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REFRIGERATOR DOOR SEALING

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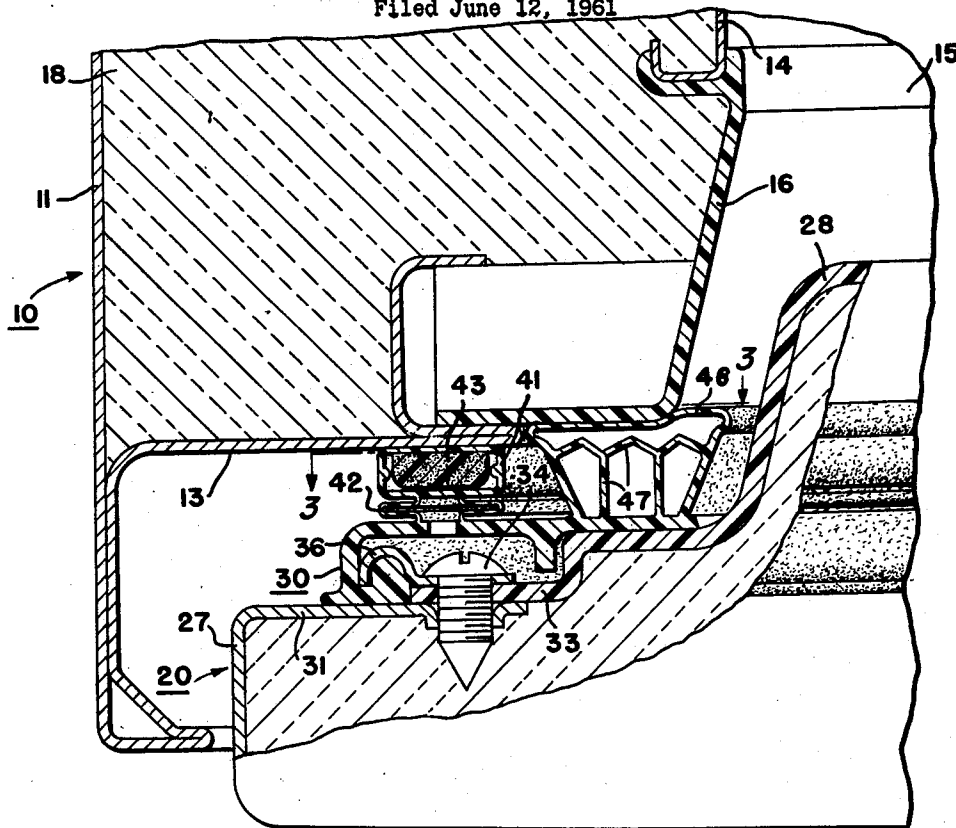


Fig. 2

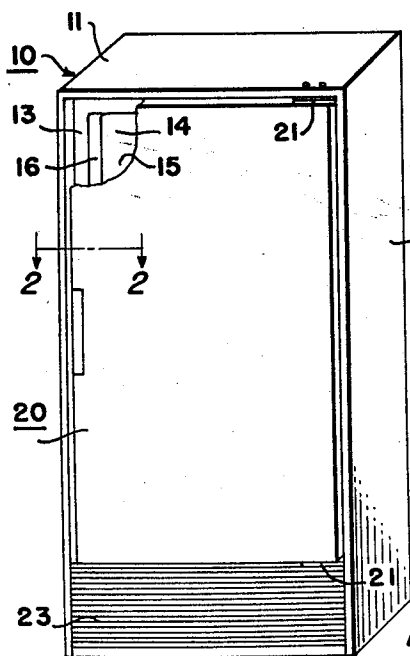


Fig. 1

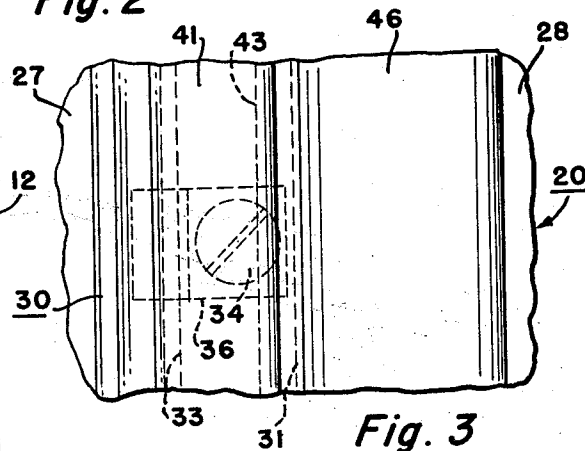


Fig. 3

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REFRIGERATOR DOOR SEALING

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1 Claim. (Cl. 312-296)

This invention relates to refrigeration and particularly to an arrangement for preventing condensation of moisture on the exterior wall of a refrigerator cabinet in the vicinity of the cabinet door.

By experimentation I have discovered that condensation of moisture on an exterior metal wall surface of a refrigerator cabinet in the vicinity of the refrigerator door is not due to a lack of sufficient insulating material in the front portion of the cabinet or to ineffectiveness of a gasket seal on the door but is instead due to exposing a portion of the cabinet outer metal panels or shell adjacent an access opening of a food storage chamber in the cabinet, normally closed by the door, to the low temperature air within the chamber. This exposure of the outer metal cabinet shell causes conduction of the low temperature past or beyond a gasket seal engaging that part of the shell adjacent the food chamber access opening and consequently cools said metal shell part to such a temperature, below the temperature of air ambient the cabinet, as to cause moisture to condense thereon. Such condensation is recognized as being objectional and others have employed electric resistance heaters in or on a refrigerator cabinet at points where the condensation accumulates to warm the cabinet shell thereat for preventing this condensation so as to overcome the problem. However, these electric heaters are not forever infallible, are extremely difficult and expensive to replace and they are in addition a continued cost to the owner of a refrigerator cabinet in energizing them throughout prolonged use of the refrigerator.

It is an object of my invention to provide an improved method of an arrangement for eliminating condensation of moisture on the exterior surface of a refrigerator cabinet.

Another object of my invention is to provide an improved seal arrangement for the throat portion of an access opening leading to a food storage chamber in a refrigerator cabinet at the junction of a door therewith.

A further object of my invention is to provide an improved gasket on a door of a refrigerator cabinet having spaced apart integral sealing portions, one of which carries therein a magnet for holding the door closed against the cabinet while the other of the sealing portions is deformed and compressed by the holding force of the magnet between the door and a nonmetallic part of the cabinet at the throat of an opening in a refrigerated chamber therein inwardly of a portion of the cabinet outer metal shell overlapped by the door.

A still further and more specific object of my invention is to provide means forming an insulated barrier in a refrigerator cabinet between a nonmetallic strip and a portion of the cabinet outer metal wall or shell at the throat of an opening in the cabinet affording access to a low temperature food storage chamber therein, which barrier prevents contact of cold air within the chamber with the portion of the cabinet shell in the vicinity of a door closing the chamber opening to eliminate condensation of moisture on the shell adjacent the door.

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

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In the drawing:

FIGURE 1 is a front view of a refrigerator cabinet having my invention embodied therein and showing a portion of the cabinet door broken away illustrating a door jamb on the cabinet adapted to be abutted by a gasket on the door;

FIGURE 2 is an enlarged fragmentary sectional view taken along the line 2-2 of FIGURE 1 showing a door closed against the refrigerator cabinet with my improved sealing arrangement therebetween; and

FIGURE 3 is a fragmentary view taken along the line 3-3 of FIGURE 2 showing a gasket on an inner edge portion of the refrigerator cabinet door.

Referring to the drawing, for illustrating my invention, I show in FIGURE 1 thereof a refrigerator cabinet generally represented by the reference numeral 10. This refrigerator cabinet construction will be herein only briefly described and for a better understanding of its specific structure or character, reference is made to the copending application of O. V. Saunders and R. C. Brown, Serial No. 23,813, filed April 21, 1960, now Patent No. 3,006,708, issued October 31, 1961 entitled, "Refrigerator Cabinet," and assigned to the assignee of the present application. The refrigerator cabinet construction is more fully illustrated and described in detail in this copending application and in so far as the instant invention is concerned it may be a single or multiple two temperature food storage chamber type with the throat or front portion of a chamber therein slightly modified to render my present improvement feasible. Refrigerator cabinet member 10, preferably although not necessarily, includes an outer inverted U-shaped metal shell 11, provided with a multifarious uninsulated front edge formation as disclosed in the copending application just referred to, having walls 12 and 13 forming sides of the cabinet member and a door jamb thereon respectively (see FIGURES 1 and 2). While I show a somewhat recently developed refrigerator cabinet structure, my invention is not necessarily restricted to this peculiar type of cabinet construction. A metal boxlike liner 14, having one side thereof open, is located in the cabinet outer shell and forms walls of a food storage chamber 15 therein with the open side of the liner providing the chamber with an access opening. A non-metallic preferably molded plastic member, part or breaker strip 16 is locked in place intermediate liner 14 and the door jamb portion 13 of shell 11 as is conventional and common in the refrigerator cabinet art. Any suitable or desirable insulating material 18 (see FIGURE 2) is disposed between walls of metal shell 11 and metal liner 14. An insulated door member or structure, generally represented by the reference numeral 20 in FIGURE 1 of the drawing, is hingedly mounted on cabinet 10 as at 21 for horizontal swinging movement relative thereto and abuts against door jamb 16 to normally close the access opening of chamber 15. The chamber 15 may be for the storage of foods above a freezing temperature or it may be a frozen food storage or food freezing chamber maintained at a temperature well below 32° F. A machine compartment is provided in cabinet 10 below chamber 15 and is closed at its front by a removable panel or the like 23. This compartment houses a refrigerant translating device including a motor compressor unit sealed within a casing and a refrigerant condenser of a refrigerating system connected in closed refrigerant flow relationship with one another and with a refrigerant evaporator associated with chamber 15 for chilling air therein by the refrigerating effect produced thereby. Such a refrigerating system is well known, conventional in the art and is therefore not shown in the present disclosure.

Door 20 in the present disclosure comprises a sheet

metal outer pan 27, an inner preferably molded plastic panel or the like 28 and a gasket 30 mounted on the door member and carried thereby for engagement with or having a junction with cabinet member 10. Gasket 30 is a one-piece rubberlike element of special construction in order to carry out the objects of my invention. Any suitable or desirable insulating material is disposed between the walls, pan 27 and panel 28 of door member 20. A flange 31 is turned inwardly on metal door pan 27 from sides thereof in spaced relation to the front face of door member 20. Side edges 33 of inner door panel 28 overlap flange 31 on door pan 27 and a plurality of spaced apart screws, bolts or the like 34 are extended through holes provided in metal clamping pieces or a strip 36, through holes provided in edges 33 of panel 28 and threaded into a tapped flared part of flange 31 on outer metal door pan 27 to rigidly lock the inner and outer door walls together. The clamp piece or strip 36 is provided with a hooklike portion at one edge thereof which hooks over a bead formed on a preferably and somewhat stiff or stiffened part of the base of gasket 30 to also, when the screws or bolts 34 are tightened, firmly lock the gasket to an inner surface of door member 20 close to peripheral sides thereof. Gasket 30 comprises or includes a one-piece element of rubberlike material which may be molded or extruded into the desired shape or cross sectional contour. This gasket element is provided, in addition to its base portion mentioned, a first bulbar portion 41 having a resilient bellows-like connection 42 with the base thereof. Bulb portion 41 has a thin relatively wide magnet 43 enclosed therein or encompassed thereby. Magnet 43 is of the now well known type wherein metallic particles embedded in a strip of plastic material have been magnetized so as to form north and south poles adjacent opposite edges of the strip. The bulbar portion 41 containing magnet 43 registers with and has magnetic attraction to the edge part of metal door jamb 13 of cabinet 10 to hold, without the aid of additional means such as a latch, door 20 in closed position thereagainst. This practice is common in the art as shown by prior patents, such, for example, as in the Harle Patent No. 2,619,693, dated December 2, 1952, and novelty in the present disclosure is not based thereon. Gasket element 30 also includes or comprises an integral resilient highly flexible second bulbar portion 46 coextensive with and spaced inwardly from bulb portion 41, with respect to the access opening of chamber 15, and adapted to engage the non-metallic part or breaker strip 16 of cabinet 10 at the front thereof. Bulbar portion 46 is substantially hollow but is provided with interconnecting reinforcing webs 47 therein aiding in securing same to the base portion of gasket 30. Normally the bulb 46 projects farther inward toward the front of cabinet 10 than magnet containing bulbar portion 41 of the gasket so as to insure deformation thereof, as shown in FIGURE 2 of the drawing, when compressed between the cabinet and door members by attraction of magnet 43 to the metal door jamb part of cabinet shell 11. The pockets or pouches provided by webs 47 in the substantially hollow bulb 46 of gasket 30 may, if desired, be vented to facilitate flexing and deformation of this portion of the gasket when the magnet containing portion 41 thereof is attracted to metal door jamb part 13 of cabinet member 10. Compression of bulb part 46 of gasket 30 as described is believed to be readily understood and for this reason its original or uncompressed cross-sectional shape or contour is not illustrated. The two spaced apart bulbar portions 41 and 46 of gasket 30 extend in parallel spaced apart relation along all four sides of door member 22 of cabinet member 10 and the magnet extends around at least three sides of door 20. In other words, it may be preferable or desirable, in order to prevent wiping action of gasket 30 to omit the magnet from that

portion of bulb 41 extending along the hingedly mounted side of door member 20.

By virtue of bulbar portion 46 of gasket 30 engaging and sealing against the nonmetallic part or breaker strip 16 adjacent and bounding the innermost portion of the throat of access opening of food chamber 15 and by virtue of magnet 43 abutting and sealing the spaced bulb portion 41 against an edge part of the metal door jamb 13, this part of the cabinet outer shell 11 is effectively isolated from contact with cold air within the food storage chamber. To increase the effectiveness of this isolation the spaced apart bulbar portions 41 and 46 of gasket 30 form, when they are engaging cabinet 10, a dead air pocket along the door jamb portion of the cabinet at the joint between metal part 13 and breaker strip part 16. Thus the one bulbar portion 46 of gasket 30 and the air pocket between both bulbar portions thereof cooperate to form an insulated barrier intermediate the interior of chamber 15 and metal part 13 of the cabinet outer shell 11. In this fashion the part of metal shell 11 ordinarily exposed to cold air within chamber 15 is prevented from being contacted thereby and the metal door jamb part 13 of the shell will not absorb and conduct the cold temperature of the food chamber, beyond bulbar portion 41 of gasket 30, to warmer temperature portions of shell 11 beyond or in the vicinity of edges of door 20. Consequently moisture in air ambient cabinet 10 will not condense on metal shell 11 or the outer wall of the cabinet member in the vicinity of door member 20 and objections to such condensation are effectively overcome. My invention is particularly important when a food chamber such as chamber 15 is employed as a freezing chamber and refrigerated to a very low freezing temperature.

It should, from the foregoing, be apparent that I have made a meritorious contribution to the art in solving a problem which has caused considerable concern to manufacturers of refrigerators. My improvement accomplishes a desirability without the purchaser of a refrigerator cabinet incurring continued expense throughout its prolonged use. The present disclosure represents an innovation which renders a refrigerating system incorporated in a refrigerator cabinet more efficient in that a portion of the refrigerating effect produced in a chamber of the refrigerator is not wasted. The improvement disclosed is provided at a minimum of cost and is substantially permanent in character. Should the gasket seal element of this arrangement become damaged or ineffective it may be readily replaced by merely separating wall parts of the door structure and thereafter reexamining them together with a new gasket therebetween as is common practice.

While the embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

A refrigerator cabinet comprising in combination:

- (a) an outer metal wall, an inner liner defining a food storage chamber in said cabinet having an access opening bounded by a nonmetallic breaker strip anchored between edges of said wall and said liner,
- (b) a door hingedly mounted upon said cabinet adapted to close the chamber access opening,
- (c) gasket means on said door at the juncture thereof with said cabinet,
- (d) said gasket means including a one-piece element provided with a base secured to said door and spaced apart coextensive resilient bulbar portions formed integral on said base thereof,
- (e) the one bulbar portion on said element located farthest from the access opening of said chamber having a magnet therein extending at least along the side of said door opposite its hinged side attracted to a face of the cabinet outer metal wall and serving therewith the sole means holding the door closed against said cabinet,

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- (f) the other of said bulbar portions on said element closest the chamber access opening being flexible and abutting said breaker strip at a point thereon spaced from said face of the cabinet outer wall,
- (g) said magnet compressing said other flexible bulbar portion on said element into sealing engagement with said breaker strip for preventing air within said chamber from contacting the cabinet outer wall about the chamber opening while said door is closed to isolate said wall from temperatures in said chamber, and
- (h) said base of the gasket element spanning the joint between said cabinet outer wall and said breaker

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strip to thereby form an air pocket intermediate bulbar portions of said gasket means directly opposite said joint or augmenting the isolation of said cabinet outer metal wall.

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