

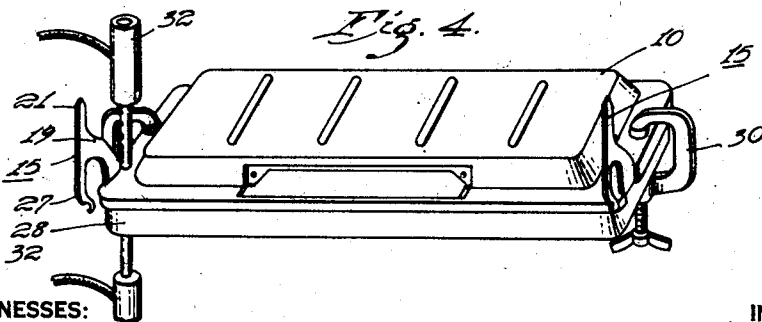
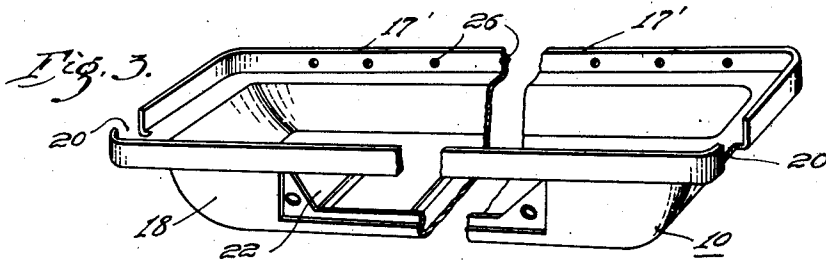
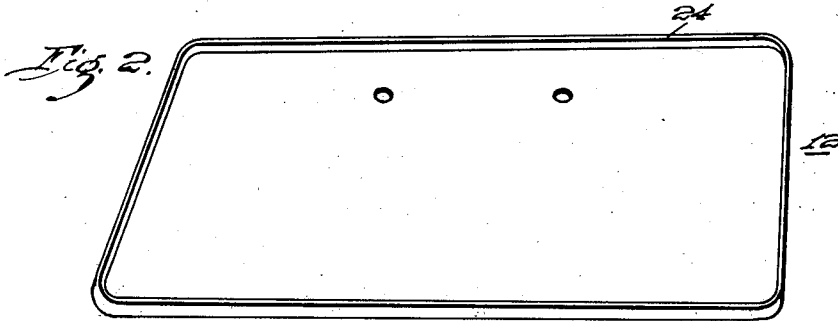
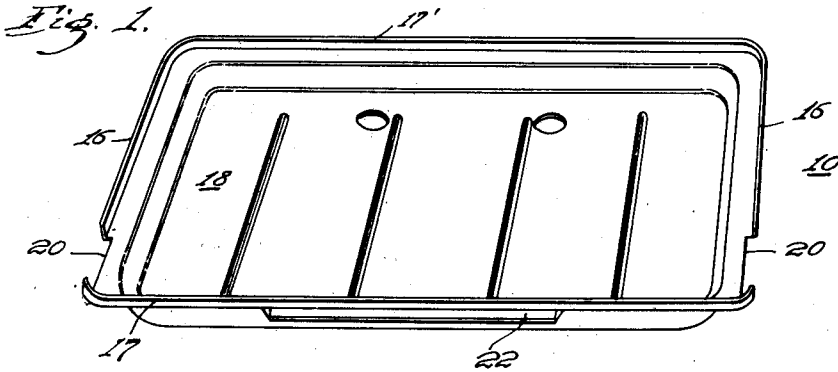
Aug. 19, 1941.

L. E. LOWN ET AL
OVEN DOOR CONSTRUCTION

2,253,384

Filed Jan. 4, 1939

3 Sheets-Sheet 1



WITNESSES:

C. J. Miller.
H. E. Keller.

INVENTORS

Lester E. Lown and
Edwin H. Lockwood

BY

W. R. Coley
ATTORNEY

Aug. 19, 1941.

L. E. LOWN ET AL
OVEN DOOR CONSTRUCTION

2,253,384

Filed Jan. 4, 1939

3 Sheets-Sheet 2

Fig. 5.

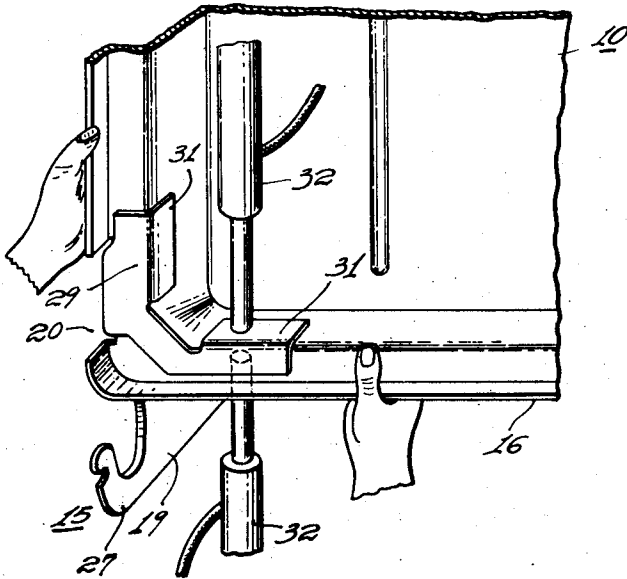
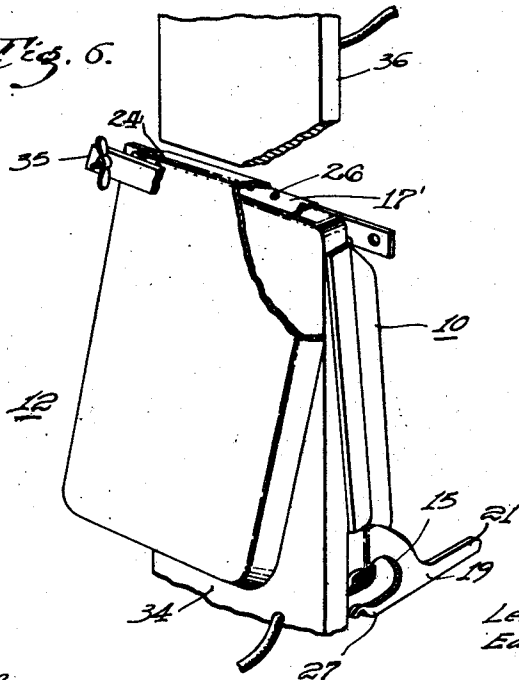


Fig. 6.



WITNESSES:

C. J. Miller.
H. E. Nepler.

INVENTORS

Lester E. Lown and
Edwin H. Lockwood.

BY

W. R. Coley
ATTORNEY

Aug. 19, 1941.

L. E. LOWN ET AL
OVEN DOOR CONSTRUCTION

2,253,384

Filed Jan. 4, 1939

3 Sheets-Sheet 3

Fig. 7.

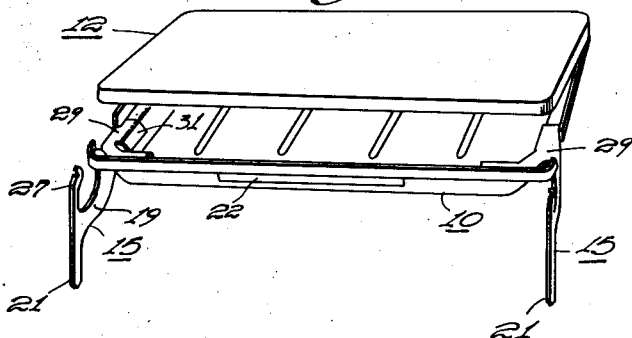


Fig. 8.

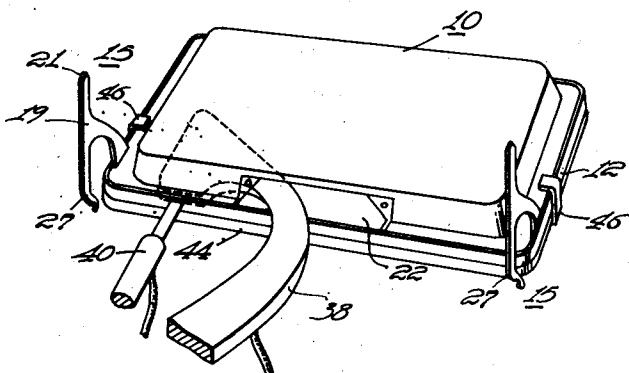
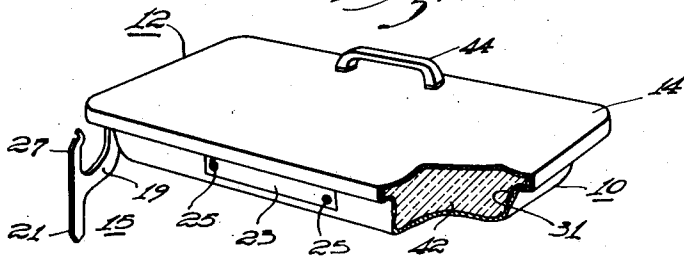


Fig. 9.



WITNESSES:

C. J. Miller.
H. C. Kepler.

INVENTORS

Lester E. Lown and
Edwin H. Lockwood

BY

W. R. Coley
ATTORNEY

UNITED STATES PATENT OFFICE

2,253,384

OVEN DOOR CONSTRUCTION

Lester E. Lown and Edwin H. Lockwood, Mansfield, Ohio, assignors to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

Application January 4, 1939, Serial No. 249,181

3 Claims. (Cl. 29—148)

Our invention relates to ranges and more particularly to methods of making a range-oven door.

It has been a common practice in the construction of present day range-oven doors to form individual inner and outer panels. The panels have then been individually finished in, say, vitreous enamel. These panels have then been rigidly secured together by being attached to suitable brackets, supports, etc.

By reason of being attached to such brackets and supports, it has been practically impossible to obtain a true alignment of the various parts. This condition, in turn, prevents some of the doors from making a good seal with an oven lining. In addition, the multi-handling of the various parts and the enameling of the two separate panels greatly increases the cost of such doors.

In contrast with this method of construction, which required the use of brackets, etc., if such doors were made without the use of internal brackets and if fabricated in such a manner that they could be enameled in one operation after being assembled, the cost of such door structure would be greatly reduced.

It is, therefore, an object of our invention to provide an oven door formed of two panels rigidly attached together without the aid of supporting brackets, supports, etc., and which can be completely assembled before being enameled.

A further object of our invention is to provide a rugged, simple, inexpensive door structure which is capable of making a good seal with an oven lining.

Another object of our invention is to provide a method of making a rugged, inexpensive, two-piece, heat-insulating door structure from two panels without the use of any internal supporting brackets.

Other objects of our invention will either be pointed out specifically in the course of the following description embodying our invention, or will be apparent from such description.

In the accompanying drawings:

Figures 1 and 2 are perspective views of the oven rear panel and front panel, respectively.

Figs. 3, 4, 5, 6, 7 and 8 are perspective views illustrating various steps in assembling the door construction embodying our invention, and

Fig. 9 is a partial perspective view illustrating the door construction embodying our invention.

Referring to the accompanying drawings, we show a rear panel 10 and front panel 12, which are, through a series of steps hereinafter de-

scribed, assembled into a rigid, inexpensive door structure 14 having hinge members 15 rigidly attached thereto.

Referring particularly to Fig. 1, the rear panel 10 includes a plurality of upstanding sides 16 and front and back edges 17 and 17', respectively, extending outwardly from the main, or central downwardly depressed, portion 18, notched portions 20 located at the front portion of the sides 16 as seen in Fig. 1, and an elongated substantially rectangular aperture 22 positioned in the front upwardly curving surface of the central portion 18 (see Figs. 1 and 3). The rear panel 10 is formed from a single sheet of enameling metal and is preferably formed by means of a combination punch and die press operation. The edges 16, 17 and 17' are formed substantially normal to the panel 10 and are of a substantially uniform depth. The centrally depressed portion 18 covers nearly the entire surface thereof. The portion 18 is positioned within the panel 10 to give added strength thereto and to give an enlarged central hollow space for the insulating material.

The front panel 12, in this instance, comprises a substantially flat sheet of enameling metal having a continuous upturned edge 24 located around the edge thereof. The edge 24 is substantially normal to the surface of panel 12 and has substantially the same depth as the edges 16, 17 and 17' of the rear panel 10. In addition, the peripheral shape of the front panel 12 is substantially the same as that of the rear panel 10. However, the front panel 12 is slightly larger than the rear panel 10 so that the edges 24 thereof will fit over the outside surface of the edges 16, 17 and 17' of the rear panel 10 in a contiguous manner, as hereinafter described.

The front panel 12, like the rear panel 10, is also preferably formed from a simple press operation. However, it is to be understood that both the front and rear panels 12 and 10, respectively, may be formed in any other desired manner.

After the rear panel 10 has been formed, a plurality of outwardly extending protrusions or projections 26 are formed within the rear edge 17' of the rear panel 10. The protrusions 26 are relatively small in shape and extend only a small distance beyond the rear surface of the rear edge 17', see Figs. 3 and 6. The projections 26 are formed in the rear edge 17' of the panel 10 to permit a fusion between such edge and a corresponding edge on the front panel 12 by projection welding, as hereinafter described.

The hinge members 15 are preferably formed

from an enameling metal and comprise an irregularly shaped leg 19 including a latching portion 21, a pivoting portion 27, and an irregularly shaped supporting portion 29. The supporting portion 29 is bent substantially 90° to the leg 19 and is adapted to fit within the notches 20 in the rear panel 10, as hereinafter described.

The supporting portion 29 includes a plurality of spaced inwardly extending ears 31, see Figs. 5 and 7. The ears 31 have substantially the same configuration as the side and front portions of the centrally depressed portion 18 of the rear panel 10 and are formed in such a manner as to fit within the respective lower corners thereof.

The two hinges 15 are, in this instance, attached to the rear panel 10 as follows. Each hinge has its bent or supporting portion 29 placed over the edge of the corresponding side notch 20, with the spaced ears 31 resting on the corresponding curved side and front portions of the depressed central portion 18, near one of the front (or bottom) corners. There is thus one hinge 15 at each front (or bottom) corner, with the two portions 27 and 29 disposed externally of the door panels in a suitable position for proper hinge action with the oven door frame (not shown) as will be understood.

After the formation of the front panel 12 and rear panel 10, as hereinabove described, the door structure is assembled substantially as follows.

The hinges are attached to the rear panel by being positioned upon a suitable jig or support 28, the back panel 10 being then located upon such jig or support and over the hinges 15, whereupon suitable clamps 30 rigidly attach the back panel 10 to such jig 28, the upper end of the hinges extending out through the notches 22. The jig 28 accurately positions the hinges 15 with respect to the back panel 10 in a predetermined manner, and through the cooperation of the clamps 30, retains such rear panel in a fixed position.

Suitable electrodes 32 are then brought in contact with the hinge 15 and the panel 10 so as to spot weld a portion of the hinge 15 to the panel 10. The hinges 15 are thus accurately positioned and rigidly attached to panel 10. After being attached to the panel 10, as described, the clamps 30 are removed and the panel is likewise removed from the jig 28, permitting the welding tools 32 to spot weld the ears 31 of the hinges to the central portion 18 of the panel 10. The hinge member 15 is thus rigidly attached to the rear panel 10 of the door structure without the need of any supporting brackets or auxiliary members.

The rear panel 10 is then placed over a suitable wide flat stationary welding tool 34 (Fig. 6) and hangs upon such welding tool by means of the rear edge 17'. Therefore, it is obvious that the protrusions 26 in the rear edge 17' will be substantially in line with the welding tool 34 and will extend upwardly therefrom. The front panel 12 is then positioned in front of the welding tool 34 with an edge 24 thereof located over and upon the rear edge 17' of the rear panel 10 in a contiguous manner. A suitable holding and gauging tool 35 is then fitted down over the cooperating front panel 12, welding tool 34 and rear panel 10. The tool 35 insures proper physical relationship between the rear panel 10 and the front panel 12, as well as holding the panels in a fixed position. The welding tool 34 is thus located between such panels and in contact with the rear edge 17' of the rear panel 10. After the panels 10 and 12 have been positioned upon

and rigidly clamped to the lower welding tool 34, the upper movable welding tool 36 is lowered substantially in line with the lower welding tool 34 and the projections 26. The upper welding tool 36, after contacting the edge 24 of the front panel 12, applies pressure and a welding current to the panels 12 and 10. The welding current then fuses the contacting edges of the rear and front panel together. Thus, the rear edges of the front and rear panels 12 and 10, respectively, are rigidly attached together by means of projection or protrusion welding. However, it is to be understood that such edges may be joined together in any other suitable manner.

After having the rear edges of the panels 10 and 12 fused or rigidly attached together, the structure is removed from the lower welding tool 34, whereupon the front panel 12 will be substantially ajar or inclined with respect to the rear panel 10 (see Fig. 7). In other words, the rear and front panels 10 and 12, respectively, are sprung apart from each other while being rigidly attached to the rear edges as hereinabove described.

The front portions of the rear and front panels 10 and 12, respectively, are then positioned upon a suitable jig 44 and are held together by means of a clamp 46. The clamp 46 is preferably fixed with respect to the jig 44 so as to retain the front edges of the panels 10 and 12 in a given predetermined fixed position (see Fig. 8). An irregular arcuately shaped welding tool 38 is then passed through the substantially rectangular shaped aperture 22 in the rear panel 10 and positioned within the space between the rear and front panels. The irregular shaped welding tool 38 is of such a configuration and predetermined thickness as to permit such tool to be located along the inside of the front edge. In addition, the predetermined thickness of the welding tool 38 ensures the front edges of the panels 10 and 12 being spaced a given distance. The tool 38 thus cooperates with a movable welding tool 40 to spot weld the side and front cooperating edges of the structure to form a solid functionally integral door structure, and cooperates with the jig 44 and clamp 46 to ensure the front portions of the panels 10 and 12 being spaced a predetermined amount.

The functionally integral door structure 14, comprising the front panel 12, rear panel 10, and hinges 15, may thus be treated as a unitary member or structure 14. The door structure may now be enamelled or painted without any danger of the finished coat being marred or destroyed. The enameling is performed in the usual manner and covers the whole structure.

It is, therefore, obvious that the door structure 14 at this point includes an enameled or painted rear panel 10 and a front panel 12 rigidly attached together at their cooperating edges with a hollow space therebetween and suitable hinge members 15 located at both ends thereof. Suitable insulating material 42 is then positioned within the space between the two panels 10 and 12. The insulating material 42 may be any suitable powdered or finely divided insulating material which may be positioned therein through the aperture 22 in the rear panel. After the insulating material 42 is positioned and packed within the space between the panels 10 and 12, a suitable cover plate 23 is positioned over the aperture 22 and rigidly attached thereto by means of suitable screws 25 (Fig. 9). It will be noted that this plate 23 is located at the bottom of the

finished door, where it is inconspicuous in service.

At this point or prior to the filling of the insulating material 42 within the hollow space between the panels 10 and 12, a suitable handle may be located on the front portion of the door structure 14 in any desired manner, such as by means of elongated bolts which may extend through the door structure 14 or which may be rigidly attached merely to the front panel 12 of such structure.

It is, therefore, obvious that a door structure 14 formed in such a manner will constitute a functionally integral structure, the parts being rigidly attached together without the use of any internal brackets or supports or the like. In addition, such structure is rigidly assembled before being enameled. Further, by being formed in such a manner, the door structure may be built to specific physical specifications, permitting such structure to fit tightly against any desired oven wall structure.

Various changes may be made in the method of making the device embodying our invention without departing from the spirit and scope thereof, and we desire, therefore, that only such limitations shall be placed thereon as are imposed by the prior art and the appended claims.

We claim as our invention:

1. The method of making a two-piece bracketless door structure which includes the steps of forming a separate rear panel and front panel with depending edges, providing projections along one edge of the rear panel, placing an edge of the front panel over the corresponding edge of the rear panel in contact with the projections with a welding tool located between the panels, holding said panels in an ajar position upon said welding tool, applying a pressure and a welding current to the panels in line with the projections for fusing the panels together along one edge of each, and applying welding current to the remain-

ing contiguous edges while holding said panels together in their closed position.

2. The method of making a bracketless door structure comprising a front panel and a rear panel, which includes forming the panels with depending edges, forming outwardly extending projections in one of the edges of one of the panels, attaching hinge members to one of the panels, placing said one edge upon a welding tool with the panel being located on one side of such tool, placing a corresponding edge of the other panel upon such edge in a contiguous manner with said other panel being positioned upon the opposite side of the same tool from the first panel, applying pressure and a welding current to the contiguous edges to fuse them together, holding the panels together and applying a spot welding current to the remaining edges by inserting a welding tool through an aperture in one of the panels, filling the space between the panels with heat insulating material through said aperture, covering said aperture, and applying a decorative coating to the entire structure.

3. The method of making a door structure which includes the steps of bending over edges on all sides of a front panel and a rear panel, placing a corresponding bent-over edge of each of the panels in overlapping contacting relation upon a welding tool with one panel in front of and the other in back of the same tool, holding said panels in an ajar position upon said welding tool with said overlapping edges as the pivotal area, applying pressure and current to the overlapping edges for fusing them together, closing the panels to cause overlapping of the corresponding remaining bent-over edges of the panels, and applying welding current to said remaining edges while in their closed position.

LESTER E. LOWN.

EDWIN H. LOCKWOOD.