

Oct. 26, 1954

K. K. KESLING
REFRIGERATING APPARATUS

2,692,809

Filed Feb. 21, 1952

2 Sheets-Sheet 1

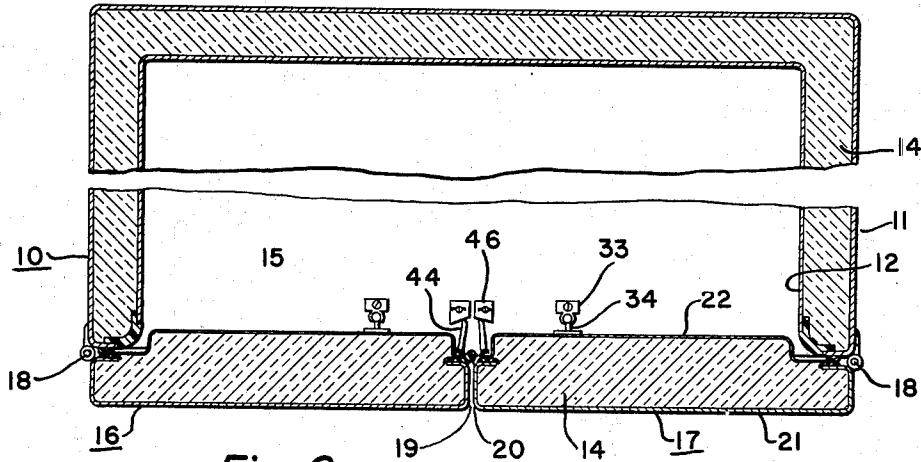


Fig. 2

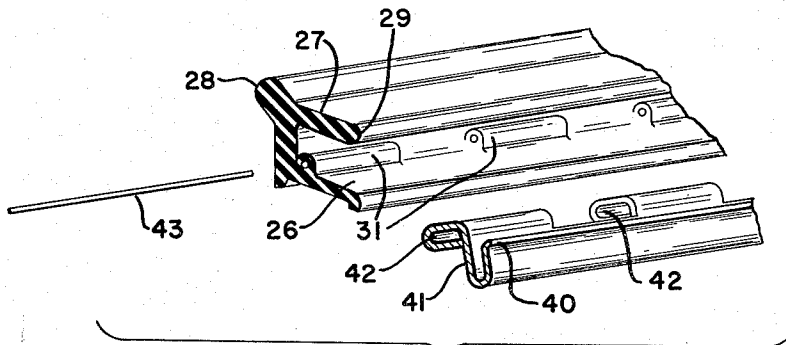


Fig. 5

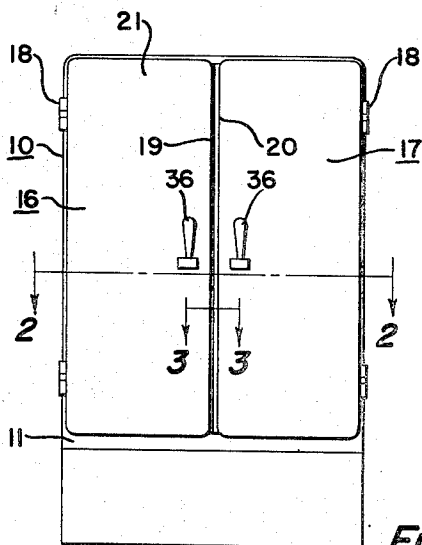


Fig. 1

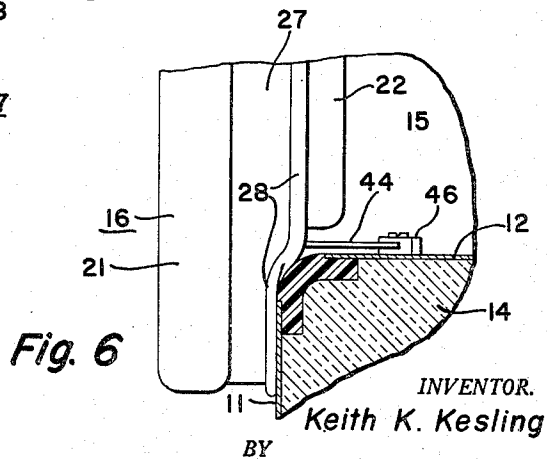


Fig. 6

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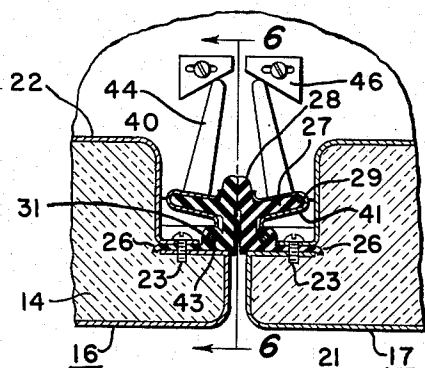


Fig. 3

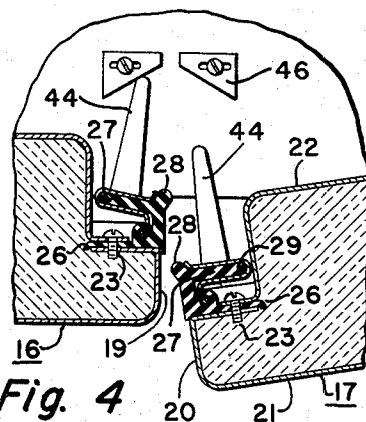


Fig. 4

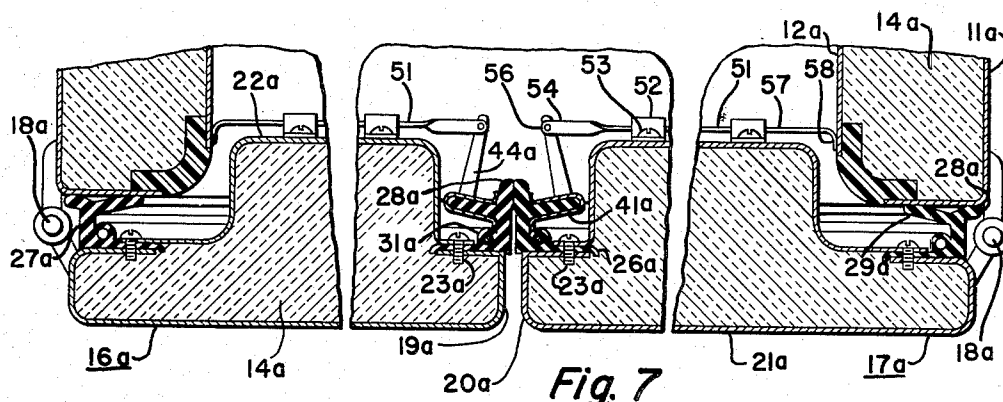


Fig. 7

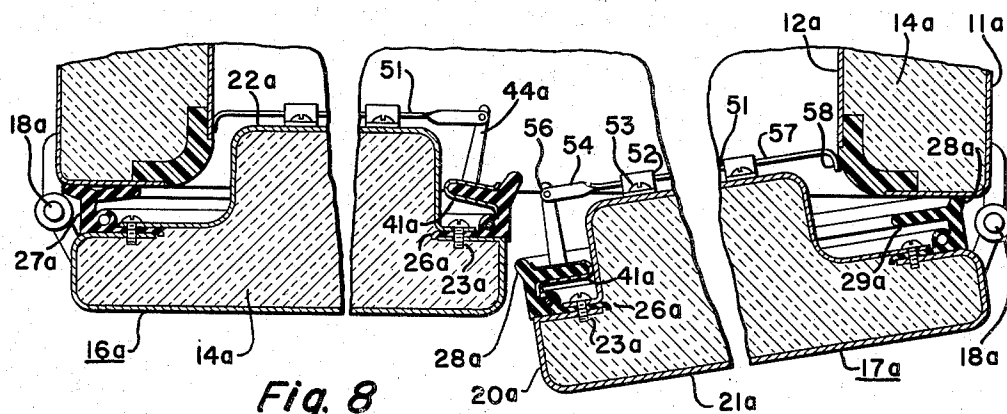


Fig. 8

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UNITED STATES PATENT OFFICE

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REFRIGERATING APPARATUS

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4 Claims. (Cl. 312-214)

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This invention relates to a refrigerating apparatus and more particularly to a double door arrangement for thoroughly sealing an access opening of a refrigerated compartment in a refrigerator cabinet.

It has long been the custom in manufacturing refrigerating cabinets of the two door type to provide a central mullion across the front of a food storage compartment in the cabinet which is flush with the front wall of the cabinet so as to permit a gasket about the peripheral edges of the doors to engage and seal against this mullion as well as against portions of the cabinet front wall. The provision of such a central mullion not only complicates the cabinet construction but also increases its manufacturing cost. I, therefore, contemplate the omission of the central mullion in a two door refrigerator while at the same time effectively sealing the opening providing access to a food storage compartment in the refrigerator cabinet particularly at a joint between mating edges of two doors employed to close the compartment access opening.

An object of my invention is to provide an improved double door arrangement for opening and closing the open front of a food storage compartment in a refrigerator cabinet.

Another object of my invention is to provide a double door arrangement for the food storage compartment of a refrigerator cabinet wherein the joint between mating edges of the doors is effectively sealed against heat leakage by a mechanical mechanism carried by and rendered effective upon closing the doors.

A further object of my invention is to provide a sealing arrangement for the joint between mating edges of two doors on a mullionless refrigerator cabinet that includes two gaskets mechanically pressed into engagement with one another and wherein either of the doors can be moved to break the seal at the joint independently of movement of the other door for opening a portion of the food storage compartment in the refrigerator.

In carrying out the foregoing objects it is a still further and more specific object of my invention to provide a leverage mechanism on each of two doors employed to close the access opening of a food storage compartment in a refrigerator cabinet which mechanism includes portions engageable with the cabinet for moving a movable resilient portion of a gasket on the mating edge of each door whereby the gaskets are brought into sealing contact with one another when the doors are closed.

Further objects and advantages of the present

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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:

Figure 1 is a front view of a refrigerator cabinet showing two doors closing a compartment therein and having the joint at their mating edges sealed in accordance with the present invention;

Figure 2 is an enlarged broken horizontal sectional view of the refrigerator cabinet shown in Figure 1 and is taken on the line 2-2 thereof;

Figure 3 is an enlarged fragmentary horizontal cross sectional view taken on the line 3-3 of Figure 1 showing the refrigerator cabinet doors in closed position with gaskets thereon in sealing engagement with one another;

Figure 4 is a view like Figure 3 and shows one of the cabinet doors partially opened with a movable portion of a gasket thereon moved to a rest position along the mating edge of the opened door;

Figure 5 is a fragmentary bracketed perspective view of parts of the refrigerator door seal structure dismantled;

Figure 6 is a fragmentary vertical sectional view taken on the line 6-6 of Figure 3 showing the door sealed to the cabinet adjacent the sealed joint between mating edges of two doors;

Figure 7 is a fragmentary horizontal sectional view of two doors sealed to a cabinet in accordance with a modified form of the present invention; and

Figure 8 is a view like Figure 7 showing one of the doors in a partially opened position.

For illustrating purposes, I have shown in Figure 1 of the drawings a refrigerated cabinet, generally represented by the reference character 10, having my invention embodied therein. The cabinet comprises a plurality of walls forming a food storage compartment therein. The walls of cabinet 10 include an outer metal panel or shell 11, an inner metal liner 12 and any suitable or conventional insulating material 14 disposed therebetween (see Figure 2). These walls surround a food storage compartment 15 formed within cabinet 10. Compartment 15 has an opened front or the front wall of cabinet 10 has an opening therein providing access to the interior of the food storage compartment. This opened front or access opening of compartment is normally closed by two doors, generally represented by the reference characters, 16 and 17, pivotally mounted upon cabinet 10 in side by side relationship for horizontal swinging movement rela-

tive thereto by any suitable or conventional hinges 18. Any suitable or conventional insulating breaker strip structure may be located at the throat of the access opening of compartment 15 where the front edges of metal shell 11 and liner 12 terminate and are secured together. It is to be noted that the open front of cabinet 10 is devoid of a central mullion and that the doors 16 and 17 have adjacent mating edges 19 and 20 respectively extending across the access opening of compartment 15 and providing a joint exposed to the interior of the food storage compartment which joint must be thoroughly sealed to prevent heat leakage into the compartment. Each door 16 and 17 comprises a metal outer pan or panel 21, an inner, preferably plastic, pan or panel 22 and insulating material, similar to the material 14, disposed therebetween (see Figure 2). The door pans or panels 21 and 22 are secured together in any suitable or desirable manner such as by screws 23 (see Figure 3) preferably of low heat conductive metal or insulating material. Screws 23 are also employed to anchor a mounting portion 26 of a rubber or the like gasket upon each of the doors 16 and 17. The gaskets extend around the perimeter of doors 16 and 17, between overlapping flanges provided at the edges of the pans or panels 21 and 22, and the screws 23 pass through suitable openings provided in the mounting portion 26 of the gaskets. Each rubber gasket has a movable or resilient body portion 27 integral with the mounting portion 26 thereof and a soft sponge-like sealing lip 28 projecting outwardly from and formed integral with the body portion 27. The lip 28 together with an edge part 29 of body portion 27 on the gaskets engage and seal against the front wall shell or panel 11 of cabinet 10 along the top, bottom, and the hinged side of doors 16 and 17 (see Figures 2 and 7). At least that portion of each gasket extending along the adjacent mating edge 19 of door 16 and 20 of door 17 is provided with integral aligned and spaced apart eyelet-like bosses 31 (see Figure 5) forming a row of piano-like hinge butts for a purpose to be presently described.

Any suitable or conventional latching means may be employed to maintain the doors 16 and 17 in closed position. In the present disclosure, I mount spring brackets 33 within and on the top and bottom walls of food compartment 15 for the reception of headed studs 34 (see Figure 2) carried upon the inner pan or panel 22 of doors 16 and 17. Legs of the spring brackets 33 embrace and frictionally grip the enlarged head portion of studs 34, when the doors are closed, and thus only a stationary handle, such as handles 36 (see Figure 1), are required on the doors 16 and 17 to permit breaking of the frictional engagement between the brackets 33 and studs 34 when a door is to be opened. It is to be understood that any desirable arrangement for latching doors 16 and 17 in their closed position may be provided and instead of latching the doors to brackets on walls of compartment 15 they may be latched to suitable means provided at the front edge of food supporting shelves stationarily mounted within compartment 15.

A metal member 41 (see Figures 3 and 5) is associated with and embraces the body portion 27 of the gaskets and is disposed between this body portion and the edge of the inner door pan 22 at each of the adjacent mating edges 19 and 20 of doors 16 and 17 respectively. Each member 41 is of substantially U-shaped in cross section and is provided with spaced apart aligned eyelet-like portions 42 (see Figure 5) forming a

row of piano-like hinge butts along the end of one leg thereof. The end of the other leg of each U-shaped member 41 is provided with a rolled or bent over flange 40 which lies in back of the gasket lip 28 to insure movement of this lip when member 41 is moved. A long rod or hinge pin 43 (see Figure 5) is passed through eyelet-like bosses 31 provided on the gaskets and through the inter-fitting eyelet-like portions 42 of member 41 to hingedly attach member 41 to the gasket for mounting the same upon doors 16 and 17 (see Figure 3). Metal members 41 extend throughout substantially the entire length of the mating edges 19 and 20 of doors 16 and 17 respectively and have a finger 44 welded thereto and projecting outwardly therefrom at the top and at the bottom thereof through suitable slots provided in the gaskets. The fingers 44 extend at right angles to members 41 a short distance into food compartment 15 and are adapted to engage cam strikers 45 adjustably secured, by screws or the like, to liner 12 at the top and at the bottom of compartment 15 for a purpose to be presently described.

The body portion 27 of the gaskets and consequently the projecting lip 28 thereon along the two adjacent mating edges 19 and 20 of doors 16 and 17 respectfully lie in a rest position along the edge of the inner door pans 22 when the doors are opened. When doors 16 and 17 are moved toward closed position the projecting fingers 44 on metal member 41 engage the cam strikers 45 and are cammed or moved in a direction to swing members 41 and consequently bias the movable portion 27 and the integral sealing lip 28 of the gaskets outwardly relative to the mating edge of the doors. The swinging of members 41, by the act of closing doors 16 and 17, and consequently the biasing of lips 28 on the gaskets move these lips 28 into engagement with one another (see Figure 3) to seal the joint, exposed to the interior of compartment 15, between mating edges 19 and 20 of doors 16 and 17 respectively. When this joint is sealed the lip 28 and the edge of body portion 27 on the gaskets along the portions thereof extending across the top, bottom and the hinged vertical side of doors 16 and 17 engage the cabinet wall 11 to form a double seal for the access opening of compartment 15 (see Figures 6 and 7). The gaskets along the mating edge of doors 16 and 17 are extended beyond the operating fingers 44 at the bottom of the doors (see Figure 6) and also at the top of the doors so as to overlap and engage the front cabinet wall 11 adjacent the upper and lower portions of the joint between the doors. This extension of continuation of the gaskets at these joints form the sole means of providing a continuous seal for the access opening of compartment 15 throughout its height. In other words no additional elements are required adjacent the joint between the doors to seal this joint at the top and the bottom of the doors.

Pulling on handle 36 of either door 16 and 17 releases stud 34 from its holding bracket 33 during the act of opening one door. Movement of one door relative to the other, to open a portion of the access opening of food storage compartment 15, causes the operating projections or fingers 44 on member 41 to disengage the cam strikers 45 (see Figure 4). The biasing force stored up in the body portion 27 of a gasket, particularly along a mating edge of a door, moves member 41 into engagement with the edge of door pan 22 (see Figure 4). The biasing force stored up in the gaskets while the doors are closed causes

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the initial opening movement of one of the doors 16 or 17 to move the sealing lip 28 away from and out of sealing engagement with the lip 28 on the mating edge of the other door to break the sealed joint between the doors. Separation of lips 28 on the gaskets at the mating edges 19 and 20 of doors 16 and 17 respectively, upon initial opening movement thereof, prevents undue scraping or rubbing of the gasket sealing lips against one another. Since the gasket arrangement along the mating edge of both doors 16 and 17 is substantially the same it should be understood that both doors may if desired be opened simultaneously and/or one door may be opened independently of movement of the other door.

In Figure 7 of the drawings, I show a modification of my invention wherein the operating means for the gasket moving member includes means which extends to the hinged edge of the doors and engages a wall of the cabinet to thus eliminate the mounting of brackets 46 in the food storage compartment 15. In this form of my invention I slidably mount a pair of arms 51 upon each door 16a and 17a. One arm 51 extends horizontally across the upper portion while the other of the pair of arms extends in like manner across the lower portion of each door. The arms 51 preferably lie closely adjacent to the inner face of doors 16a and 17a and are slidable within suitable openings provided in supporting guides 52 attached in any suitable or desirable manner, such as, by screws 53 to the inner door pan 22. While I show the arms 51 as being located on the outside of the inner face of doors 16 and 17 it is to be understood that these arms could, if desired, be extended horizontally through the interior of the door structure. The one or inner end 54 of each arm 51 is pivotally attached by a screw, pin or the like 56 to the finger 44a welded to and projecting from the gasket backing metal member 41a. Finger 44a is similar to but somewhat shorter than the finger 44 in the construction disclosed in Figures 1 to 6 of the drawings. The outer or other opposite end 57 of each arm 51 is bent or formed to provide a foot or tab 58 thereon adapted to engage a wall of the refrigerator cabinet.

In this modified arrangement of the camming or operating means for the gaskets on the mating edges 18a and 20a of doors 16a and 17a respectively normally locates the gasket backing member 41a in a position of rest against door pan 22a (see Figure 8) when a door is opened. Upon moving the opened door 17a shown in Figure 8 into closed position as shown in Figure 7, about its hinges 18a, the foot or tab 58 on each of the pair of arms 51 engages a part of the cabinet, vertical wall of liner 12 of compartment 15, at the hinged side of the door. As the door 17a is moved into its final closed position the direct engagement of arms 51 with the cabinet wall causes relative movement between the arms 51 and door 17a. During this relative movement the arms 51 move fingers 44a to cause member 41a to pivot or swing about its hinged mounting and consequently the gasket along the mating edge of the door is biased out of its position of rest and the lip 28a thereon is biased into engagement with the lip 28a on the adjacent gasket, at the joint between the two doors 16a and 17a, for sealing this joint.

It should be apparent that I have provided an improved mechanically operated sealing arrangement for the joint between mating edges of two doors employed to close a compartment access opening in a refrigerator. By thoroughly

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sealing mating edges of doors as herein disclosed the necessity of extending a mullion across the access opening of a food storage compartment in a refrigerator cabinet is eliminated and the cabinet structure is rendered less complicated and more inexpensive to produce. Also by extending or continuing the gaskets beyond the operating fingers 44 at the joint between the two doors I provide a seal extending continuously throughout the height of the food compartment access opening. My novel sealing arrangement for the joint between mating edges of two doors is such that either of the doors can be opened independently of movement of the other door to thus open a portion of the open front or access opening of a food compartment in a refrigerator.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. In combination, walls forming a cabinet having a compartment therein, one of said walls having an opening providing access to the interior of said compartment, doors normally closing said compartment access opening, said doors having portions thereof abutting said one cabinet wall and having adjacent mating edges forming a joint exposed to the interior of said compartment and extending across the access opening thereof, a rubber-like gasket on each of said doors, each gasket including a mounting portion secured to the door and an integral resilient portion extending along the mating edge of the door upon which it is mounted, a substantially rigid member associated with the resilient portion of each of said gaskets, said member having operating means engageable with a means on said cabinet upon closing the doors for biasing the resilient portion of the gaskets in a direction outwardly relative to the mating edge of the doors into sealing engagement with one another, each of said gaskets extending beyond the top and the bottom of said compartment access opening at the joint between said doors and overlappingly engaging said one cabinet wall when the doors are closed to form without the aid of additional means a continuous seal throughout the height of the opening, and each of said doors being movable independently of the other to break the seal at said joint and open a portion of said compartment access opening.

2. In combination, walls forming a cabinet having a compartment therein, one of said walls having an opening providing access to the interior of said compartment, doors normally closing said compartment access opening, said doors having portions thereof abutting said one cabinet wall and having adjacent mating edges forming a joint exposed to the interior of said compartment and extending across the access opening thereof, a rubber-like gasket on each of said doors, each gasket including a mounting portion secured to the door and an integral resilient portion extending along the mating edge of the door upon which it is mounted, a substantially rigid member associated with the resilient portion of each of said gaskets, said member having operating means engageable with a means on said cabinet upon closing the doors for biasing the resilient portion of the gaskets in a direction outwardly relative to the mating edge of the doors into sealing engagement with one another, each

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of said gaskets extending beyond the operating means on said member at the top and bottom of said doors and overlappingly engaging said one cabinet wall above and below the said joint between said doors when the doors are closed to form without the aid of additional means a continuous seal throughout the height of said compartment access opening, and each of said doors being movable independently of the other to break the seal at said joint and open a portion of said compartment access opening.

3. In combination, walls forming a cabinet having a compartment therein, one of said walls having an opening providing access to the interior of said compartment, doors normally closing said compartment access opening; said doors including inner and outer panels with insulating material therebetween, said doors having portions thereof abutting said one cabinet wall and having adjacent mating edges forming a joint exposed to the interior of said compartment and extending across the access opening thereof, a rubber-like gasket on each of said doors, each gasket including a mounting portion and an integral resilient portion extending along the mating edge of the door upon which it is mounted, a common means for securing said door panels to one another and for locking the mounting portion of said gasket to said door, a substantially rigid member associated with the resilient portion of each of said gaskets, said member having operating means engageable with a means on said cabinet upon closing the doors for biasing the resilient portion of the gaskets in a direction outwardly relative to the mating edge of the doors into sealing engagement with one another, each of said gaskets extending beyond the top and the bottom of said compartment access opening at the joint between said doors and overlappingly engaging said one cabinet wall when the doors are closed to form without the aid of additional means a continuous seal throughout the height of the opening, and each of said doors being movable independently of the other to

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break the seal at said joint and open a portion of said compartment access opening.

4. In combination, walls forming a cabinet having a compartment therein, one of said walls having an opening providing access to the interior of said compartment, doors normally closing said compartment access opening, said doors including inner and outer panels with insulating material therebetween, said doors having portions thereof abutting said one cabinet wall and having adjacent mating edges forming a joint exposed to the interior of said compartment and extending across the access opening thereof, a rubber-like gasket on each of said doors, each gasket including a mounting portion and an integral resilient portion extending along the mating edge of the door upon which it is mounted, a common means for securing said door panels to one another and for locking the mounting portion of said gasket to said door, a substantially rigid member associated with the resilient portion of each of said gaskets, said member having operating means engageable with a means on said cabinet upon closing the doors for biasing the resilient portion of the gaskets in a direction outwardly relative to the mating edge of the doors into sealing engagement with one another, each of said gaskets extending beyond the operating means on said member at the top and bottom of said doors and overlappingly engaging said one cabinet wall above and below the said joint between said doors when the doors are closed to form without the aid of additional means a continuous seal throughout the height of said compartment access opening, and each of said doors being movable independently of the other to break the seal at said joint and open a portion of said compartment access opening.

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