May 28, 1957 E. T. MORTON 2,793,781

REFRIGERATOR LINER SEALING MEANS

Filed July 15, 1952 3 Sheets-Sheet 1

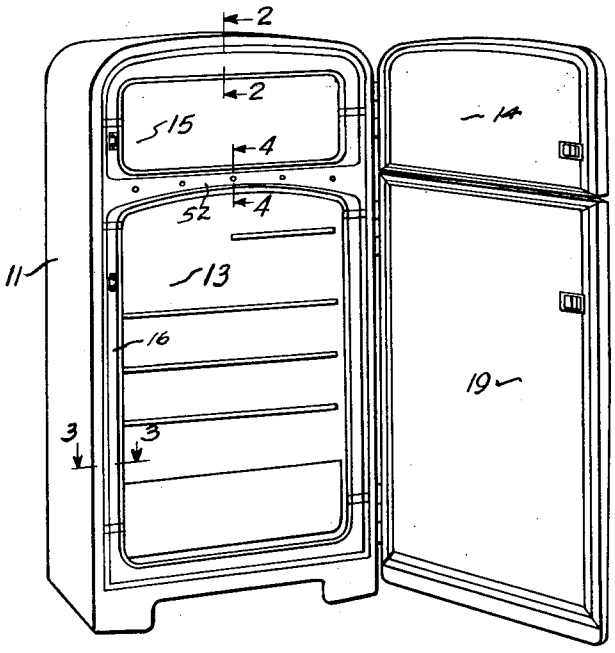

Fig. 1

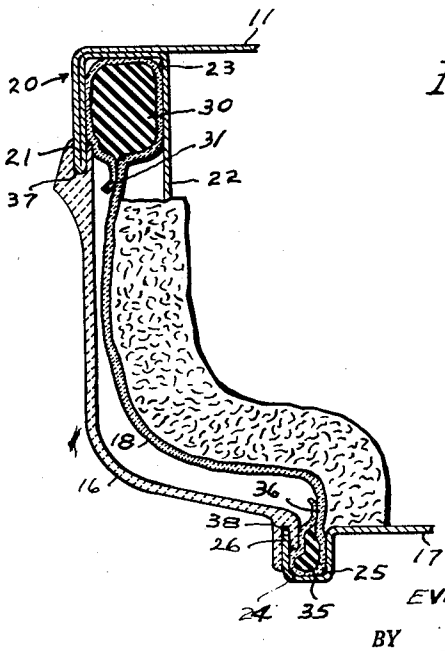

Fig. 2

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Fig. 3

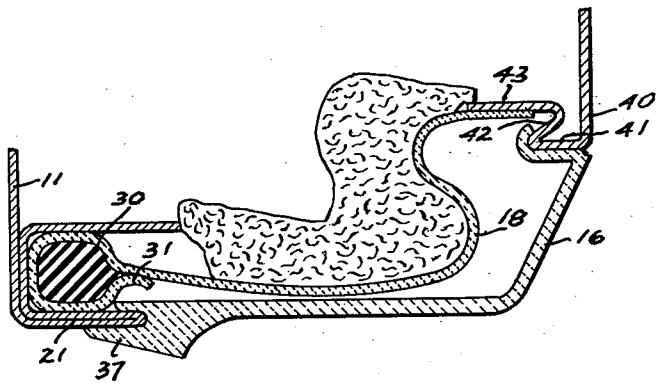
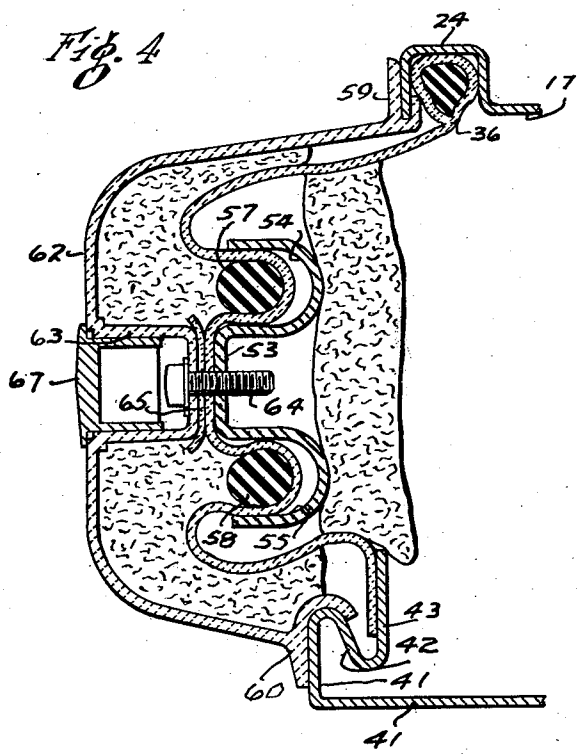


Fig. 4



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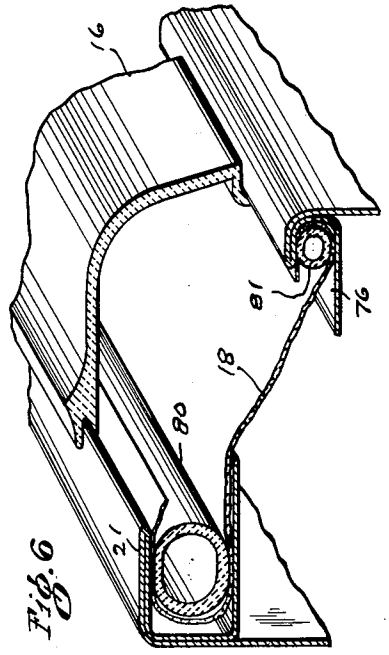

Fig. 6

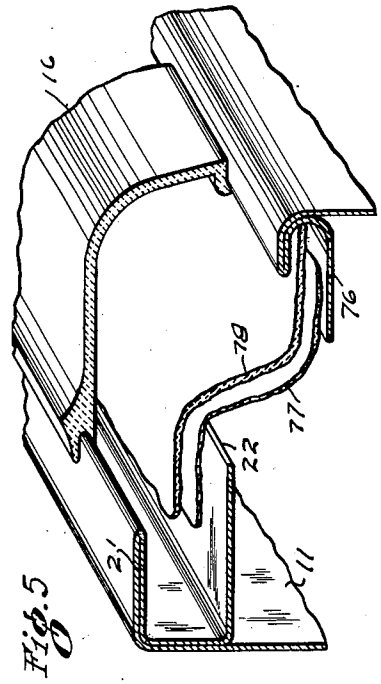

Fig. 5

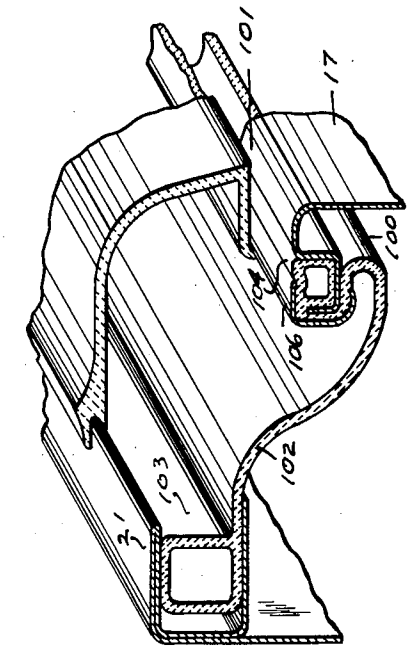

Fig. 8

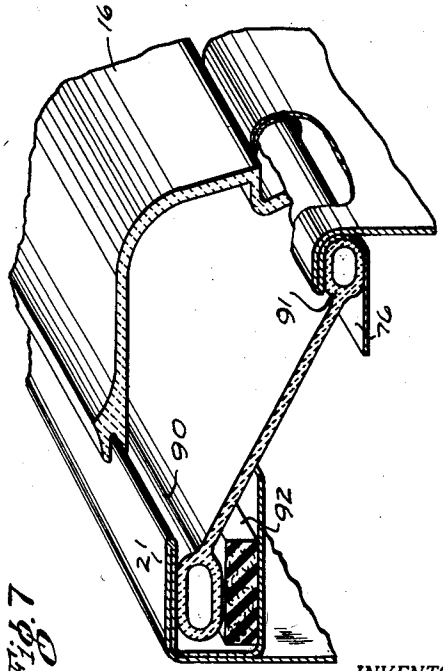

Fig. 7

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REFRIGERATOR LINER SEALING MEANS

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Application July 15, 1952, Serial No. 298,911

4 Claims. (Cl. 220—9)

This invention pertains to household refrigerators, and more particularly to an improved breaker strip and seal for preventing the ingress of moisture to the space between the outer wall and the food compartment liner.

In household refrigerators of the types in which the walls of food compartment liners are cooled to a temperature slightly above freezing, considerable difficulty has ben experienced with the condensation of moisture on the outside of the liner due to the moisture pumping action that occurs as a result of the refrigeration cycle. This moisture may gradually accumulate and be present in sufficient amounts to damage the insulation between the liner and the outer cabinet shell, or at least to destroy partially its insulating properties as well as to cause rust and/or corrosion of the various parts of the cabinet.

This problem has been recognized for some time, and various means have been proposed to cope with it some of which have not been too successful. By my invention, the space between the liner and the cabinet is completely sealed off from the influx of outside air thus preventing any moisture, except that originally in the space, from entering. Thus no moisture can be carried into this space. I accomplish this by forming the flanges on the liner and outer shell properly and then sealing the space between the shell and liner with a sealing strip applied to these flanges. If, then, the inner liner and the outer shell are otherwise tight, this will seal the space between them and thereby prevent any ingress of moisture laden air.

A more complete understanding of my invention may be gained by reference to the following description and the figures which form a part of this specification.

In the drawings:

Fig. 1 is a perspective view of a refrigerator embodying my invention, the doors being open;

Fig. 2 is a sectional view along line 2—2 of Fig. 1 showing a preferred form of sealing strip;

Fig. 3 is a view similar to Fig. 2 on the line 3—3 of Fig. 1 showing the alternate form of sealing strip;

Fig. 4 is a view similar to Fig. 2 on an enlarged scale on the line 4—4 of Fig. 2 showing a second alternate strip for effecting a seal between the freezer locker and the moist cold compartment; and

Figs. 5, 6, 7 and 8 are views showing modifications of the invention and alternate forms of sealing strips.

As will be noted by reference to the figures, and particularly to Fig. 1, my invention has particular application to the class of refrigerators in which two separate insulated compartments are provided, one for frozen food storage and the other for moist cold storage wherein both compartments are refrigerated by coolant tubes running along the walls of the compartment liners. These are frequently referred to as "cold-wall" compartments.

This type of refrigerator is customarily built of an outer shell 11 surrounding both the frozen food compartments 15 and the moist cold storage compartment 13. A pair of doors 14 and 19 may be provided to close

the compartments although a single outer door may be used in which event a small auxiliary door is customarily used on the freezer chest or frozen food compartment 15. Use of a breaker strip 16 between the outer shell 11 and the liner 17 of the storage compartment is conventional, although in this case, due to the construction, an improvement is realized.

In the construction according to my invention, both the outer shell 11 and the liners are made substantially air tight. A sealing strip 18 is then used to seal both pieces at their edge nearest the doors but behind the breaker strips 16. In order to do this, flanges are formed on the edges of the liner and the outer shell. As best shown in the figures these flanges may be of several different formations.

The preferred embodiment utilizes the customary flange 20 on the outer shell 11. This is formed by doubling the metal back on itself, turning the doubled edge 21 inward substantially 90 degrees and also turning the raw edge 22 of the metal away from the wall of the shell, thus forming a channel 23. Usually, the raw edge 22 extends farther from the wall of the shell than the folded edge 21 thus forming an extending lip. On the inner liner 17 a simple channel 24 may be formed in the edge of the walls, or, as shown in Figs. 5–7, the edge of the liner may be treated in the same manner as the outer shell to form a channel 25 having an extending inner lip 26.

Again referring to Fig. 2, it will be noted that the two open channels on the outer wall and inner liner, in this case the liner for the frozen food compartment, face toward each other. The moisture sealing means includes a strip of waterproof plastic of which there are a number on the market, the preference being for one which does not change its pliable characteristics with changes in temperature, such as poly-ethylene.

The plastic sheet or web 18 is held in place in the channels by a packing strip 30 of flexible compressible material such as sponge rubber and which may be normally circular in cross section. This strip of rubber is used to hold the web in place by forcing the rubber strip against the web, which is laid over the channel, into the channel. The strip is deformed during the process since it is larger in diameter than the width of the channel, and takes a formation substantially as shown in Fig. 2.

The preferred manner of effecting this operation, however, is to wrap the web around the compression strip and heat seal it at 31, to provide an edge bead of plastic having a core of sponge rubber which may then be more readily pushed home into the channel. In the case of Fig. 2, the liner edge of the web may be formed in exactly the same manner, except that the channel 24, being smaller, the sponge rubber insert 35 is also smaller. The same heat seal is provided at 36.

After the seal is sealed in the channels, the final operation consists in placing the breaker strip 16 in place. The breaker strip is made of a hard but resilient plastic to provide a smooth curved exterior and has at its edges grooves 37 and 38. The groove 37 is disposed seated on the flange 21. At this time, the inner lip which defines the groove 37, engages with the holding bead on the web in such a manner as to provide additional holding effect on the bead as well as additional deformation thereof to increase the holding power and the effectiveness of the seal in the channel.

Likewise, the bead 38 engages the raw edge of the channel 24 where it also deforms the bead 35 to even a greater extent than the outer bead.

The seal thus provided is completely moisture proof, highly flexible, permitting relative movement between

the inner liner and the outer wall without disrupting the seal, and because of the manner of applying the breaker strip is neat and pleasing in appearance. It will be appreciated that the seal being simple to apply is readily applied by relatively unskilled labor and still enables an effective seal to be made.

The seal just described is applied to the upper portion of the cabinet and the freezer locker. Since the freezing locker is completely independent of the moist cold compartment, it is customary to provide a different type channel on the moist cold compartment liner, which requires a slightly different formation of the seal. Fig. 3 shows the shape of the channel and the form the seal takes at this point. It may be well to state, at this point, that a still different form of seal is required between the two compartments which seal is shown in Fig. 4.

Referring back to Fig. 3, the seal with the outer wall channel **24** is exactly as described in connection with Fig. 2. The liner is provided with a different type of peripheral flange which is of Z shape including a section **41** bent 90 degrees to the wall **40** and then a backwardly bent section **42** and finally an outwardly extending relatively wide flange **43** also disposed 90 degrees to the wall. This structure lends rigidity to the wall edge, provides a seat for the breaker strip and a seat for the web seal.

In this case, the web **18** is sealed flat against the flange **43** which is coated at the point of contact with the web with a suitable adhesive.

The breaker strip is similar to that just described and includes the outer flange engaging channel **37** and the intermediate part **16**. The inner edge is changed, however, since it engages the part **41** lying flat against this wall and curling around the edge which leads to the intermediate part **42** of the flange.

It will be noted that both the breaker strip of Figs. 2 and 3 are designed to enable them to be easily snapped in place. This is done by engaging the outer edge of the breaker strip with the edge **21** of outer channel and then deforming it by hand, which can readily be done due to the inherent resiliency of the material, in the case of Fig. 2 so that it slips over the raw edge of channel **24**, and in the case of Fig. 3, so that it slips over the flanges **41** and **42**. The breaker strip is so constructed originally that when it is placed in its final position, it tends to force the two ends in opposite directions thus maintaining a firm seat on the outer wall and inner liners.

As previously stated, the two compartments being independent except for the fact that they are enclosed by the outer sheet of the cabinet, and being insulated from each other makes a slightly different construction necessary at the horizontal divider partition. This is further complicated by the fact that the front of each compartment is closed by separate doors, each of which is provided with edge gaskets **50—51** that engage with the outer cabinet flange **24** and a mullion **52** that separates the two compartments.

A steel cross member, Fig. 4, is provided that bridges the cabinet between the two compartments and ties the opposite outer side walls to each other and furnishes a support for the intermediate breaker strip against which the bottom of the top door and the top of the bottom door seals when closed.

This cross bar includes a center web **53** which extends between two horizontally extending channels **54** and **55** that open toward the front of the cabinet.

In this case, the web is wider. The upper end is secured in the channel on the edge of the freezing locker in the same manner as shown and described in connection with Fig. 2. The lower edge is secured to the flange of the moist cold compartment in the same manner as described for Fig. 3. The intermediate portion of the web is seated in the channels **54** and **55** by rubber strips **57** and **58** which are sufficiently large to wedge strip securely in the channels.

The breaker strip comprises the upper portion formed with the flange engaging edge **59** similar to that of Fig. 2, and the lower flange engaging edge **60** similar to that of Fig. 3. The intermediate part extends outward to form a sill, or mullion **62**, which is provided with a series of cup-shaped downward projectors **63** the bottom of which is continguous to the web **53** of the cross bar and is secured thereto by screws **64**, a buffer strip **65** of material being placed between the bottom of the projections and the web. After installation, the cup openings are closed by plugs **67**.

It will be apparent that this particular web could be made in two parts which could be overlapped at the web **53**, in which instance they could be cemented together with a suitable adhesive or held in place by perma-gum.

Figs. 5, 6 and 7 show alternative forms which are useful, particularly where the liner is provided with a peripheral flange similar to that of the cabinet wall.

In Fig. 5, the web **77** may be tape of the adhesive variety which engages the flanges **22** and **76**, bridging the gap therebetween. It also may be polyethylene cemented in place, after which it may be sprayed with a coating **78** which assists in maintaining its moisture proof qualities. The breaker strip is the same as that described.

In Fig. 6, the web is held in place in each of the channels by tubular strips **80** and **81** which are forced into position along with the web.

In Fig. 7, the web is considerably heavier and may be made of plastic or synthetic rubber and is provided with beads **90** and **91** each of which may be originally circular in cross section or of generally rectangular cross section but adapted to be deformed when wedged into the channels. In the case of the bead **90**, a strip of sponge rubber **92** may also be used if desired.

In Fig. 8, there is shown a structure where, although the flange on the outer wall is the same, the flange on the liner faces toward the door opening and includes a channel **100** facing toward the door opening and separated from the wall **17** by a narrow curved section **101**. The web **102** is provided with an outer rectangular bead **103** which is wedged in the channel **24**. The inner edge of the web has a smaller rectangular bead **104** that seats in the channel **100**. The bead is locked in the channel by a strip **106** of spring steel of channel shape which engages and digs into the top of the bead and then folds the web around the edge and underneath the channel.

This conformation causes a firm edge seal and also a displacement of the bead. In addition, the breaker strip seats on the strip assisting in holding it in place.

It will thus be seen that the broader concepts of my invention which includes the moisture-proof web extending from the inner liner to the cabinet and hidden behind a breaker strip, may be applied to various flange constructions and still provide an effective moisture proof seal.

Having thus described my invention, I am aware that numerous and extensive departures may be made therefrom without departing from the spirit or scope thereof as defined by the appended claims.

I claim:

1. A refrigerator cabinet comprising an outer shell having a channel shaped flange at an open edge thereof, an inner liner disposed within said shell, a channel shaped flange on said liner at the edges thereof adjacent said flange on said shell, sealing means to seal the space between said flanges comprising a web, and tubular bead members on opposite edges of said web, said bead members being disposed in said channel shaped flanges in substantially air-tight relationship thereto, and said web extending across said space between said flanges to seal said space, a breaker strip extending over said web, between and engaging said flanges, a lip formed on said strip adjacent at least one of said flanges and extending

over and into said flange to engage at least one of said bead members to hold said bead in said flange.

2. A refrigerator cabinet having a shell defining the outer limits of said cabinet and an inner liner disposed within said shell, a channel-shaped flange formed at the open edge of said shell and extending within said shell and having wall members parallel to the plane formed by said shell opening, a channel-shaped flange formed on the open edge of said liner and having wall members parallel to the plane formed by said liner opening, the axis of said flange on said liner being parallel to and laterally displaced from the axis of the flange of said shell, sealing means to seal the space between the shell and liner comprising a thin flexible member of rubber-like material having a central web and a bead formed on each edge thereof, one of said beads being compressively disposed in said flange on said shell and held therein by said wall members of said shell, said remaining bead being compressively disposed in said flange on said liner and held therein by said wall members of said liner, a breaker strip extending between said flanges and having a lip formed thereon adjacent at least one of said flanges, said lip engaging one of said wall members on said flange and extending into said flange and engaging said bead disposed therein to prevent said bead from being disengaged from said wall members.

3. The refrigerator cabinet as defined in claim 1, and wherein a clip strip engages at least one of said beads and said flange to hold said bead in place, and said breaker strip also engages said clip strip to hold it in place.

4. A refrigerator cabinet construction comprising a pair of spaced walls, at least one of said walls defining a channel open at one side, a flexible web of moisture resistant material extending from said channel across the space between said walls, said web terminating at one end in a bead seated in said channel in sealing relationship therewith, said web at its opposite end being sealed to the other of said walls, and a breaker strip extending over said web from said one wall to the other, said breaker strip being formed with a lip extending into said channel and engaging said bead on the web thereat to hold said bead seated in said channel.

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