United States Patent [19]

Iller

[11] **3,911,999**

[45] **Oct. 14, 1975**

[54] **RADIANT AND CONVECTION HEATED CHAMBERS**

[75] Inventor: **John A. Iller,** Seattle, Wash.

[73] Assignee: **Adabelle E. Iller,** Seattle, Wash. ; a part interest

[22] Filed: **Oct. 25, 1973**

[21] Appl. No.: **409,675**

[52] **U.S. Cl.** ..... **165/41;** 165/57; 165/122; 165/129; 296/23 R; 237/28; 237/80

[51] **Int. Cl.** **B60h 1/00**

[58] **Field of Search** ..... 165/53, 57, 122, 129, 41, 165/47, 56; 98/36; 62/50, 51, 52, 7, 420–423, 387; 237/28–33, 43, 45, 80, 5, 12.3 A, 12.4, 12.5, 12.6; 296/23 R

[56] **References Cited**

UNITED STATES PATENTS

1,883,939	10/1932	Killeffer et al.	62/420 X
1,948,954	2/1934	Weiland	62/420 X
1,977,472	10/1934	Dietrichson	62/420 X
2,024,053	12/1935	Minard	62/420 X
2,046,967	7/1936	Post, Jr. et al.	62/387 X
2,070,044	2/1937	Gilpin	62/387
2,200,465	5/1940	Brelsford et al.	62/420
2,216,873	10/1940	Browne	165/57 X
2,478,617	8/1949	Anderegg	165/57

Primary Examiner—Albert W. Davis, Jr.
Attorney, Agent, or Firm—Clarence A. O'Brien; Harvey B. Jacobson

[57] **ABSTRACT**

An upstanding wall of an enclosure such as a mobile home, house trailer or camper body is provided with a horizontal opening extending therethrough forming a chamber between the inner and outer surfaces of the wall. An upstanding panel of heat conductive material closes the end of the chamber opening through the inner side of the wall and a closure member is provided for movement into and out of position closing the outer end of the chamber which opens through the outer side of the wall. The chamber may have bottles of LPG stored therein and the portions of the wall defining the perimeter of the chamber are insulated, as is the closure member. In this manner, warm air from the interior of the enclosure may move by convection currents or be driven by a blower across the inner side of the panel of heat conductive material so as to heat the panel in a manner such that the air within the chamber on the outer side of the heat conductive panel may absorb heat from the panel. By heating the air within the chamber through the panel of heat conductive material the LPG bottles within the chamber will be maintained at a higher temperature than the air temperature outside of the enclosure in extremely cold weather.

10 Claims, 7 Drawing Figures

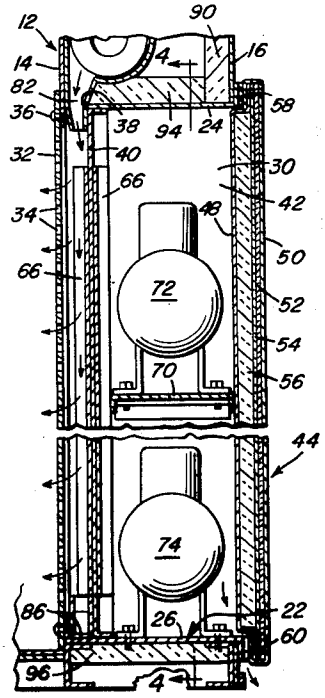


Fig. 1

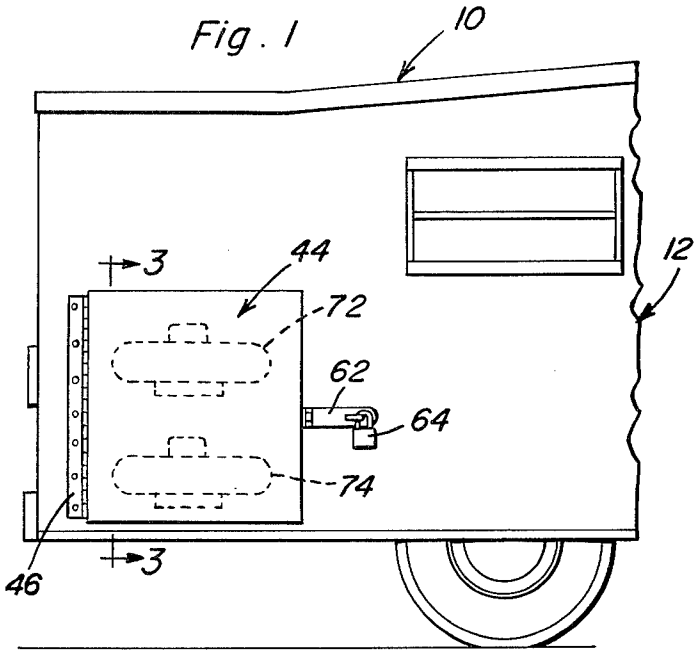


Fig. 2

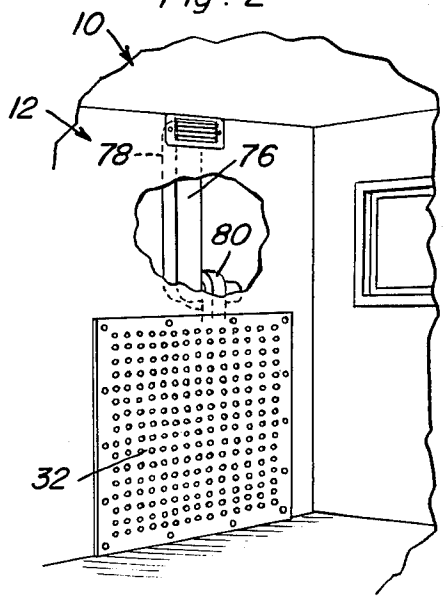


Fig. 6

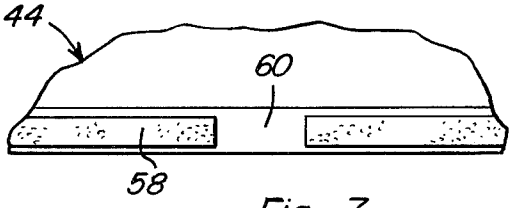


Fig. 7

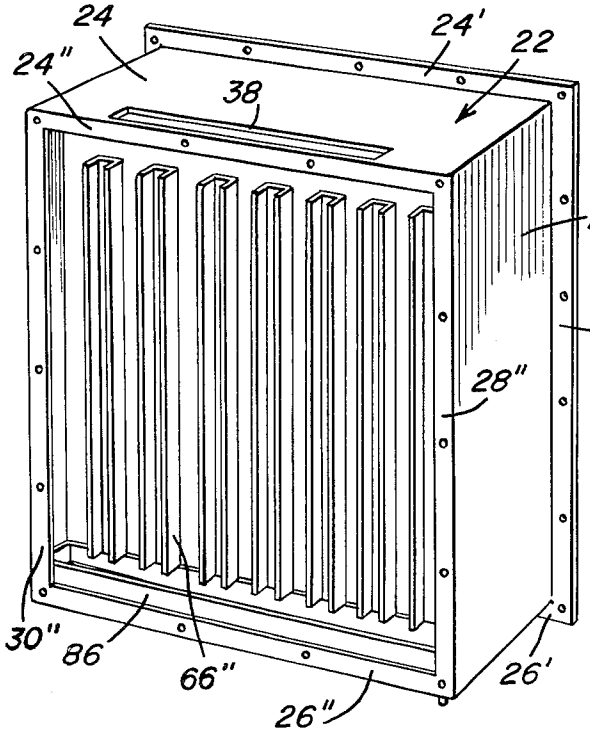


Fig. 3

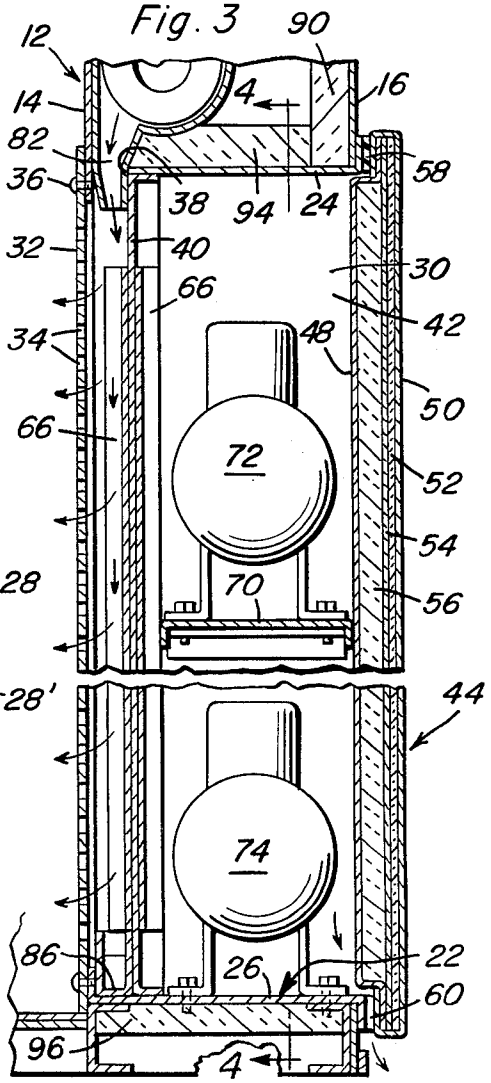


Fig. 4

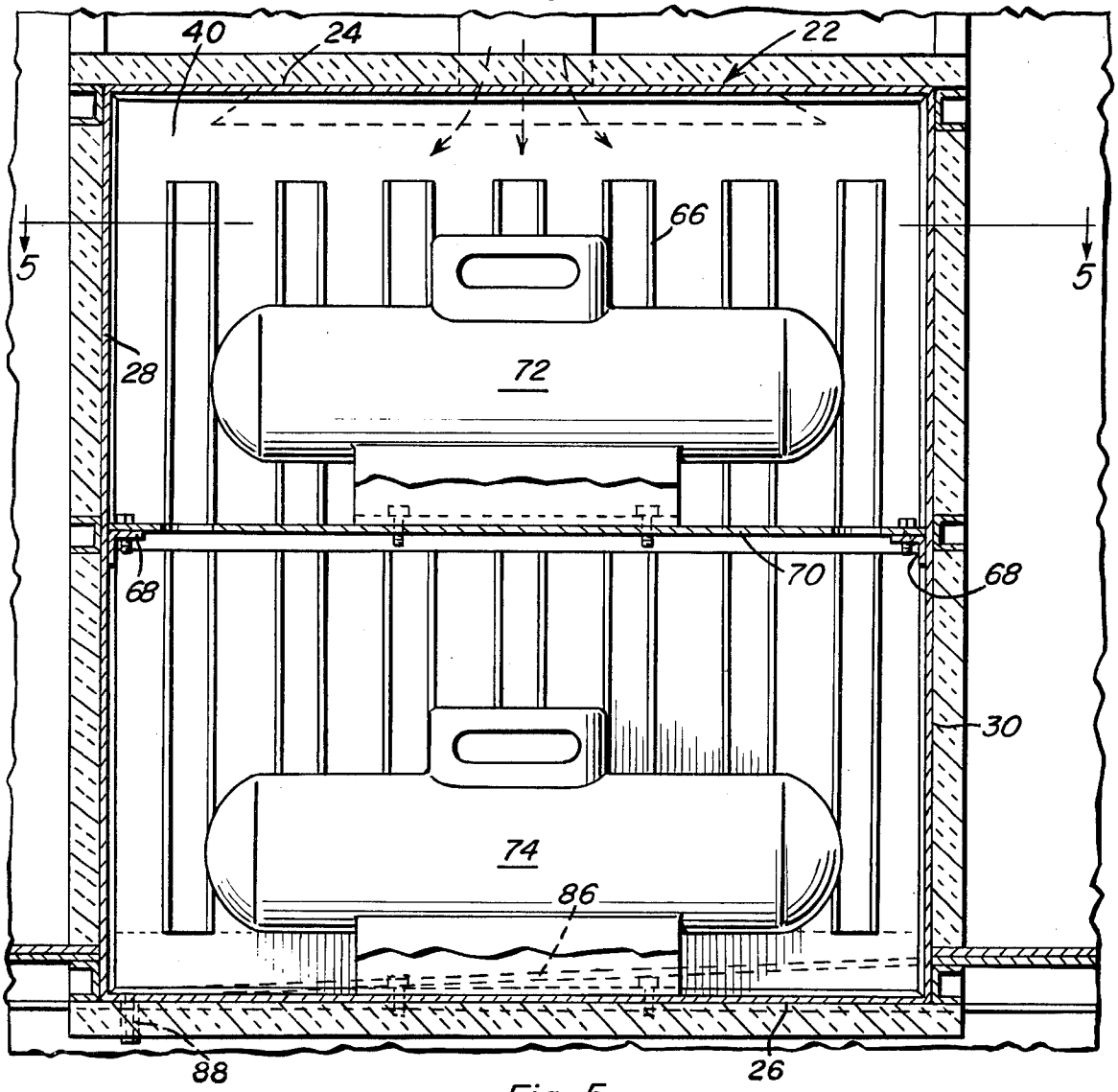
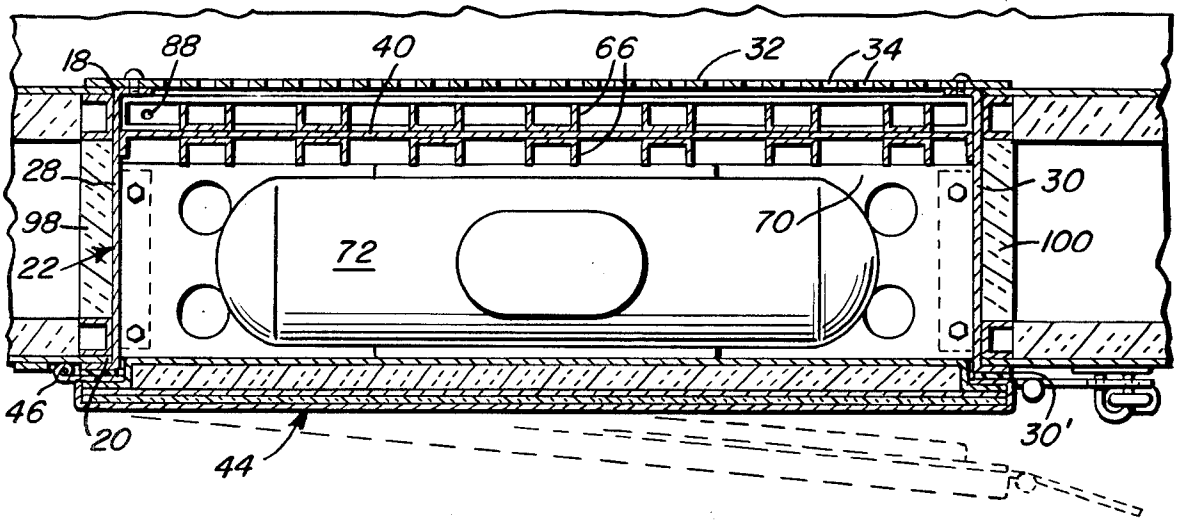

40
24
22
66
5
5
28
72
68
70
68
30
74
86
88
26

Fig. 5


18
88
40
66
32
34
28
98
22
72
70
30
100
46
20
44
30'

RADIANT AND CONVECTION HEATED CHAMBERS

In extremely cold climates the temperature of LPG bottles which are exposed to exterior temperatures quite often drops below the temperature which will enable the LPG to properly vaporize. In addition, conventional automotive storage batteries, even when fully charged, are not capable of producing more than a fraction of the electrical potential which may be available at considerably higher temperatures. For these reasons an economical and efficient manner of storing automotive batteries and bottles of LPG in various types of vehicles has been long sought.

It is accordingly the main object of this invention to provide an enclosure wall construction designed to store bottles of LPG and automotive type storage batteries in a manner whereby heat within the enclosure may be used to maintain the storage chamber at a temperature higher than the ambient temperature and yet maintain the storage chamber completely sealed from the interior of the associated enclosure.

Another object of this invention is to provide an enclosure wall construction in accordance with the preceding object and which may be readily incorporated into the manufacture of new enclosures.

Still another object of this invention is to provide a construction by which existing enclosure walls may be modified in accordance with the present invention.

A final object of this inention to be specifically enumerated herein is to provide an enclosure wall construction in accordance with the preceding objects and which will conform to conventional forms of manufacture, be of simple construction and easy to use so as to provide a device that will be economically feasible, long lasting and relatively trouble free in operation.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout.

FIG. **1** is a fragmentary side elevational view of a mobile enclosure including a side wall structure constructed in accordance with the present invention;

FIG. **2** is a fragmentary perspective view of the inner side of the side wall structure with portions thereof being broken away;

FIG. **3** is an enlarged transverse vertical sectional view taken substantially upon the plane indicated by the section line **3—3** of FIG. **1**;

FIG. **4** is a vertical sectional view taken substantially upon the plane indicated by the section line **4—4** of FIG. **3**;

FIG. **5** is a horizontal sectional view taken substantially upon the plane indicated by the section line **5—5** of FIG. **4**;

FIG. **6** is a side elevational view of the lower marginal edge portion of the inside of the swingable closure member portion of the instant invention, and FIG. **7** is a perspective of the assembly.

Referring now more specifically to the drawings, the numeral **10** generally designates a mobile enclosure including an upstanding side wall referred to in general by the reference numeral **12** and including inner and outer panels **14** and **16.** The inner and outer panels have horizontally aligned openings **18** and **20** formed

therein and a rectangular frame assembly referred to in general by the reference numeral **22** is secured in the openings **18** and **20.** The rectangular framework includes upper and lower walls **24** and **26** interconnected by upstanding opposite side walls **28** and **30** and the marginal edges of the walls **24, 26, 28** and **30** adjacent the outer panel **16** include outwardly directed flanges **24′, 26′, 28′** and **30′** which are secured over the adjacent outer surfaces of the outer panel **16** in any convenient manner. The inner marginal portions of the walls **24, 26, 28** and **30** include inturned flanges **24″, 26″, 28″** and **30″.** The framework **22** is secured within the wall **12** by means of the attachment of the flanges **24′, 26′, 28′** and **30′** to the outer panel **16.** A foraminous panel **32** having a plurality of openings **34** formed therethrough is secured over the flanges **24′, 26′, 28′** and **30′** by means of suitable fasteners **36.**

The framework includes a slot **38** formed in the top wall **24** adjacent the inner marginal edge portion thereof and a transverse partition panel **40** constructed of heat conductive material extending and secured between the walls **24, 26, 28** and **30** just outward of the slot **38** formed in the top wall **24.** The partition panel **40** defines a substantially fluid-tight partition within the framework **22** and thereby closes the inner end of the chamber **42** defined by the framework **22** from the interior of the enclosure **12.**

A closure member panel or door referred to in general by the reference numeral **44** is provided for the outer end of the chamber **42** and is hingedly supported as at **46** from the exterior panel **16** of the wall **12.** The door **44** includes inner and outer panels **48** and **50** of suitable metal, a panel **52** of insulative material immediately inwardly of the panel **50,** an intermediate panel **54** of suitable metal and an inner insulative panel **56** disposed between the metallic panel **54** and the inner panel **48.** In addition, the outer peripheral portion of the outer panel **50** is bent inwardly and over the outer peripheral portions of the panels **52, 54, 56** and **48** to form a bead extending about the door **44** and the inner surface of the outer periphery of the door includes a resilient insulative strip **58** extending fully thereabout, except for a short area **60** in the center of the lower marginal edge portion of the door **44.** The area **60** is left devoid of the insulative and seal strip **58** in order to enable limited air circulation between the interior of the chamber **42** and the exterior of the enclosure **12.**

The door **44** is equipped with a hinged hasp **62** by which the door **44** may be locked in the closed position by means of a padlock **64** and the opposite sides of the partition panel **40** have upstanding heat conductive channel members **66** secured thereto. Also, the walls **28** and **30** of the framework **22** include horizontally aligned support brackets **68** at their vertical midportions from which a shelf **70** is supported. An upper LPG bottle (or storage battery) **72** is mounted on the shelf **70** and a lower LPG bottle **74** is mounted on the bottom wall **26.**

A vertical duct **76** is disposed within the wall **12** above the openings **18** and **20** and includes a register **78** communicated therewith opening into the interior of the enclosure through the upper marginal edge portion of the inner panel **16.** A blower assembly **80** is communicated with the lower end of the duct **76** and includes an outlet nozzle **82** supported within the wall **12** and opening downwardly through the slot **38.** In operation, the door **44** may be opened when necessary to

provide access to the chamber **42** in which the LPG bottles **72** and **74** are stored. Very limited air circulation is afforded between the interior of the chamber **42** and the exterior of the enclosure **10** through the area **60** in which the strip **58** is omitted. On the assumption that the interior of the enclosure **10** is at a temperature higher than the ambient temperature convection air currents may enter the upper portion of the foraminous panel **32** and pass downwardly along the inside channel members **66** and out of the lower portion of the foraminous panel. The passage of warm air over the channel member **60** and the interior surface of the partition panel **40** will transfer heat to the panel **40** and the channel member **66** on the outside of the panel **40** whereby convection air currents will be set up within the chamber **42** to warm the air therein, even though the chamber **42** is vented to the exterior of the enclosure **10** through the area **60** at the center of the lower marginal edge portion of the door **44.** The foraminous panel **32** may comprise an expanded metal panel, if desired and an inclined drip channel **86** is secured to the inner surface of the lower marginal edge portion of the panel **40** for collecting moisture which may condense on the inner side of the panel **40** and flow downwardly along the inner face of the panel **40.** The drip channel **86** includes a drain tube **88** at its lower end which is secured through the wall **26** of the framework **22** for discharging collected condensation onto the ground beneath the enclosure **10.**

If convection air currents are not sufficient to adequately raise the temperature of the air within the chamber **42,** the blower assembly **80,** which may be under the control of a thermostat (not shown) disposed within the chamber **42** is actuated in order to force additional amounts of warm interior air downwardly along the inner surface of the panel **40** and the inner channel members **66.**

The interior surfaces of the framework **22** and the inner and outer sides of the panel **40** as well as the channel members **60** may be painted with a dull plack paint in order to increase the transfer of heat. Also, it will be noted that in addition to the exterior panel **16** being provided with interior insulation **90** the exterior surfaces of the walls **24, 26** and **28** have insulating strips **94, 96, 98** and **100,** respectively, secured thereover. Further, as hereinbefore set forth, the partition panel **40** completely seals the compartment **42** from the interior of the enclosure **10.**

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. In combination, a heat insulative enclosure adapted to be inhabited in a frigid zone and to be at least somewhat heated interiorly, at least by its inhabitants, said enclosure having a first wall including means defining an opening extending therethrough and forming a chamber between the opposite inner and outer surfaces of said wall, a panel of heat conductive material closing the inner end of said chamber adjacent the inner surface of said wall, a heat insulative closure member movable into and out of position adjacent the outer surface of said wall closing the outer end of said chamber, said chamber, inwardly of said closure member and outwardly of said panel, defining a storage area in which to store an assemblage which may be adversely affected by extreme cold temperatures, said enclosure including means, operative at least when the temperature of air within said storage area is lower than the temperature of said panel and the air within said enclosure, operative to cause air from within said enclosure to flow across the inner surface of said panel for transmitting heat energy from the air within said enclosure to said panel and from the latter to the air within said storage area and thus to said assemblage.

2. The combination of claim **1** wherein said first wall and panel are disposed in upstanding position, and upstanding heat conductive baffle means carried by and projecting outwardly from at least one side of said panel in good heat transfer relation therewith, whereby generally vertical air currents may be moved over the side of said panel remote from said closure, an inclined trough secured to the lower marginal edge portion of the side of said panel remote from said closure for collecting moisture condensed against said remote side of said panel, the lower end portion of said trough including a drain opening.

3. The combination of claim **1** including an open-ended frame secured through said opening, said panel being secured across the corresponding end of said frame and said closure member being operatively associated with the other end of the frame for opening and closing the latter.

4. The combination of claim **3** wherein the exterior surfaces of said frame between the opposite ends thereof are insulated.

5. The combination of claim **4** wherein said first wall includes spaced interconnected inner and outer panels between which said frame extends.

6. The combination of claim **5** wherein said first wall and heat conductive panel are disposed in upstanding position, said heat conductive panel being spaced inwardly from the adjacent end of said frame, and a foraminated panel member secured across said adjacent frame and spaced from said upstanding panel.

7. The combination of claim **6** including means for pumping air from within said enclosure across said upstanding heat conductive panel inwardly of said foraminated panel member from one marginal edge of said heat conductive panel toward the opposite marginal edge thereof.

8. The combination of claim **1** including an open-ended frame secured through said opening, said panel being secured across the corresponding end of said frame and said closure member being operatively associated with the other end of the frame for opening and closing the latter, said first wall including spaced interconnected inner and outer panels between which said frame extends, said heat conductive panel being spaced inwardly from the adjacent end of said frame, said wall and heat conductive panel being disposed in upstanding position, said opening being formed in a lower portion of said walls, a foraminated panel member secured across said adjacent frame end and spaced from said upstanding panel, said means operative to cause air to flow across the inner surface of said heat conductive panel including duct means in said wall having an inlet opening into an upper portion of said enclosure and an outlet opening downwardly through an upper portion

of said frame between said heat conductive panel and said foraminated panel, and blower means operatively associated with said duct means for pumping air therethrough.

9. The combination of claim **8** wherein the opposite sides of said upstanding heat conductive panel include upstanding heat conductive baffle means supported therefrom in good heat conductive relation therewith.

10. The combination of claim **1** wherein said closure and adajcent portions of said opening defining means include coacting portions defining an area of limited air flow communication between said chamber and ambient air outside said enclosure.

* * * * *