

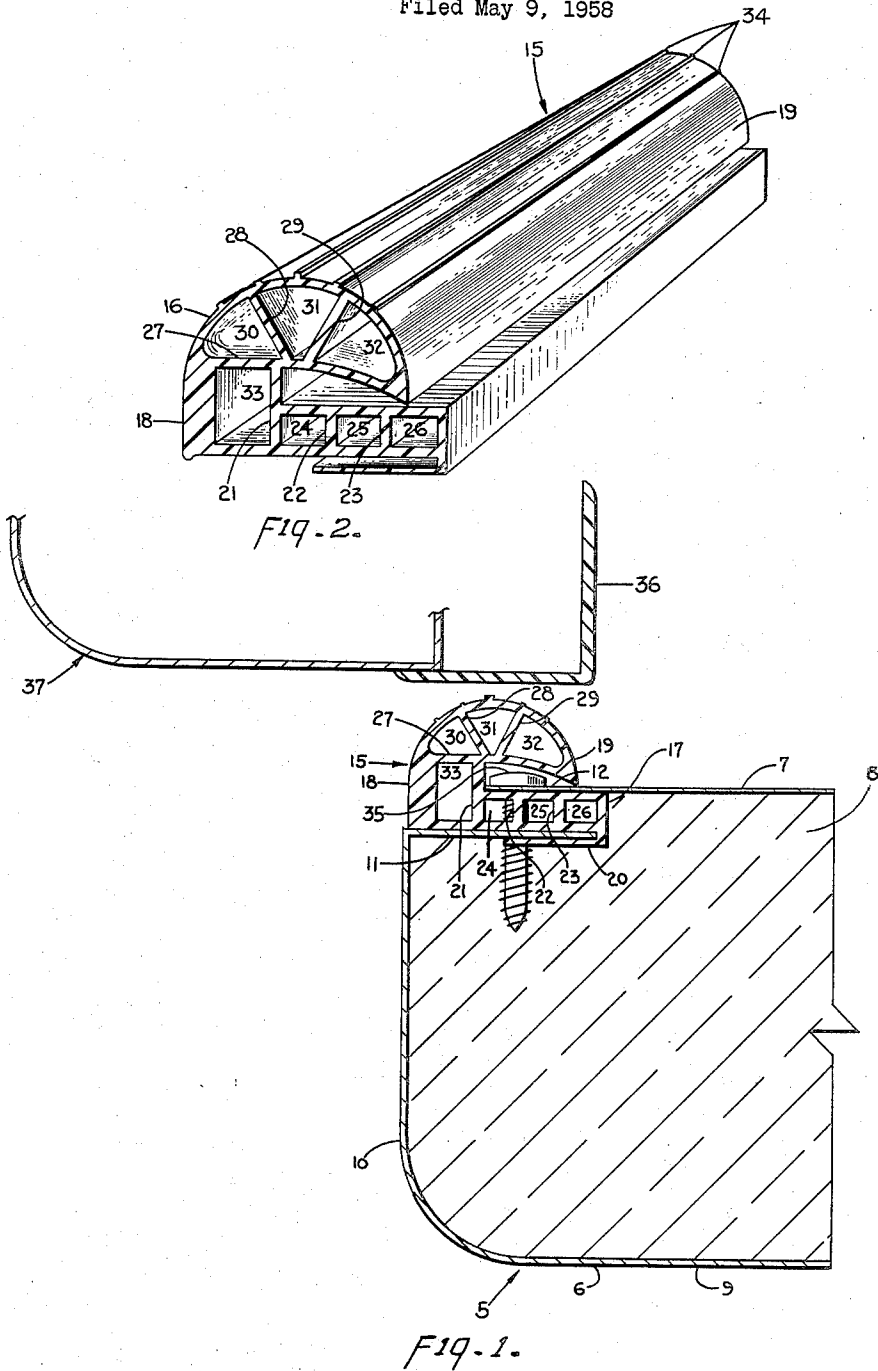
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REFRIGERATOR DOOR CONSTRUCTION

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REFRIGERATOR DOOR CONSTRUCTION

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9 Claims. (Cl. 20—35)

The present invention relates to refrigerators, and more particularly, to a refrigerator door construction. The instant application is a continuation-in-part application of my prior copending application Serial No. 661,058, filed May 23, 1957, which has now become abandoned, and relates back to said application for all common subject matter.

Refrigerator doors usually comprise an outer shell subjected to the ambient temperature in a room and an inner liner or door pan subjected to a lower temperature at the interior of the refrigerator cabinet. A sealing gasket of natural or synthetic rubber or other flexible plastic is usually provided at the edge of the door for engagement with the door frame of the refrigerator cabinet. Quite often, a thin flange on the gasket is positioned between the outer shell and inner liner to attach the gasket in place on the door. While this thin flange of gasket material provides a heat insulating barrier of very limited effectiveness, the door pan itself is usually depended upon to prevent the conduction of heat from the room to the interior of the cabinet. For this purpose, the door pan is constructed of a poor heat conducting plastic material. Thus, conventional refrigerator door constructions are not effective to prevent the transmission of heat by conduction when a metal door pan is used.

Also, no means are provided on refrigerator doors of conventional construction for adjusting the gasket relative to the door frame to insure a seal between the door and cabinet. An uneven compression of the gasket between the door and door frame is depended upon to correct any inaccuracy in the alignment of the door and door frame. If any inaccuracy occurs during manufacture which can not be corrected by such compression of the gasket when the door is closed, the door is sprung on its hinges in an attempt to correct the misalignment. As a result many refrigerator doors are not properly aligned with the door frame of the cabinet and do not produce an effective seal.

One of the objects of the present invention is to provide a construction in a refrigerator door which produces an effective thermal barrier between the outer shell and an inner liner of metal.

Another object is to provide a sealing gasket which is adjustable on the door to align it with the door frame of the cabinet to insure a vapor tight seal therebetween.

Another object is to provide a sealing gasket on a refrigerator door which provides an effective thermal barrier between the outer shell and an inner metal liner and is adapted to be compressed at spaced points along the door to align it with the door frame which it engages.

Still another object is to provide a sealing gasket on a refrigerator door which is of simple and compact construction, facilitates the assembly of the parts of the door and one which is economical to manufacture and reliable in operation.

These and other objects will become more apparent from the following description and drawing in which like

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reference characters denote like parts throughout the several views. It is to be expressly understood, however, that the drawing is for the purpose of illustration only and not a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In the drawing:

Figure 1 is a transverse sectional view of a portion of a refrigerator door incorporating the novel gasket construction of the present invention; and

Figure 2 is a perspective view of a section of the gasket.

Referring to the drawing, the present invention is shown applied to a refrigerator door 5 having an outer shell 6 and an inner liner or door pan 7. The outer shell 6 and inner liner 7 may be made in any suitable shape to provide a space therein which is packed with a heat insulating material 8. In the illustrated embodiment, the outer shell 6 is a metal sheet formed to provide a continuous front wall 9 and peripheral side wall 10 extending generally at right angles to the front wall. The rearward edge portion of the side wall 10 is folded inwardly around the entire periphery of the shell 6 to provide a peripheral flange 11 generally parallel with the front wall 9. The outer peripheral edge 12 of the inner liner 7 overlies the flange 11 on the shell 6.

While the door construction of the present invention may be applied with advantage to doors having conventional metal outer shells and plastic liners, it is particularly adapted for use with refrigerator doors having a metal liner 7 as well as a metal shell 6. For example, the present invention is used with refrigerator doors 5 having an outer shell 6 and inner liner 7 formed of sheet aluminum. Refrigerator doors made of sheet aluminum have a very attractive and pleasing satin-like finish. However, aluminum is an especially good heat conductor and conventional gasket constructions are not effective to prevent conduction of heat from the room to the interior of the refrigerator.

In accordance with the present invention a novel gasket 15 is provided which produces an effective thermal barrier between the outer shell 6 and inner liner 7 and permits adjustment to align it with the door frame of the refrigerator which it engages. The gasket 15 is composed of a flexible, poor heat conducting material, such as vinyl resin, natural or synthetic rubber or other suitable plastic, and is extruded as a continuous hollow tubular strip.

As illustrated in Figures 1 and 2 of the drawings, the gasket 15 has a continuous wall 16 forming the hollow tubular construction with spaced sides. Gasket 15 is so shaped as to provide a rectangular plate 17, a connecting web 18 at one edge of the plate and a continuous bead 19 projecting from the web and overlying the plate in spaced relation thereto. At the opposite edge of the plate 17 from the web 18 is a reversely folded depending flap 20 which overlies the plate in offset relationship. Plate 17 of the gasket 15 has a plurality of transverse walls 21, 22 and 23 extending between the spaced sides of the continuous wall 16 to provide adjacent closed tubes or cells 24, 25 and 26 extending longitudinally throughout the length of the hollow plate. Transverse walls 21, 22 and 23 also provide supporting ribs to hold the opposite sides of the continuous wall 16 in spaced relation, but the transverse walls are flexible and permit the plate to be compressed.

The spaced sides of the bead 19 formed by the continuous wall 16 are generally curved on different arcs. Transverse walls 27, 28 and 29 extend between the curved sides of the bead 19 at an angle to each other to provide a plurality of adjacent tubular cells 30, 31 and 32 therein which also extend longitudinally through-

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out the length of the bead. As will be observed by reference to Figure 2, the transverse walls 21 and 27 cooperate with the portion of the continuous wall 16 between the plate 17 and bead 19 to form a continuous tubular cell 33 in the web 18 of the gasket 15. The outer curved wall of the bead 19 has a plurality of spaced radially projecting, longitudinally extending ribs 34. Thus, each portion of the gasket 15 is of hollow tubular construction and being composed of a poor heat conducting material constitutes a good thermal barrier. Furthermore, both the hollow plate 17 and hollow bead 19 of the gasket 15 are composed of a flexible material and are compressible.

As shown in Figure 1, the hollow tubular plate 17 of the gasket 15 is interleaved between the flange 11 on the outer shell 6 and peripheral edge 12 of the inner liner 7. Flap 20 at the inner edge of the gasket plate 17 is hooked over and overlaps the rearward side of flange 11 on the outer shell 6 to interlock therewith and the bead 19 at the outer edge of the plate overlaps the outer face of the peripheral edge 12 of the inner liner 7 to interlock therewith. When so mounted, the outer peripheral edge 12 of the inner liner 7 projects into the space between the plate 17 and bead 19 and the edge is protected by the hollow web 18 around its entire periphery.

The inner liner 7 also is connected to the outer shell 6 by a plurality of fasteners 35 arranged at spaced points around the periphery in the inner liner. Each fastener 35 engages the peripheral edge portion 12 of the inner liner 7 and flange 11 of the outer shell 6. It will be observed that the hollow tubular plate 17 provides a compressible cushion between the inner liner 7 and outer shell 6 and that the hollow tubular bead 19 provides a compressible cushion engageable with the breaker strip 36 of a door frame 37 illustrated diagrammatically in Figure 1.

The fasteners 35 are in the form of screws having a threaded engagement with tapped holes in the flange 11 of the outer shell 6. The plate 17 of the gasket 15 may be compressed by tightening the screws 35 to adjust the position of the liner 7 with respect to the shell 6 without materially effecting the thermal barrier between the inner liner and outer shell. For example, if the bead 19 of the gasket 15 does not properly align with the breaker strip 36 on the door frame 37, screws 35 may be tightened or loosened to adjust the position of the inner liner 7 with respect to the outer shell 6 and the position of the bead 19 with respect to the door frame 37. Thus, the door construction of the present invention provides for adjusting the gasket 15 to correct any misalignment between the door 5 and the door frame 37.

When assembling the door 5, the gasket 15 is attached to the outer shell 6 by interlocking the outer flap 20 over the edge of the flange 11 and the inner liner is attached to the gasket by interlocking the bead 19 around its outer peripheral edge 12. The fastening screws 35 are then screwed through the peripheral edge 12 of the inner liner 7, plate 17 of the gasket 15 and into the flange 11 of the outer shell. For this purpose, the overlapping bead 19 is pulled back away from the edge portion 12 of the inner liner 7. After the fastening screws 35 have been inserted, the bead 19 is released which snaps back to its initial position overlying the fastening screws and edge portion 12 of the inner liner 7.

It will now be observed that the present invention provides a refrigerator door of a construction to produce a thermal barrier between an outer shell and inner liner of metal. It will also be observed that the present invention provides a sealing gasket which is adjustable to align it with the door frame of a refrigerator cabinet. It will still further be observed that the present invention provides a sealing gasket for a refrigerator door which is of simple and compact construction, economical

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to manufacture, reliable in operation, and one which facilitates the assembly of the parts of the door.

While a single embodiment of the invention is herein illustrated and described, it will be understood that changes may be made in the construction and arrangement of elements without departing from the spirit or scope of the invention. Therefore, without limitation in this respect the invention is defined by the following claims.

I claim:

1. A refrigerator door adapted to close a door opening in a refrigerator and cooperate with a door frame surrounding the opening to provide a seal comprising an outer shell and an inner liner shaped to form a space therebetween, insulating material in said space, said shell having a flange projecting inwardly from its peripheral edge and said inner liner having a peripheral edge portion overlying the flange on the outer shell, a hollow tubular gasket of a resilient, poor heat-conducting material between the flange on the shell and the inner liner, said hollow tubular gasket having spaced opposed walls engaging the flange of the shell and inner liner, respectively to provide a compressible heat insulating barrier therebetween, and spaced adjustable fastening means acting between the shell and inner liner for holding the parts in assembled relationship and varying the compression of the hollow tubular gasket at different points around the periphery of the door to compensate for any in accuracies between the edge of the door and door frame and insure a seal therebetween.

2. A refrigerator door comprising an outer shell and an inner liner formed to provide an insulating space therebetween, the outer shell having an inwardly directed peripheral flange which lies in a common plane and the inner liner having a peripheral edge overlying the peripheral flange on the shell, a sealing gasket of a resilient, poor heat-conducting material having a hollow plate with tubular cells extending longitudinally therein and a bead attached to one edge of the plate extending laterally over at least a portion of one side of the plate in spaced relation thereto, said hollow plate being interleaved between the flange on the outer shell and the outer peripheral edge of the inner liner, and said bead overlying the peripheral edge of the inner liner whereby the tubular cells in the hollow plate provide an insulating air space between the outer shell and inner liner and permit compression of the plate to adjust the spacing of the periphery of the liner relative to the peripheral flange on the outer shell around the entire periphery of the door.

3. A refrigerator door comprising an outer shell and an inner liner shaped to form a space therebetween, insulating material in said space, said outer shell having a flange projecting inwardly from its peripheral edge in a common plane and said liner having a peripheral edge portion overlying the flange on the outer shell, a gasket of a resilient, poor heat conducting material having a hollow tubular plate interleaved between the inner liner and flange on the outer shell, a bead projecting inwardly from the outer edge of the interleaving plate and overlying the opposite face of the inner liner and a flap projecting from the inner edge of the plate and overlying the opposite face of the inwardly projecting flange on the outer shell, said hollow interleaving plate of the gasket providing a resilient adjustable air cushion between the inner liner and outer shell to provide a thermal barrier therebetween, and adjustable fasteners at spaced points around the periphery of the door and acting between the liner and shell to compress the gasket plate and adjust the position of the inner liner and bead relative to the flange on the outer shell.

4. A refrigerator door comprising an outer shell having a flange projecting inwardly from its peripheral edge and lying in a common plane, an inner liner mounted for adjustment relative to the outer shell and having a

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peripheral edge portion overlying the flange on the outer shell, a gasket of a resilient, poor heat conducting material having a hollow tubular plate between the flange on the outer shell and the peripheral edge portion of the inner liner, a hollow tubular bead projecting from the outer edge of the plate and interlocked with the peripheral edge portion of the inner liner and a flap projecting from the inner edge of the plate and interlocked with the edge portion of the flange on the shell, and screws arranged in spaced relation around the periphery of the door and extending through the inner liner, gasket plate and tapped holes in the flange whereby the inner liner is adjustable relative to the outer shell by tightening and loosening the spaced screws to control the compression of the hollow tubular gasket plate at different areas around the periphery of the door.

5. A refrigerator door comprising an outer shell and an inner liner formed to provide a space therebetween, insulating material in said space, a flange projecting inwardly from the edge of the outer shell in a common plane and said inner liner having a marginal edge portion overlying the flange on said shell, a hollow one piece gasket of a resilient material having a web overlying the outer peripheral edge of the inner liner, a plate projecting inwardly from the web and interleaved between the flange on the outer shell and marginal edge portion of the inner liner and a bead projecting from the web and overlying the marginal edge of the inner liner and plate, and said gasket including said plate comprising a continuous wall forming spaced inner and outer sides with spaced walls extending transversely between the inner and outer sides of said continuous wall to form the hollow web, plate and bead and to divide the gasket into a plurality of adjacent tubular insulating and compressible sections, and screw fasteners extending through the marginal portion of the inner liner, the plate of the gasket and the flange on the shell to hold the parts in assembled relationship.

6. A refrigerator door in accordance with claim 1 in which the adjustable fastening means comprises screws extending through the peripheral edge of the inner liner, hollow gasket and flange on the outer shell, and said screws being arranged in spaced relation along the peripheral edge of the inner liner whereby turning of the screws compresses the hollow tubular gasket to adjust the position of the inner liner relative to the outer shell.

7. A refrigerator door in accordance with claim 1 in which the hollow tubular gasket has a bead overlying the edge portion of the inner liner, and said fastening means

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comprises a plurality of screws arranged in spaced relation around the outer edge portion of the inner liner and extending through the inner liner, hollow tubular portion of the gasket and flange on the outer shell to attach the parts in assembled relationship, and said hollow tubular gasket being adjustably compressed to align the bead with the door frame of a refrigerator by turning the fastening screws at spaced points around the periphery of the door.

8. A refrigerator door comprising an outer shell and an inner liner, said shell having a flange projecting inwardly from its peripheral edge and said inner liner having a peripheral edge overlying the flange on the outer shell, an adjustable mounting for the inner liner comprising a hollow gasket of a flexible material on the peripheral edge of the inner liner, said gasket having a web extending around the periphery of the inner liner, a plate projecting inwardly from the web and overlying one side of the peripheral edge portion of the inner liner and a bead projecting inwardly from the web and overlying the other side of the inner liner, screw fasteners extending through the peripheral edge portion of the inner liner, plate of the gasket and flange on the outer shell, and said hollow gasket including said web, plate and bead comprising a continuous wall forming spaced sides with transverse walls extending between the spaced sides to divide the hollow interior of the web, plate and bead into a series of adjacent tubular cells.

9. A refrigerator door in accordance with claim 8 in which the spaced sides of the plate portion of the gasket are parallel to each other with the transverse walls extending at right angles to the parallel sides, and the spaced sides of the bead are curved on arcs of different radius with the transverse walls extending between the spaced sides at an angle to each other.

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