May 3, 1927. 1,626,655

J. C. WOODSON

HEAT INSULATING WALL

Filed Aug. 30, 1923

Fig. 1.

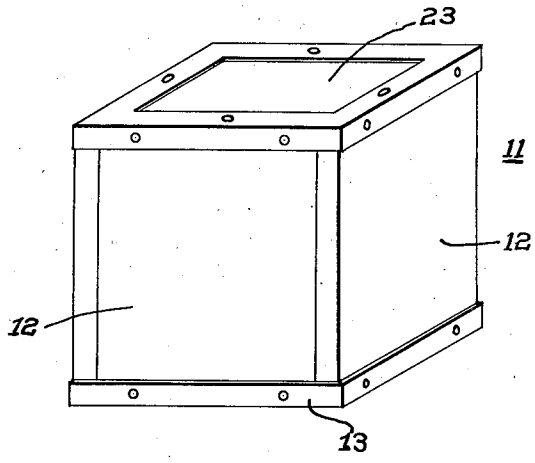
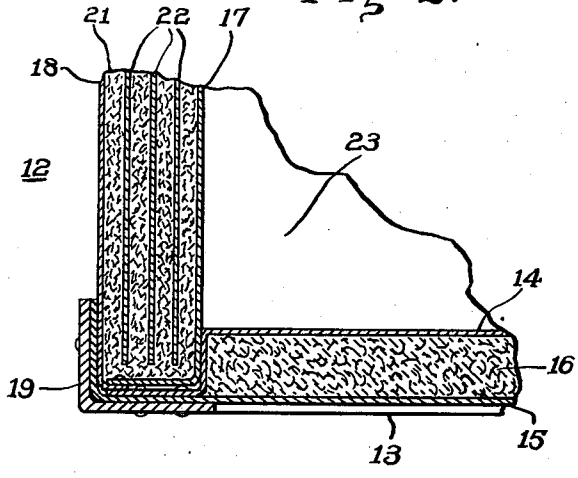


Fig. 2.



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HEAT-INSULATING WALL.

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My invention relates to heat-insulating walls and particularly to means for more efficiently insulating from each other two adjacent volumes or spaces maintained at different temperatures.

One object of my invention is to provide a heat insulating wall that shall have a uniform variation of temperature laterally therethrough.

Another object of my invention is to provide a heat insulating wall that shall have heat insulating qualities in substantially direct proportion to its thickness.

It is well known that in the ordinary construction of heat-insulating panels comprising a pair of spaced thin sheet metal walls separated by heat-insulating material, the heat insulating characteristic thereof is not in direct proportion to the thickness. That is, if it is found that a certain number of heat units are lost through the wall when the same is, say 1″ in thickness, and if we then employ a wall 2″ in thickness, it is not possible to reduce the loss therethrough to substantially one-half the former value. This action is not thoroughly understood but is believed to be because of the fact that the heat-insulating qualities of such panel depend upon two factors, viz, the heat-insulating qualities of the heat insulating material itself and what may be termed the surface-effect wherein both surfaces of the panel present a relatively high thermal resistance to the passage of the heat.

Accordingly, the main object of my invention is to provide a heat-insulating panel so constructed that the thermal or heat-insulating qualities thereof shall be substantially in proportion of the thickness thereof and shall be uniform over the lateral surface thereof.

In practicing my invention, I provide a panel comprising a pair of outer, spaced, relatively thin metal plates and a plurality of layers of a suitable heat-insulating material located therebetween and alternating with thin sheet metal plates. The surface of each of the interposed sheet metal plates adjacent to the high temperature side of the panel is blackened and the other side of the respective plates is preferably polished.

In the single sheet of drawings,

Figure 1 is a view, in perspective, of a heat-insulated structure embodying my invention, and

Fig. 2 is a fragmentary view, in section, of a heat-insulating panel embodying my invention.

A heat-insulating structure 11, illustrated schematically only in Fig. 1 of the drawing, comprises a plurality of heat-insulating side, front and rear panels 12, and a bottom panel 13. As the device embodying my invention is applicable to many different kinds of heat insulating structures, I desire it to be understood that the device illustrated in Fig. 1 is intended to represent any type of heat-insulating structure.

Referring more particularly to Fig. 2 of the drawing, the bottom panel 13 may be of the usual construction comprising an inner thin sheet metal plate 14, an outer thin sheet metal plate 15 and a mass 16, of a suitable heat-insulating material such as mineral wool, located between the two plates. In such panel, the temperature drop is greatest adjacent to the high-temperature side thereof, and decreases rapidly toward the low-temperature side thereof, mainly because of the surface effect, in conjunction with the fact that the temperature difference over small distances, is a maximum at this side of the panel.

The heat-insulating panel 12 embodying my invention comprises in inner, relatively thin, sheet metal member 17, an outer, thin, sheet metal member 18, whose edges may be bent over and operatively engage each other and be secured together by any suitable means such as rivets 19. A plurality of relatively thin layers 21 of any suitable heat-insulating material, such as mineral wool, are located between the inner and the outer members 17 and 18 and are separated by interposed, relatively thin, sheet metal members 22. The plates 22 are of smaller lateral area than the members 17 and 18, in order that their edges may not operatively engage the down-turned flange portions of the members 17 and 18, thereby reducing the amount of heat carried by the inner metal members 17 from the heated space 23 adjacent to which they are located.

If the temperature of the space 23 adjacent to the inner members 17 is at a relatively high value, as compared to that of the space immediately adjacent to the outer member 18, I find it desirable to blacken that surface of each of the members 22 facing the high temperature side and to polish that

surface of the members 22 facing the low temperature side.

As hereinbefore noted, the heat insulating qualities of any panel depend upon two factors, one, the surface-effect and the other the heat-insulating qualities of the material employed. By employing a plurality of relatively thin sheet metal members and of heat insulating members located in space relation laterally of the panel 12, I obtain substantially a plurality of surface effects. As the surface effect contributes a relatively large percentage to the heat-insulating qualities of any panel, it is easily seen that the heat insulating qualities of such panel will be relatively high and substantially in proportion to the thickness thereof.

It is possible that there may be local hot spots in any mass of heat-insulation, caused by irregularities in the mass of the heat-insulating material itself, and whenever this occurs, the thermal resistance thereof is very greatly reduced and accordingly the heat-insulating qualities of the panel are greatly impaired. By blackening the high temperature side of the intermediate sheet metal members 22, I provide a heat-path of low resistance over each layer 21 of heat-insulating material to the metal member 22, the heat absorbed by each intermediate member 22 being more uniformly distributed thereby than would be the case if no such panel were used, and the polished side reduces the amount of heat radiated thereby to the next adjacent layer of heat-insulating material.

The device embodying my invention thus provides a relatively simple means for insuring that the thermal resistance of a panel or wall shall be substantially in proportion to its thickness and provides further a means for preventing local hot spots in the heat-insulating material employed in such a panel.

Various modifications and changes may be made without departing from the spirit and scope of the invention and I desire therefore that no such limitations shall be placed thereon as are imposed by the prior art or set forth in the appended claims.

I claim as my invention:

1. A heat insulating wall comprising means having alternate layers of metallic and heat-insulating materials for obtaining a uniform variation of temperature throughout the thickness of the wall.

2. A heat-insulating panel comprising spaced outer wall members, and means located therebetween and comprising a plurality of spaced-apart layers of heat insulating material for obtaining a uniform variation of temperature throughout the thickness of the wall.

3. A heat-insulating wall comprising integral means having alternate layers of metallic and heat-insulating materials for reducing the flow of heat therethrough in inverse proportion to the thickness of said wall.

4. A heat-insulating panel comprising spaced outer wall members, heat-insulating material therebetween, and spaced means in said heat-insulating material for dividing it into a plurality of spaced layers.

5. A heat-insulating panel comprising two outer spaced-apart sheet metal walls, layers of heat-insulating material between said walls, and relatively thin sheet metal plates, substantially coextensive with said outer walls, located between the successive layers of heat-insulating material.

6. A heat-insulating panel comprising a plurality of layers of heat-insulating material and a metal plate located between each two successive layers having one surface which readily absorbs heat and a second surface which has a relatively low heat-radiating characteristic.

7. A heat insulating panel to be located between two areas having different temperatures and comprising two spaced-apart outer sheet metal walls, a plurality of layers of heat insulating material between said walls, a plurality of thin sheet-metal plates, substantially coextensive with said outer walls, located between the successive layers of heat-insulating material, that surface of each of the thin sheet-metal plates adjacent the high temperature area having a heat-absorbing characteristic and the other surface of each of the plates having a relatively low heat-radiating characteristic.

In testimony whereof, I have hereunto subscribed my name this thirteenth day of August, 1923.

JAMES C. WOODSON.

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