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[54] INSULATED CABINET CONSTRUCTION FOR VENDING MACHINES OR THE LIKE

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[52] **U.S. Cl.** ..... **220/9 F**, 49/495, 312/214

[51] **Int. Cl.** **B65d 25/18**

[58] **Field of Search** ..... 220/9 R, 9 F, 14; 312/214; 49/495

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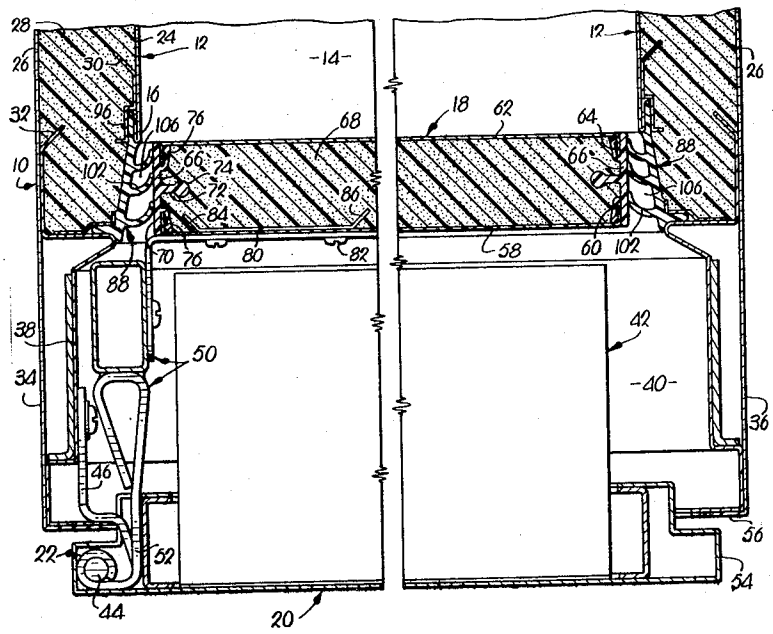
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[57] **ABSTRACT**

An insulated cabinet for vending machines or the like employs an improved construction for an insulated door per se and improved means for effecting a heat seal between such door and the wall structure of the cabinet and for releasably retaining such door in a closed position relative to such wall structure. The door is formed from a pair of spaced metallic panels having an edging strip of heat insulative material extending therebetween about the periphery thereof, with the interior of such door assembly filled with heat insulative foam material suitably interlocked with both the panels and the edging strip. The wall structure is provided at the zone thereof within which the door is received when in its closed position with a sealing gasket of heat insulative material having a plurality of spaced resilient fingers extending from the wall structure toward the space to be occupied by the door when in closed condition, so that such fingers will engage the edging strip of the door along spaced areas of the latter to provide heat insulative air chambers circumscribing the peripheral edge of the door, with such fingers being deflected in a direction upwardly of the cabinet to releasably hold the door in its closed condition. The construction is particularly advantageous for use in vending machine cabinets having relatively thin insulated walls and employing an outer door as well as an inner door with the latter being insulated, of thickness substantially equal to that of the main cabinet wall structure and desirably mountable in manner such that it will clear the access opening to the cabinet when the doors are opened.

5 Claims, 4 Drawing Figures



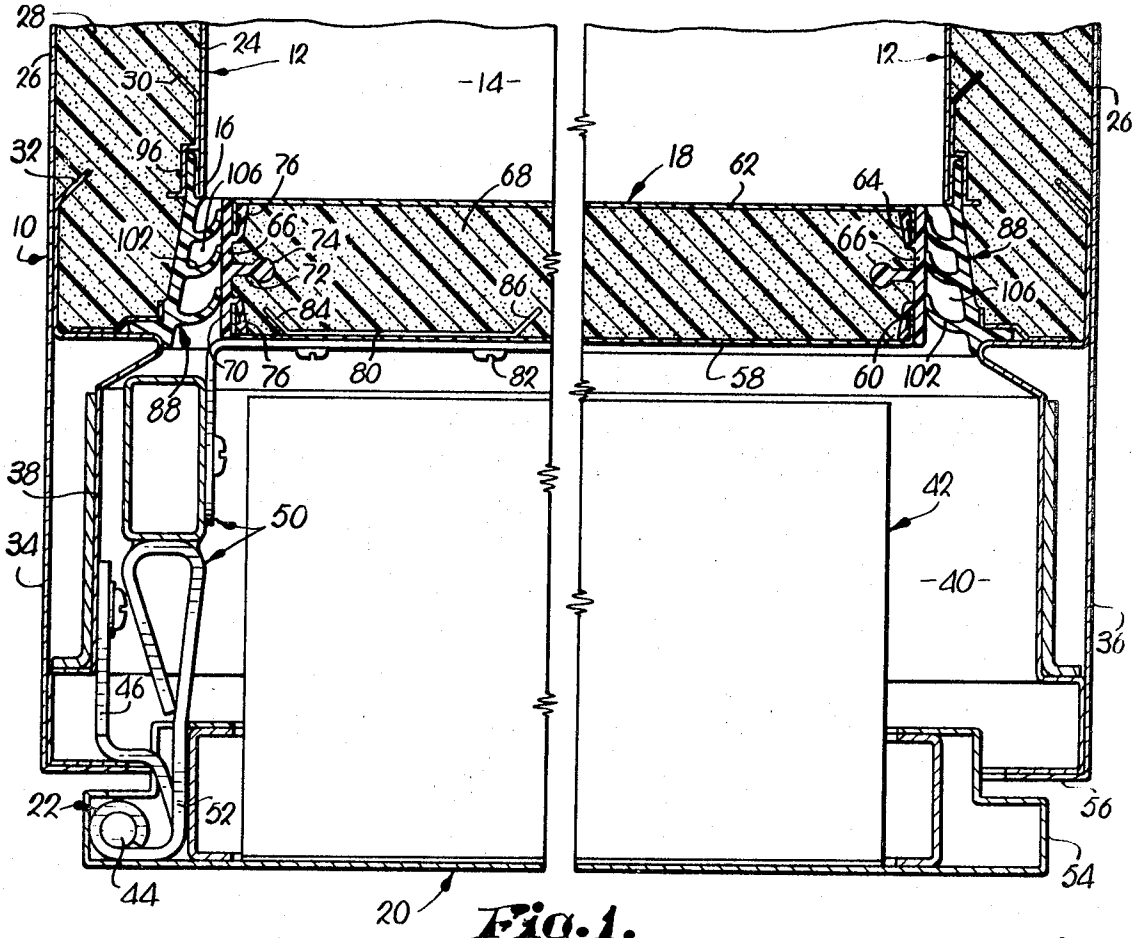


Fig. 1.

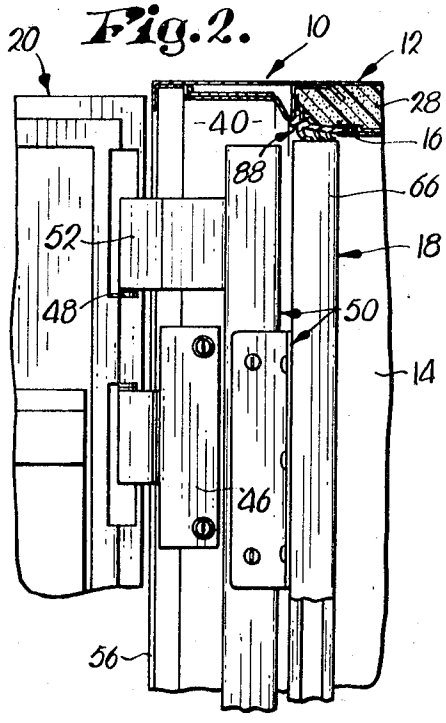


Fig. 2.

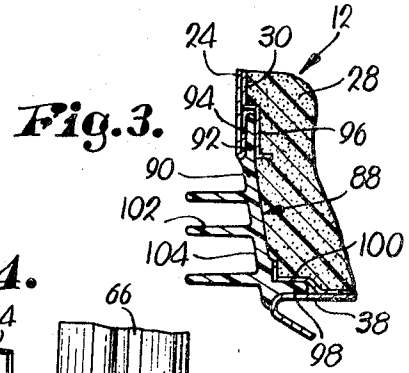


Fig. 3.

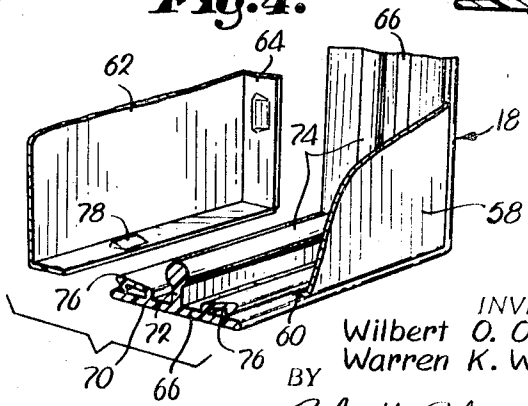


Fig. 4.

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INSULATED CABINET CONSTRUCTION FOR VENDING MACHINES OR THE LIKE

This invention relates to vending and dispensing machines and, more particularly, to improved constructions for heat insulative doors and to improved structure for effecting a heat seal and releasable holding force between such doors and the main wall assembly of an insulated cabinet.

In many types of vending and dispensing machines employing an insulated cabinet in conjunction with means for refrigerating the interior of the cabinet or otherwise maintaining such interior at a temperature other than ambient, it is necessary that a closure door be provided that may conveniently be opened for servicing but which, when closed, will minimize the transmission or leakage of heat to and from the interior of the cabinet. Conventional approaches to solving such a problem have generally followed the course of providing relatively heavy and bulky doors of heat insulated construction such as have been developed and utilized in the refrigerator art. Conventional constructions have also generally attempted to effect sealing between the insulated door and the main cabinet structure by providing a compression gasket or the like on either the door itself or upon a portion of the main cabinet wall structure which will, as the door is closed, be compressed between the rear panel of the door and the main wall structure of the cabinet for the purpose of effecting an intended seal. With such constructions, it is customary to provide some form of manually operable latching structure to maintain the door in its closed position against the opposing bias of the compressed sealing gasket between the door and the main wall structure of the cabinet.

Such conventional constructions, although apparently suitable for use in home refrigerators or the like, suffer from a number of disadvantages which become relatively critical when applied to insulated cabinets for vending or dispensing machines. For example, in the latter type of equipment, there are normally demanding space limitations upon the overall size of the apparatus, and commercial considerations require a maximum use of the available space so that the cabinet may store and condition for dispensing as many articles as possible. Both because of the large number of articles whose temperature must be conditioned as quickly as possible following filling of the machine by a serviceman and because of the need for close temperature control of articles to be commercially dispensed, a high degree of efficiency in the cooling or other temperature conditioning operation of the machine is essential and heat leakage that might be permissible in a domestic appliance becomes intolerable. In view of the necessity for rather frequent access to the interior of a dispensing or vending machine by service or operating personnel, who may tend to be careless about relatching an access door in fully closed position for accomplishing an effective heat seal, the manual latching assemblies used in domestic appliances and previous vending and dispensing equipment result in practice in lost efficiency of the cooling or other temperature conditioning process.

In the construction of vending machine cabinets which are to have a heat insulated interior, it has been found desirable from the economic and manufacturing viewpoint to employ the superior insulating and structural characteristics of foam type insulation in forming the primary walls of the cabinet, and this also permits such walls to be of a lesser thickness than previously deemed necessary. In such cabinets, it is conventional to employ both an inner and an outer door, the inner door preferably being of a thickness substantially the same as that of the main walls of the cabinet and being both of heat insulating character and adapted to close the access opening to the interior of the cabinet and effect a heat seal isolating the interior of the cabinet from ambient external temperature factors. The outer door carries various operative portions of the vending machine mechanism, is spaced forwardly from the inner door to accommodate such mechanisms therebetween, and usually is not of heat-insulated construction. The inner and outer doors are independently hinged upon the cabinet,

and it is vital that both of such doors be attached to swing entirely clear of the access opening of the cabinet to permit proper introduction and removal of structural parts or products to and from the interior of the cabinet during servicing. It has been found, however, that it is difficult, if not impossible, to obtain proper hinging and clearance for the inner door when opened and proper heat sealing between the inner door and the main cabinet walls with constructions in which an inner door of thickness similar to the thickness of the main cabinet walls is mounted to effect an abutting seal with the front of the main cabinet walls, at least in any construction in which the sides of the cabinet extend forwardly to provide a mounting for the outer door and an enclosure for the mechanism carried by the latter in substantially coplanar relationship with the more rearward portions of the sides of the cabinet housing the insulated portion of the latter.

Accordingly, it is the primary object of this invention to provide an improved insulated cabinet construction for vending machines or the like in which the aforementioned and other disadvantages inherent in conventional equipment are overcome.

It is another important object of the invention to provide such a cabinet construction which employs a minimum number of relatively simple structural elements that may be manufactured and assembled with greater economy than heretofore possible, as well as attaining a higher efficiency in the performance of the intended functions.

It is another object of the invention to provide a cabinet construction employing an improved form of heat insulative door in which a pair of spaced panels and a peripheral edging strip define an initially hollow door assembly that is filled with heat insulative foam material, with the panels, the edging strip and the foam filling all suitably mechanically interlocked with each other.

It is another object of the invention to provide such a cabinet construction in which the edge strip of the door is of heat insulative material and is engaged by a plurality of resilient fingers of a heat insulative gasket structure upon the walls of the cabinet to perform the dual function of providing a truly effective heat seal between the door and the cabinet walls when the door is closed and of providing an automatic releasable means for holding the door in its closed position through interengagement with the door along its edge portions.

Still other important objects of the invention will be made clear or become apparent to those skilled in the art from the drawings and the description of a preferred embodiment of the invention that follows. It should be noted that, although the improved cabinet construction of the invention possesses special utilities and advantages when employed in heat insulative cabinets used in commercial product dispensing or vending applications, many of the principles of the invention could also be employed to advantage in domestic appliances or the like.

In the drawings:

FIG. 1 is a fragmentary, cross-sectional view taken on a horizontal plane and looking downwardly through a preferred embodiment of a cabinet constructed in accordance with the invention;

FIG. 2 is a fragmentary, elevational view, with certain parts shown in vertical cross section, of a portion of such cabinet particularly illustrating certain details of one manner of hinging both an outer panel door and an inner heat insulative door upon a main cabinet wall assembly;

FIG. 3 is a fragmentary, cross-sectional view showing the relationship between the sealing gasket structure that circumscribes the zone for receiving the inner, heat insulative door in closed position with a portion of the wall structure of the main cabinet assembly, the fingers on the sealing gasket being shown in the positions they normally occupy when not engaged by the inner door, and it being understood that the relationship between the sealing gasket and the wall structure of the main cabinet assembly is essentially the same at the top,

bottom and both sides of the opening for receiving the inner door; and

FIG. 4 is a fragmentary, exploded, perspective view, with certain parts cut away and shown in cross section, of a corner portion of the panels and edging strip elements of the inner door prior to filling of such door with heat insulative foam material.

Referring to the drawings of the preferred embodiment, the overall improved cabinet construction is generally designated by the numeral **10**. The cabinet **10** broadly includes insulated side, top, bottom, and rear walls **12**, presently a chamber **14** therewithin having a frontal opening **16**, an inner door assembly **18**, an outer door assembly **20**, and a hinge structure **22** swingably mounting the doors **18** and **20** upon the cabinet **10**.

Since the constructions of the cabinet walls **12** may be substantially identical about all of the closed faces of the chamber **14**, only certain of the walls **12** are included in the drawings for illustrative purposes. The sidewalls **12** illustrated in FIG. **1** are typical and include an inner panel **24**, an outer panel **26** spaced therefrom, and a heat insulative filling of foam material **28** therewithin. Although various foam materials could be used, a self-curing, rigid polyurethane foam has been found quite satisfactory. The walls **12** may have the cavity between the panels **24** and **26** thereof filled with the initially liquid foam material through a tube, with the material then being frothed in place and permitted to cure itself thereupon such material not only becomes rigid but adheres to the interfaces of the panels **24** and **26**. To provide a more positive interlocking between the panels **24** and **26** and the foam material **28**, the panels **24** and **26** may respectively be provided with foam locking structures as at **30** and **32**, which are metal elements connected to the panels in any suitable fashion as by spotwelding or tapping screws, which structures **30** and **32** include bent-out portions that extend into the main body of the foam material **28** to interlock the parts when the foam filling **28** has become rigid.

The panels **26** at opposite sides of the cabinet **10** include forward portions **34** and **36** at the opposite sides of the cabinet **10**, and these are suitably interconnected and braced with forward extensions **38** of the foam locking structures **32**.

It will be noted that the portions **34** and **36** of panels **26** extend forwardly of the opening **16** in the insulated part of the cabinet **10** to define a chamber **40** therewithin between the doors **18** and **20**. In vending equipment the front panel door **20**, which need not be heat insulated, customarily carries on its rear face various mechanisms generally indicated as enclosed within a housing **42** on the back of the door **20**, which mechanisms form a part of the control portions of the vending machine, such as devices for testing deposited coinage, devices for making change, switching means for making product selections and associated electrical circuitry, etc. It will be understood that certain of such mechanisms generally indicated as supported on the rear of door **20** as within the housing **42** are not adapted for optimum operation within a cold or heated environment, so that the provision of separate inner and outer doors **18** and **20** with a space **40** therebetween for accommodating such mechanisms is necessary.

The outer door **20** may be swingably mounted upon a hinge pin **44** carried by a bracket **46** mounted on the forwardly extending portions **34** and **38** of one main sidewall **12**, the door **20** being provided with a hinge leaf **48** pivoted on the pin **44**. The inner door **18** is preferably hinged upon the same pivotal axis as the door **20**, by means of a bracket assembly **50** suitably secured to the inner door **18** and extending forwardly to a hinge leaf **52** upon the pin **44**. The opposite edge **54** of the outer door **20**, which also is typical of the top and bottom edges thereof, may be configured in any suitable fashion for effecting a closure with the forward extremity **56** of the uninsulated forwardly extended portion **36** of the corresponding side, top or bottom wall **26** of the cabinet **10**. Since the outer, front panel door **20** need not be heat insulative in character, any suitable and conventional means for holding the same in closed position may be provided, but this is not specifically illustrated since it forms no part of the present invention.

Turning attention now to the improved inner door assembly **18** provided by the invention, such door includes an outer or front metallic panel **58** having a peripheral flange **60**, an opposed rear metallic panel **62** having a peripheral flange **64** in spaced opposed relationship to the flange **60**, an edging strip **66** extending completely around the periphery of the panels **58** and **62**, and a foam filling **68** within the interior space defined by the panels **58** and **62** and the edging strip **66**. The edging strip has a substantially flat outer surface **70** thereon and, on its opposite face, is provided with a protuberance **72** having an end portion **74** of enlarged cross section extending along the center of the strip **66**. Adjacent each of the margins of the strip **66** is an integral resilient hooklike element **76** adapted to receive the corresponding flange **60** or **64** between such element **76** and a corresponding marginal portion of the strip **66**. In order to provide both the desired heat insulative qualities and the desired resiliency, it is preferred that the edging strip **66** be formed by extrusion from a relatively rigid type of plastic material of which a number are widely known and available on the market.

It will be noted in FIG. **4** that the flange portions **60** and **64** of panels **58** and **62** are preferably provided at suitable intervals with a plurality of tabs **78** stamped and bent inwardly from the corresponding flange **60** or **64**. Such tabs **78** are adapted to be received within the hook elements **76** and to interlock therewith to supplement the adhesive effects of the foam filling **68** in holding the various elements of the inner door **18** together. For the same purpose, each of the panels **58** and **62** will preferably be provided with a number of foam lock structures, one of which is shown at **80** in FIG. **1** for purposes of illustration. The locking structure **80** may be screwed as at **82** or otherwise suitably fastened to the panel **58** or **62** with which it is associated, and it is provided with opposed ends **84** and **86** angularly extending into the foam filling **68** to more securely interconnect the panels **58** or **62** with the filling **68**.

The described construction for the inner door **18** provides a door assembly that is easy and relatively inexpensive to fabricate, that is extremely strong from the structural viewpoint, that is highly efficient for heat insulating purposes, and that is relatively thin and consumes a minimum amount of the available space.

Referring next particularly to FIG. **3**, in conjunction with FIG. **1**, it will be seen that each of the top, bottom and side walls **12** defining the chamber **14** within the insulated portion of the cabinet **10** carries adjacent and in circumscribing relationship to the open front of chamber **14**, a sealing gasket member generally designated **88**. The gasket member **88** includes a striplike base wall **90** having a marginal and **92** received between a bent-under portion **94** along the forward extremity of the panel **24** and the forwardmost portion **96** of the locking structure **30**. The opposite marginal portion of the wall **90** extends outwardly at **98** and is received between the extension **38** of locking structure **32** and an opposed bracket element **100** spotwelded or otherwise suitably secured to the extension **38**. It may be noted that the walls **12** of cabinet **10** are preferably assembled by the use of a fixture (not shown) that engages the panels **24** and **26** to hold the panels in their desired relative positions while the foam material **28** is being emplaced and cured therebetween. Such fixture also maintains the pockets between the portions **94** and **96** of the panel **24** and between the extension **38** and the element **100** clear of foam material during the emplacement and curing of the material **28**, so that the marginal portions of the gasket member **88** may be inserted therein after the curing of material **28** has been completed. The gasket **88** is preferably also bonded to the adjacent surfaces of the foam material **28** by the use of any suitable cement during installation of the gasket **88**. Although the gasket **88** may be made from any suitable heat insulative, resiliently pliable material, it has been found that either rubber or certain plastic materials having similar characteristics are most satisfactory.

The gasket **88** is provided with a plurality of resilient, striplike finger portions **102** extending inwardly from the surface **104** of wall **90** bounding the opening **16** in chamber **14**. In FIG. **3**, the finger strips **102** are shown in their normal and unflexed positions. It will be noted that the base portion **90** of the gasket member **88** is disposed in the preferred embodiment at an angle slightly flaring to enlarge the cross section of the opening **16** at the forward extremity thereof remote from the chamber **14** and that the fingers **102** are of correspondingly greater dimension extending from the base of the gasket **88** as the flared extremity of the opening **16** remote from the chamber **14** is approached; such flaring of the gasket **88** and such dimensioning of the finger strips **102** are desirable to facilitate easy reception and withdrawal of the inner door **18** from its closed position. In FIG. **1** the finger strips **102** are shown in the flexed positions that they assume when the inner door **18** is swung into the opening **16**. In the latter condition, it will be noted that the finger strips **102**, in conjunction with the edging strip **66** on the inner door **18**, define and enclose therebetween elongated air pockets **106** which serve, in conjunction with the insulative properties of the edging strip **66** and the gasket fingers **102** themselves, to provide thermal insulation for the chamber **14** throughout the space circumscribing the inner door **18** between the latter and the adjacent wall structures **12** of the cabinet **10**.

It will also be observed that with the improved constructions and relationships contemplated by the invention, the finger strips **102** engage the inner door **18** only along the peripheral surface of the latter presented by the face **70** of the edging strip **66**. Accordingly, the inner door **18** itself need not fit tightly into any rigid peripheral casing provided by the wall structures **12** of cabinet **10**, thereby eliminating tolerance problems that can be quite critical in large cabinets manufactured with conventional constructions. Moreover, the finger strips **102** are not compressed or otherwise located or configured to present a force tending to move the inner door **18** toward an open position once it has been closed, which as previously noted can result in inadvertent leakage of heat and moisture vapor in conventional constructions when service personnel fail to fully seat and latch the insulated door of a refrigerated cabinet. Rather, the resilient finger strips **102** perform the important second function of providing automatic means for releasably holding the inner door in its closed position, yet permitting such door to be quickly and easily opened whenever desired. This function is accomplished by the fact that, as the inner door **18** is pushed toward its closed position, the finger strips **102** are flexed in the directions indicated in FIG. **1**, whereupon the interengagement by the strips **102** and the surface **70** of the edging strip **66** serve to securely, but releasably, hold the inner door **18** in its closed position until service personnel desire to open the same.

The employment of heat insulative materials for the edging strip **66** of the inner door **18** and for the gasket structure **88** greatly enhance the heat-insulating efficiency of the overall construction, since there is no metallic part to provide a heat conduction surface in communication with both the heat conditioned chamber **14** and the exterior of the cabinet **10**.

Thus, it will be seen that this invention, as illustrated by the preferred embodiment chosen to be shown and described, employs novel types, arrangements and relationships of structural elements to accomplish the aforementioned objectives of the invention and to overcome the disadvantages that have long been inherent in the types of insulated cabinet constructions that have heretofore been conventional. Those skilled in the art will appreciate that various minor modifications or changes could be made from the exact details of the construction explained for illustrative purposes without departing from the true spirit or essence of the invention. Accordingly, it should be understood that it is intended for the invention to be deemed limited only by scope of a fair interpretation of the claims that follow.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. An insulated cabinet comprising:
insulated wall structure defining a chamber having an access opening therein;
a pair of spaced, opposed panels each having a peripheral flange extending toward but spaced from the flange of the other panel;
edging strip means of resilient heat insulative material extending along the peripheries of said panels and provided with elements thereon for gripping said flanges between said elements and proximal other portions of said strip means to interconnect said panels in said spaced relationship;
a substantially rigid filling of heat insulative material between said panels secured to said panels and said strip means;
means swingably mounting the assembly including said panels, strip means and filling upon said structure to present a door movable into and away from said opening;
a gasket member having a base portion mounted on said structure in circumscribing relationship to the periphery of said opening; and
a plurality of spaced finger strips of resilient heat insulative material on said base portion of said member in circumscribing relationship to said opening and normally extending inwardly toward an opposite portion of the opening,
said resilient strips being disposed to be engaged by the peripheral edge only of said door when the latter is closed.

2. The invention of claim **1**, wherein said panels and said strip means are each provided with structure thereon extending into said filling to interlock said panels, strip means and filling.

3. In the invention of claim **1**, wherein said panels are formed of heat conductive metal; said strip means and said elements thereon are integrally formed of relatively rigid plastic material; and said filler is formed of foam plastic material adhered to said panels and strip means.

4. The invention of claim **1**, wherein said base portion of said member flares outwardly as the extremity thereof remote from the interior of the cabinet is approached; and said finger strips are of greater size along the dimension thereof extending inwardly of said opening as said extremity of said member is approached.

5. The invention of claim **1**, wherein said finger strips are integrally connected with said base portion of said member.

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