover plate having an intermediate portion angularly disposed with respect to each of the side surfaces of the overlapping wall sections and outer portions substantially parallel to and engaging the side surfaces, a channel member having surfaces substantially parallel to the intermediate portion of the cover plate and surfaces engaging the ends of the wall sections, said channel member having a flange engaging the side surface of one of the wall sections opposite the surface engaged by the cover plate and having an extension engaging the side surface of the other wall section opposite the surface engaged by the cover plate, and means for securing the channel member and cover plate together to clamp the wall sections between the cover plate and said flange and extension.

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