Sept. 23, 1930. B. R. ANDREWS 1,776,610

HEAT INSULATING PANEL

Filed Feb. 1, 1930

Fig.1.

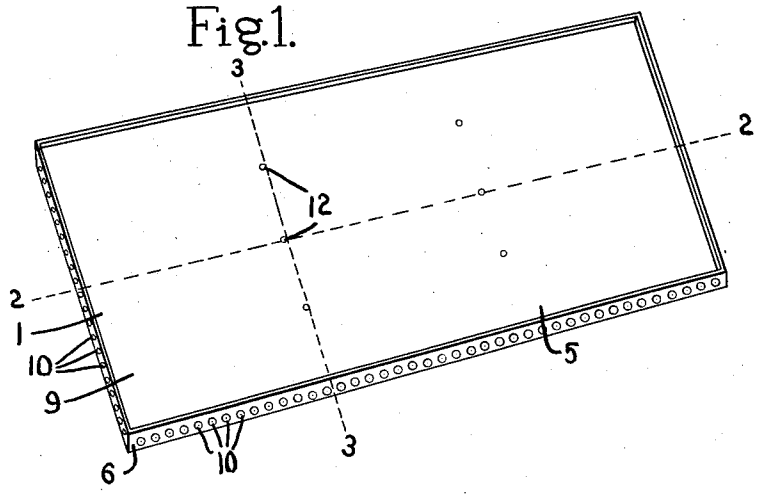


Fig.2.

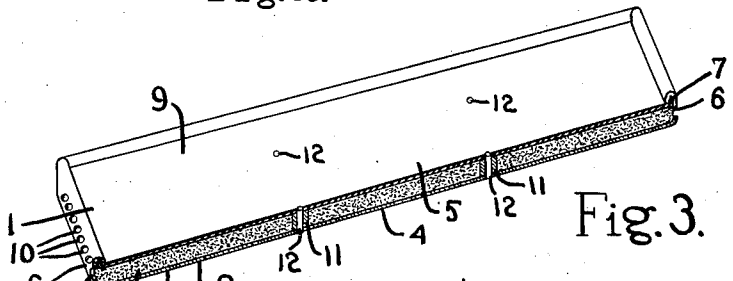
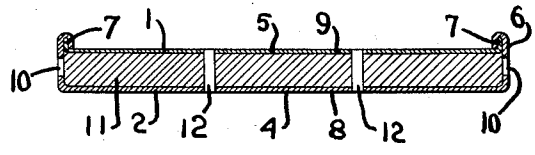


Fig.3.



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HEAT-INSULATING PANEL

Application filed February 1, 1930. Serial No. 425,136.

This invention relates to a heat-insulating panel which is suitable for use in building walls of drying ovens, drying chambers and similar devices, and especially to the so-called metal panel which comprises a metal envelope with the filling of heat insulating material.

When these panels are used there is more or less heat loss due to conduction or flow of heat through the metal envelope from the face of the panel which is exposed to a higher temperature and which presents a relatively large surface for picking up heat, to the face of the panel which is exposed to the atmosphere and which presents a relatively large heat-radiating surface.

It is the object of my present invention to provide an improved metal panel in which the heat loss is materially reduced and I accomplish this by so making the envelope of the panel that it presents an area of reduced cross section adjacent the outer edge of the face of the panel which is subjected to a higher temperature.

The amount of heat which will be conducted or will flow through metal under any given conditions is proportional to the cross sectional area of the metal and by forming the metal envelope with a zone of reduced cross sectional area which is located adjacent the outer edge of the face of the panel which is subjected to a higher temperature, the amount of heat which can flow or which will be conducted from said face to the opposite face, which acts as a radiating surface, will be correspondingly reduced.

In order to give an understanding of the invention I have illustrated in the drawings a selected embodiment thereof which will now be described after which the novel features will be pointed out in the appended claims.

Fig. 1 is a perspective view of a panel embodying my invention;

Fig. 2 is a perspective sectional view on the line 2—2, Fig. 1;

Fig. 3 is a section on the line 3—3, Fig. 1.

A panel embodying my invention may be made of any desirable size depending on the use to which it is to be put. In the illustrated embodiment of the invention the panel is made longer than it is wide and it is relatively thin compared to its length or width. In fact, I find that a panel of 1½″ or 2″ in thickness makes a practical and efficient panel.

In the drawings 1 indicates a panel embodying my invention and this is formed with an envelope 2 of sheet metal which covers the entire surface of the panel, the interior of the envelope being filled with some suitable heat-insulating material 3 which will preferably be of a non-combustible character. I find that rock wool makes an excellent heat-insulating material but the invention is in no way limited to the use of any particular material and hence I contemplate using any appropriate heat-insulating material.

The envelope of the panel may be made in any appropriate way without departing from the invention. In the particular construction shown, said envelope is made with the two sections 4 and 5, the section 4 having the upturned portions 6 which form the side edges of the completed panel and the marginal portions of which are bent over the flange 7 which is turned up from each edge of the section 5. This, however, is only one way in which the metal panel may be constructed.

In using panels of this sort for building walls of a drying oven the panels will preferably be placed edge to edge and supported between and secured to suitable posts or uprights and when the oven is in use one face of each panel, for instance the face 8, will be subjected to the interior heat of the drying oven while the other face of each panel, for instance the face 9, will be subjected to the temperature of the surrounding atmosphere.

In a panel of this type the heat-insulating material 3 affords a practical heat insulation against the conduction of heat directly from the heated face 8 of the panel to the non-heated face 9 thereof but the material of the envelope at the edges 6 of the panel provides a path through which heat may be conducted from the heated surface 8 of the panel, which

provides a relatively large surface for picking up heat, to the non-heated surface 9 thereof, which constitutes a relatively large radiating surface. Any heat which thus flows through the metal envelope from the heated "pick-up" surface 8 to the radiating surface 9 represents a heat loss. In order to reduce this heat loss and thus make the panel a more effective heat insulator I propose to so form the envelope that it will present a zone of reduced cross sectional area adjacent the outer boundary or portion of the heated face, and the presence of this zone of reduced cross sectional area interposes a barrier to the conduction or flow of heat from one face of the panel to the other and thus reduces the heat loss occasioned by such flow.

The exact location of this zone of reduced cross sectional area is not important so long as it is in the vicinity or adjacent to the outer limits of the heated face. A convenient place to locate it is in the side edges 6 of the panel but it might be in the outer marginal portion of either face 8 or 9 and yet be effective for the purpose desired.

This reduction in cross-sectional area may be obtained in various ways without departing from the invention. As one simple and practical method of obtaining this end I have shown the edge portion 6 of the envelope as provided with perforations 10, these perforations preferably being arranged in a row and thus coming in a zone encircling the panel. The presence of these perforations 10 reduces the total cross-sectional area of the metal in said zone. I find that it would be possible to place the perforations or apertures 10 at a distance approximately equal to the radius of each perforation or even closer than this without materially weakening the envelope so far as its function as an envelope for the heat-insulating material 3 is concerned.

With the arrangement of perforations as above described at least two-thirds of the metal in the zone constituted by the row of perforations is removed so that the total cross-sectional area of the envelope throughout the zone is only a third or less than one-third of that at either side of said zone.

The removal of any metal from the envelope reduces proportionately the capacity of the envelope for conducting heat from the heated to the non-heated face of the panel and if it be assumed that the perforations are so arranged that in the zone approximmately three-fourths of the mass of metal has been removed from the edge walls 6 then the capacity of these edge walls for conducting heat from the heated to the non-heated face of the panel will be correspondingly reduced, that is, reduced to one-quarter of what it would be without the presence of the apertures.

The size and arrangement of the apertures may be varied without affecting the invention in any way. Similarly the location of these apertures may be varied within limits without in any way changing the inventive idea so long as they are so placed that their presence reduces the conduction or flow or heat from the relatively large "pick-up" surface 8 of the panel to the relatively large radiating surface 9.

I desire to state again that while I have illustrated the construction in which the reduction in cross-sectional area is secured by forming perforations in the metal envelope yet the invention is not limited to this particular way of securing the reduced cross-sectional area. A panel in which the reduction in cross-sectional area in the zone adjacent the outer marginal portion of the heated surface is formed in any other way would come within my invention.

Where rock wool or a similar heat-insulating material is employed within the envelope and the panels are of considerable size it may be desirable to provide some means within the panel for holding the heat-insulating material in place and evenly distributed. One simple way of accomplishing this is to provide a plurality of partitions 11 which extend across from one side to the other of the panel and which divide the interior of the envelope into separate smaller compartments, each of which, of course, is filled with the heat-insulating material. These partitions may be formed of any suitable material and they are herein shown as being retained in place by bolts or rivets 12 extending through the sections 4 and 5 and through the partitions.

I claim:

1. A heat-insulating panel for use in building heat-insulated walls comprising a metal envelope and a filling of heat-insulating material enclosed within said envelope, said envelope being formed with a zone adjacent the outer marginal portions of the face thereof which is subjected to heat in which the total cross-sectional area of the metal of the envelope is considerably less than that of the envelope adjacent said zone whereby the capacity of the envelope to conduct heat from one face to the other of the panel is correspondingly reduced.

2. A heat-insulating panel for use in building heat-insulated walls comprising a metal envelope and a filling of heat-insulating material enclosed within said envelope, the envelope being provided with closely arranged perforations in a zone adjacent the outer marginal portions of the face which is subjected to a higher temperature whereby the capacity of the envelope to conduct heat from one face to the other is materially reduced.

In testimony whereof, I have signed my name to this specification.

BERNARD R. ANDREWS.

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