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April 2, 1940. E. F. SCHWELLER 2,195,500

REFRIGERATING APPARATUS

Filed June 28, 1937 2 Sheets-Sheet 1

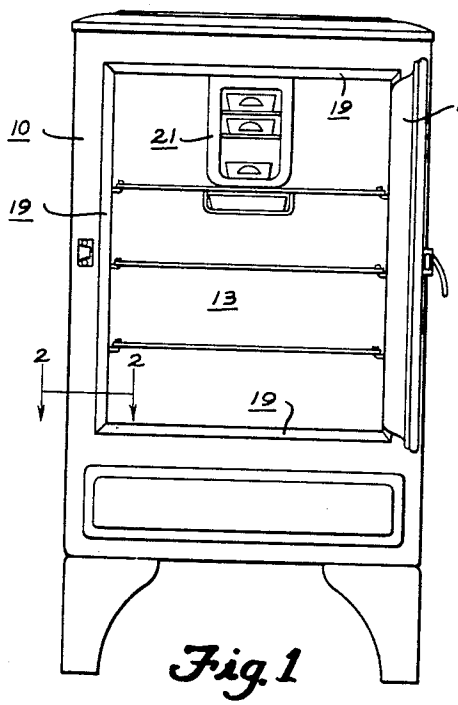


Fig. 1

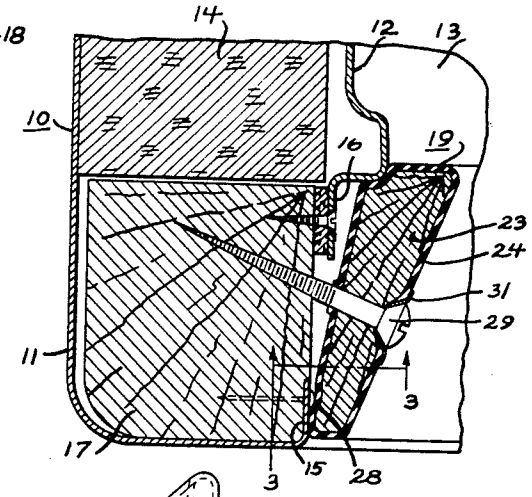


Fig. 2

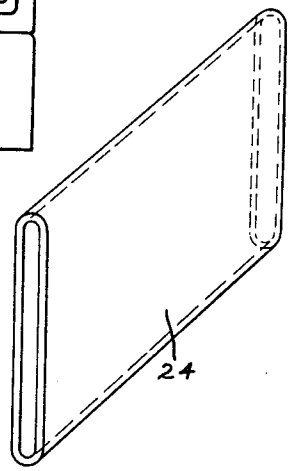


Fig. 4

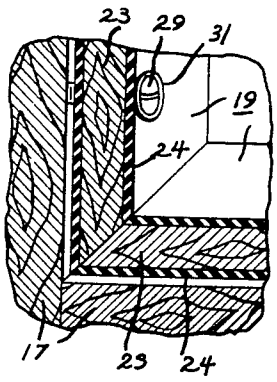


Fig. 3

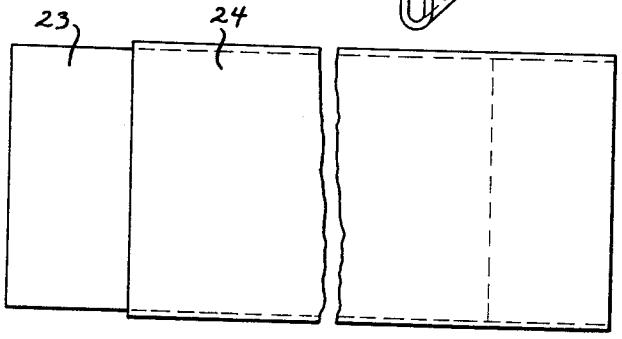


Fig. 5

INVENTOR.
EDMUND F. SCHWELLER.

BY

Spencer, Hardman and Fehr.
HIS ATTORNEYS.

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REFRIGERATING APPARATUS

Filed June 28, 1937 2 Sheets-Sheet 2

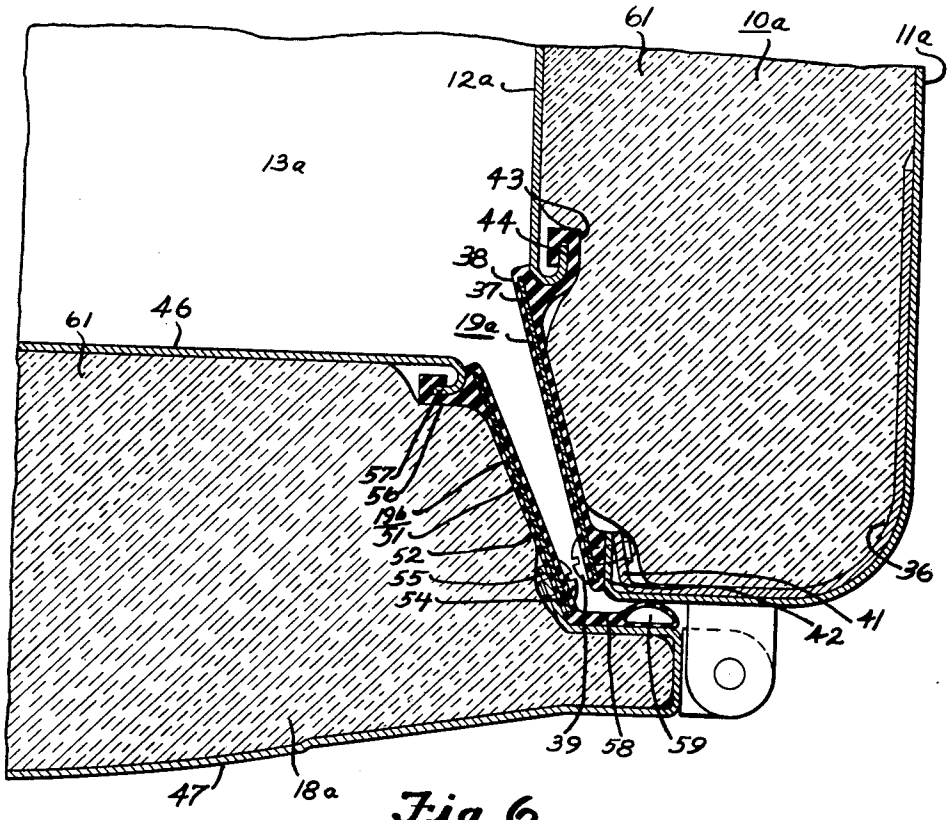


Fig. 6

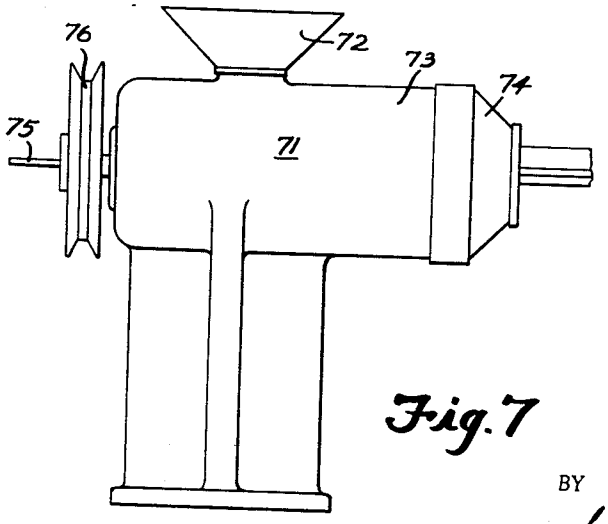


Fig. 7

INVENTOR.
EDMUND F. SCHWELLER.

BY

Spencer, Hardman and Fehr
HIS ATTORNEYS.

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UNITED STATES PATENT OFFICE

2,195,500

REFRIGERATING APPARATUS

Edmund F. Schweller, Dayton, Ohio, assignor to General Motors Corporation, Dayton, Ohio, a corporation of Delaware

Application June 28, 1937, Serial No. 150,719

3 Claims. (Cl. 220—9)

This invention relates to refrigerator cabinet wall constructions and particularly the door opening moldings therefor. The present application is a continuation in part of my copending application Serial No. 18,630, filed April 27, 1935.

An object of my invention is to provide improved molding or trim strips between the spaced apart edges of metallic members of a wall structure for refrigerator cabinets such as between the metal panels of a refrigerator door or between the metal wall members of a refrigerator cabinet at the door opening or throat of a food storage compartment.

Another object of my invention is to reduce the cost of producing a finish breaker strip or trim molding for a refrigerator cabinet or for the door thereof while at the same time providing a strip or molding that is strong, effective and of neat appearance.

Still another object of my invention is to provide refrigerator wall structures with a finish breaker strip or trim molding which is relatively thin, substantially rigid and of low heat conductivity having exposed surfaces that are non-hygroscopic.

In carrying out the foregoing objects it is a further and more specific object of my invention to provide a finish breaker strip or trim molding for refrigerator wall structures by covering a self-sustaining substantially rigid strip element of low heat conductivity with rubber such for example as by stretching a rubber tubular member over a piece of wood or by passing an insulating strip through a rubber extruding apparatus to thereby extrude a layer or coating of rubber directly thereover, the latter of which permits attaching and/or flexible sealing portions to be extruded integrally and simultaneously with the impervious non-hygroscopic rubber covering of the molding member.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a front elevational view of a refrigerator cabinet having my invention embodied therein;

Fig. 2 is a fragmentary sectional view taken on the line 2—2 of Fig. 1 showing a molding strip of the present invention applied to the refrigerator cabinet;

Fig. 3 is a fragmentary sectional view taken on the line 3—3 of Fig. 2 and showing the molding strips in abutting relation at a corner of the cabinet door opening;

Fig. 4 is a perspective view of a flexible rubber tube adapted to be applied over a wood strip;

Fig. 5 shows the tube disclosed in Fig. 4 as being applied to a wood strip;

Fig. 6 is an enlarged sectional view similar to Fig. 2 and showing a slightly different refrigerator cabinet construction having a modified form of molding strip applied thereto and a still further modified form of molding strip applied to the door thereof; and

Fig. 7 is a view representative of a conventional rubber extruding apparatus.

Referring to the drawings, for illustrating the present invention, I have shown in Fig. 1 thereof a refrigerator cabinet of the household type generally designated by the reference character 10. Cabinet 10 includes a metal exterior shell or finish panel 11 and an interior metal lining 12 (see Fig. 2) forming walls of a food storage compartment 13. Any suitable insulating material 14 may surround the lining 12. The metal members 11 and 12 each have edge portions 15 and 16 respectively overlapping and secured to a wood door frame 17. The edge portions 15 and 16 of the metal members 11 and 12 respectively are spaced apart so as to break metal-to-metal contact therebetween to prevent transference of heat into the food storage compartment 13. The frame 17 extends around the throat of the compartment 13 or around the opening which affords access to compartment 13 and which opening is adapted to be closed by a door 18. The edges 15 and 16 of the panel or shell 11 and lining 12 respectively and the exposed face of frame 17 at the throat of compartment 13 are adapted to be covered or concealed by molding of trim strips generally designated by the reference character 19. It is to these trim strips that my invention is particularly directed and their construction together with the means for attaching same to the throat of compartment 13 of cabinet 10 will be more fully described hereinafter. A cooling element or evaporator 21 of a closed refrigerant liquefying and circulating system may be mounted in any suitable manner in the compartment 13 of cabinet 10 for cooling food adapted to be stored therein.

Each of the molding or finish trim strips 19 include a wood member 23 having a covering 24 thereover. Wood member 23 has, in the present disclosure, a cut-out portion 26 along one side thereof for abutment against a raised or shoulder portion 27 provided on the food compartment

lining 12. A cut-out portion 28 along the surface of member 23 is adapted to clear fastening means employed to secure the edge portion 15 of shell or panel 11 to the frame 17. The trim strips 19 are secured to the frame 17 by a plurality of screws 29 each having a cone-shaped metal washer 31 under their heads. The ends of the wood members 23 and the ends of the covering 24 of each of the trim strips 19 are cut at an angle so as to cause proper alignment and abutment of the ends of strips 19 and coverings 24 at the corners of the throat of the food compartment 13 (see Fig. 3).

The covering 24 over the trim strip 19 is in the present invention in the form of a flat tube of flexible resilient rubber (see Fig. 4). The rubber tube 24 may be produced in any suitable manner such, for example, as by molding a strip of flat sheet rubber into a tubular form or by forming a continuous tubular element by extruding a continuous rubber tube from a rubber extruding apparatus as is well-known to those skilled in the art. The opening in the covering tube 24 is slightly smaller than the total distance around the wood member 23 and this tube, when the wood member 23 is placed or forced therein, is stretched so as to tightly engage outer surfaces of the wood member. In Fig. 5 of the drawings I have shown the rubber covering tube 24 as being applied to the wood member 23 by stretching the tube and slipping same over the wood member. The tube 24 and member 23 may be wetted with water or any other substance to facilitate application of the tube to the strip member. The resilient rubber from which tube 24 is formed is a non-hygroscopic material and consequently forms an outer surface over the wood strip 23 which is impervious to moisture. The stretching of the tube 24 over and upon the rigid member 23 is sufficient to hold same in place thereon while at the same time permitting removal of the tube from the member 23 when necessary. This removability of tube 24 from member 23 is a novel feature of the present disclosure in that it permits the outer covering of the trim or molding strips 17 to be removed and replaced with new coverings upon being damaged. For example, should the covering or tube 24 on the wood strips 23 become torn or damaged, so as to impair the appearance of the cabinet or so as to be ineffective in preventing the entrance of moisture to the insulating space between the outer and inner metal walls 11 and 12 respectively of the refrigerator cabinet 10, a service man can remove the molding 19, by removing the screws 29 and sliding the molding horizontally outwardly from the cabinet, and take the damaged covering 24 off of the wood strip 23. The service man can then quickly and readily install a new tube covering upon the wood strip 23 and replace the molding 19 so as to improve the appearance of the cabinet at a very low cost.

In Fig. 6 of the drawings I have disclosed a modified form of my invention applied to a refrigerator cabinet 10a of slightly different construction than the cabinet 10. The wood frame 17 of cabinet 10 is omitted from cabinet 10a and a metal frame 36 is substituted therefor. The metal frame 36 in cabinet 10a supports the outer metal cabinet wall 11a and the metal liner wall 12a of the food storage compartment 13a which may be attached to the outer cabinet wall 11a in any desirable manner. One suitable method of supporting the food compartment liner 12a directly from the cabinet outer metal wall 11a is disclosed in my copending application Serial No. 58,363 filed January 9, 1936. The door 18a of cabinet 10a shown in Fig. 6 may also have my invention embodied therein and for this reason a further modified form of my invention is disclosed as being applied to door 18a. The insulating breaker or trim strip molding member 19a forms another wall between the spaced apart edges of the metal outer wall 11a and the metal inner wall 12a of the insulating wall structure of cabinet 10a at the throat of the food compartment 13a or at the opening of the compartment to be closed by door 18a. This member 19a preferably comprises a self-sustaining, substantially rigid, wide, thin strip of fiber or fish paper 37 enclosed in a rubber casing 38 which forms an impervious non-hygroscopic coating thereover. The strip element 37 imbedded in the rubber cover 38 may, however, be formed of any suitable material preferably of low heat conductivity such, for example, as those materials known to the trade as "glyptol," "Bakelite," "textolite," etc., without departing from my invention. The one side or edge of molding wall 19a is secured to the frame 36 and to the outer wall 11a of cabinet 10a by a plurality of screws 39 which pass through molding member 19a and are threaded into openings provided in inturned flanges 41 and 42 formed on frame 36 and wall 11a respectively. The molding member 19a has an integral attaching portion 43 formed on its opposite edge and disposed at an angle to the extension of the member 19a and this attaching portion thereof is hooked over a reversely bent flanged edge 44 provided on the liner 12a.

The door 18a which forms a wall structure portion of cabinet 10a includes an inner metal panel or wall 46 and an outer metal panel or wall 47 having their edges widely spaced apart at the periphery of the door. An insulating breaker or trim strip molding member 19b forms another wall between the spaced apart edges of the metal walls 46 and 47 of the wall structure formed by door 18a. This member 19b comprises a self-sustaining substantially rigid, wide, thin strip of fiber or fish paper 51 enclosed in a rubber casing 52 which forms an impervious non-hygroscopic coating thereover. Like element 37 of member 19a strip element 51 of member 19b may be formed of any suitable material preferably of low heat conductivity. The one side or edge of molding member 19b is secured to door 18a by a plurality of screws 54 which pass through member 19b and are threaded into suitable openings provided in a reversely bent flange 55 formed on the outer metal panel 47 of door 18a. The molding member 19b has an integral attaching portion 56 formed on its opposite edge and disposed at an angle to the extension of member 19b and this attaching portion thereof is hooked over a reversely bent flanged edge 57 provided on the inner metal panel 46 of door 18a. In addition the molding member 19b has a thick integral web portion 58 extending at an angle to the extension thereof and lying along the inturned face portion of the flange 55 on door panel 47. The edge of thick web portion 58 of molding member 19b terminates in the form of a hollow, flexible, resilient and compressible bead or cushion portion 59 which forms a seal for engaging the outer cabinet wall 11a to seal the door opening of the food compartment 13a. It will be seen that molding member 19b is secured to the outer metal wall 47 of door 18a and that the inner metal wall 46 of door 18a is secured to the door

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by hooking the attaching portion 56 of member 19b thereto. The rigidity of the rubber enclosed elements 37 and 51 of molding members 19a and 19b respectively and the wall formed thereby is sufficiently self-sustaining to prevent deformation thereof by insulating material 61 placed or packed in the chamber formed between the inner and outer metal walls of the door or cabinet wall structure.

By virtue of the substantially rigid nature of the trim molding member 19b and its method of attachment to door 18a all framework can be eliminated from the door to thus render it light in weight. Since the door 18a is attached to cabinet 10a by hinges having a part thereof welded or otherwise suitably secured to the outer metal panel 47 and since the mold member 19b is attached to panel 47 and clamps the inner wall 46 thereto the parts of the door 18a remain in contact during manipulation thereof. By virtue of the construction disclosed in Fig. 6 an improved refrigerator cabinet is provided in that the insulation 61, which may be of any suitable or desirable material, can be extended continuously beyond the front edge of liner 12a to surround the throat of the food compartment 13a at the front of the cabinet 10a. The insulating material 61 in door 18a can be extended to the periphery thereof. The insulation 61 is obviously and preferably much more efficient than wood frame members and by its extension to the front of the refrigerator cabinet particularly in the vicinity of the wall of the access opening leading to the food compartment 13a and the edge portion of door 18a the cabinet and the door are thereby effectively insulated. By eliminating heavy wood frames about the opening to compartment 18a and around the periphery of door 13a the weight of the cabinet 10a is materially reduced.

Having described the structure of the improved molding members or breaker strips shown in Fig. 6 and their function in refrigerator cabinet wall constructions, I will now describe one method of producing the members for a better understanding of my invention. In Fig. 7 of the drawings I have illustrated a rubber extruding apparatus which is more or less conventional and well known to those skilled in the art. The extruding apparatus, generally represented by the character 71, may comprise a funnel-shaped hopper 72 which feeds molten rubber into a cylinder or barrel 73 containing propelling means such, for example, as a screw or the like for forcing the molten rubber from the barrel or cylinder 73 through suitably shaped openings provided in a head 74. In the production of the molding members or breaker strips 19a and 19b of the present invention a continuous strip of fiber or fish paper 75, or other self-sustaining, substantially rigid, strip material, is inserted into the extruding apparatus 71 at the end of barrel or cylinder 73 opposite the head end 74 thereof. A driving pulley or the like 76 is mounted at this opposite end of the barrel or cylinder and is connected with the extruding screw or propeller located in the barrel or cylinder 73 for operating same. Means is of course provided for causing the continuous strip of paper 75 to travel through the apparatus 71 preferably at a speed corresponding to the speed of extruding the layer or cover of rubber from the apparatus 71 thereover. Means may also be provided for guiding the strip 75 through the cylinder or barrel 73 of apparatus 71 to protect same from being deformed by pressure or heat existing therein. In this apparatus the paper 75 comes out of head 74 simultaneously with a continuous tube or layer of rubber extruded around the paper. The extruding openings in head 74 of apparatus 71 are designed to produce the particular shape of extruded rubber element desired. For example in the production of the improved molding members 19a and 19b disclosed the attaching portions 43 and 56 thereon respectively and the hollow sealing portion 59 of member 19b are extruded integrally and simultaneously with the layer or coating of rubber over or around the rigid strip element thereof. The molten rubber upon being extruded from the head end 74 of apparatus 71 is in the form of a thin film over the strip element 75 and upon being cooled expands slightly to provide the surrounding layer of rubber over the strip element. The continuous rubber extruded member leaving the apparatus 71 upon being cooled and assuming its predetermined shape is cut into the desired lengths to provide the trim or mold members of the present invention. The apparatus for and the method of extruding rubber as herein briefly described is well known to those skilled in the art and is illustrated merely for a better understanding of the article claimed as my invention.

It will be seen that I have provided improved refrigerator cabinet wall constructions and that I have provided a novel trim or molding strip for application to a wall construction either around the throat or opening of the food storage compartment or around the periphery of the cabinet door. My invention provides trim strips that are impervious to moisture and form non-hygroscopic surfaces and these strips may be of any desired color so as to harmonize with the finish of the refrigerator cabinet or so as to provide a contrast to the finish. The trim strips of the present invention obviate the expensive molding process of non-hygroscopic materials and provide strips which are inexpensive to produce and readily replaced. By virtue of the self-sustaining or substantially rigid element within the novel trim strips disclosed a refrigerator wall structure can be materially simplified to thereby reduce manufacturing costs and to reduce the weight thereof.

While the forms of embodiment of the invention as herein disclosed, constitute preferred forms, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A refrigerator wall structure comprising in combination, an outer metal wall, an inner metal wall spaced from said outer wall and providing a chamber therebetween, insulation material within said chamber, said outer and inner walls having their edges spaced apart and forming an opening therebetween, a member providing a closure wall for the opening between the edge portions of said inner and outer metal walls, said member including a flat substantially rigid core of insulating material having a layer of rubber extending continuously therearound and forming a non-hygroscopic enclosure for the core, said core of said member having its edge portions overlying the edge portions of said inner and outer metal walls to bridge the opening therebetween whereby said edge portions of the inner and outer metal walls form the sole rigid backing for said closure wall member, said rubber layer on said member having a resilient portion abutting the edge portions of said inner and outer metal walls, said rubber layer having a portion formed integral therewith at one edge of said

member attached to the edge portion of said inner metal wall, means for securing the other edge of said member to said outer metal wall, said means being constructed and arranged to act on the rigid core of said closure member and apply force therethrough to the rubber layer thereover to impinge the layer against the edge portion of said outer metal wall, and said rubber layer on said closure member also having an integral flexible bead projecting outwardly from the edge of said member overlapping said outer metal wall and abutting a portion of said outer metal wall beyond its edge to provide a gasket adapted to engage and seal against another wall structure.

2. A frameless door structure for closing an opening in a refrigerator cabinet comprising in combination, spaced metal panels having insulating material disposed therebetween, said panels having their peripheral edges spaced from one another, a member for maintaining the edges of said metal panels in a predetermined substantially fixed spaced apart relation and also forming a closure wall for the insulation between the spaced panels, said closure wall member including a substantially rigid element of low heat conductivity having a layer of rubber disposed over at least the surface thereof providing a peripheral exposed portion of the door and forming a non-hygroscopic covering for said surface, said element of said closure wall member having its edge portions overlapping the edge portions of said metal panels to bridge the space therebetween whereby said edge portions of the metal panels form the sole rigid backing for said closure wall member, said rubber layer on said wall member having a resilient portion abutting the edge portions of said metal panels, said rubber layer having a hook-like portion formed integral therewith at one edge of said closure wall member hooked over an edge portion of one of said metal panels, means for securing the other edge of said closure wall member to the other of said metal panels, said means being constructed and arranged to act on the rigid element of said closure wall member and apply force therethrough to the resilient rubber portion of the closure wall member to impinge same against the edge portion of said other metal panel, and said rubber layer having an integral flexible bead projecting outwardly from an overlapping edge of the rigid element of said closure wall member and abutting a portion of one of said metal panels adjacent its edge portion to provide a gasket adapted to engage a wall of the refrigerator cabinet to seal the opening therein to be closed by said door.

3. A frameless door structure for closing an opening in a refrigerator cabinet comprising in combination, an outer metal panel, an inner metal panel spaced from said outer panel and providing a chamber therebetween, insulating material within said chamber, said outer and inner panels having their peripheral edges spaced from one another, a member for maintaining the edges of said metal panels in a predetermined substantially fixed spaced apart relation and also forming a closure wall for the space therebetween, said closure wall member including a flat substantially rigid core of the insulating material having a layer of rubber extending continuously therearound and forming a non-hygroscopic enclosure for the core, said core of said closure wall member having its edge portions overlapping the edge portions of said metal panels to bridge the space therebetween whereby said edge portions of the metal panels form the sole rigid backing for said closure wall member, said rubber layer on said wall member having a resilient portion abutting the edge portions of said inner and outer metal panels, said rubber layer having a portion formed integral therewith at one edge of said closure wall member attached to the edge portion of said inner metal panel, means for securing the other edge of said closure wall member to said outer metal panel, said means being constructed and arranged to act on the rigid core of said closure wall member and apply force therethrough to the resilient rubber portion of the closure wall member to impinge same against the edge portion of said outer metal panel, and said rubber layer having a integral flexible bead projecting outwardly from the edge of the rigid core of said closure wall member overlapping the edge portion of said outer metal panel and abutting a portion of said outer metal panel adjacent its overlapped edge to provide a gasket adapted to engage a wall of the refrigerator cabinet to seal the opening therein to be closed by said door.

EDMUND F. SCHWELLER.