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REFRIGERATOR DOOR SEAL

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2 Sheets-Sheet 1

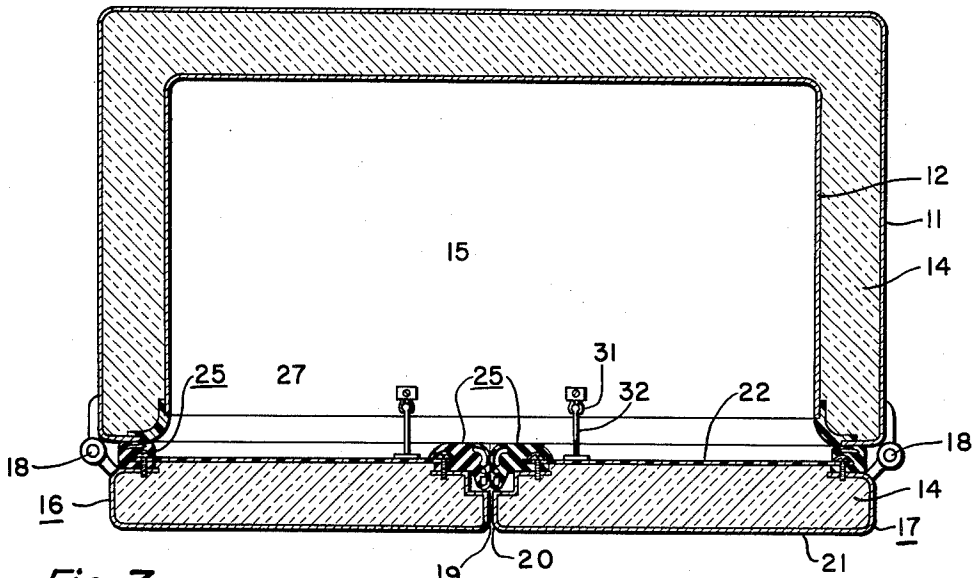


Fig. 7

Fig. 2

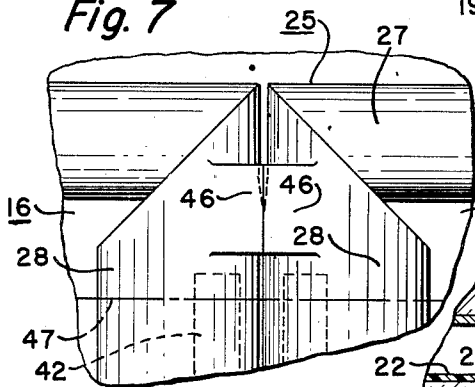


Fig. 3

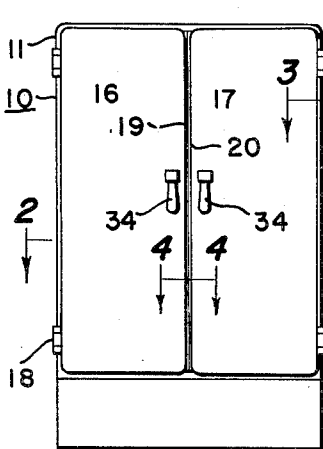


Fig. 1

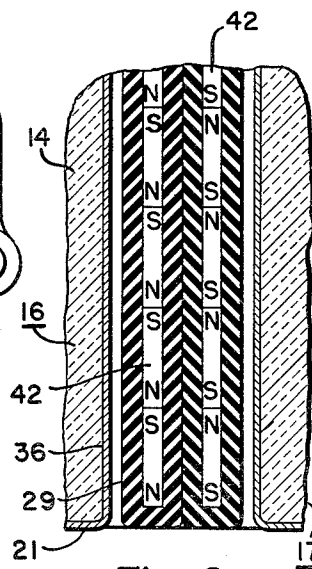


Fig. 6

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1

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REFRIGERATOR DOOR SEAL

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

For many years it has been the custom in manufacturing refrigerated 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 a 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 refrigerated cabinet particularly at a joint between adjacent 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 adjacent mating edges of the doors is effectively sealed against heat leakage by means responsive to the closing of both doors.

A further object of my invention is to provide a sealing arrangement for the joint between the mating edges of two doors on a mullionless refrigerator cabinet which permits either of the doors to 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 a refrigerator.

In carrying out the foregoing objects it is a still further and more specific object of my invention to provide magnetic means for automatically moving a portion of gaskets on adjacent mating edges of two doors extending across and employed to close the access opening of a food storage compartment in a refrigerator into engagement with one another for sealing the joint between the doors when they are closed and which magnetic means moves and retains the movable portion of the gaskets closely adjacent to or in contact with the mating edge of the doors when the doors are opened to prevent undue rubbing or scraping of the gaskets against one another.

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:

Figure 1 is a front view of a refrigerator cabinet showing two doors closing a compartment therein and

2

having the joint at their mating edges sealed in accordance with the present invention;

Figure 2 is an enlarged 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 sectional view taken on the line 3-3 of Figure 1 showing a sealing portion of a gasket on a door engaging the cabinet front wall;

Figure 4 is an enlarged fragmentary horizontal cross-sectional view taken on the line 4-4 of Figure 1 showing the doors of the refrigerating cabinet in closed position with magnets in gaskets along adjacent mating edges of the doors maintaining a resilient movable portion of the gaskets in engagement with one another to seal the joint between the doors;

Figure 5 is a view like Figure 4 and shows one door partially open with the magnets in the gaskets holding the sealing portion thereof in contact with the mating edges of the doors;

Figure 6 is a fragmentary vertical cross-sectional view taken on the line 6-6 of Figure 4 showing the stacked arrangement of a plurality of magnets within the door gaskets;

Figure 7 is a fragmentary view taken on the line 7-7 of Figure 4 showing an embossed portion on each of the door gaskets;

Figure 8 is a fragmentary sectional view similar to Figure 4 showing the joint between two doors sealed by a modified arrangement of the present invention; and

Figure 9 is a view like Figure 8 showing one door in a partially open position with magnets in the gasket holding a resilient movable portion thereof against an edge of a door.

Referring to the drawings, for illustrating my invention, I have shown in Figure 1 thereof a refrigerator cabinet, generally represented by the reference character 10, formed by a plurality of walls. The walls of cabinet 10 comprise an outer metal shell or panel 11, an inner metal liner 12 and any suitable or desirable insulating material 14 disposed therebetween (see Figure 2). These cabinet walls form a food storage compartment 15 within the cabinet and one wall thereof, preferably the front wall, has an opening therein providing access to the interior of compartment 15. The open front or access opening of compartment 15 is normally closed by two doors, generally represented by the reference characters 16 and 17, pivotally mounted upon cabinet 10 by any suitable or conventional hinges 18. Any suitable or conventional insulating breaker strip structure may be located at the access opening of compartment 15 where the front edges of metal shell 11 and metal 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 mating edges 19 and 20 extending across the open front of compartment 15 and providing a joint exposed to the interior of the compartment which joint must be thoroughly sealed. An evaporator or cooling element of a closed refrigerating system associated with cabinet 10 may be located in compartment 15 for cooling the interior thereof. Doors 16 and 17 are mounted in side-by-side relationship for horizontal swinging movement relative to cabinet 10.

Each door 16 and 17 comprises a metal outer pan or panel 21, an inner, preferably plastic, pan or plate 22 and insulating material, similar to the material 14, disposed therebetween (see Figures 2 and 3). The door pans 21 and 22 are secured together in any suitable or conventional manner such as by the screws 23, which are preferably formed of low heat conductive metal or insulating material. These screws 23 are also employed to anchor or mount a rubber or the like unitary gasket

element, generally represented by the reference character 25, upon each door 16 and 17 (see Figure 2). The gaskets 25 extend around the perimeter of doors 16 and 17 and comprise a mounting portion 26 disposed between the door pans 21 and 22 and provided with openings through which the screws 23 pass to lock the gaskets to the doors (see Figures 3 and 4). Each gasket 25 has portions of different cross-sectional contour. For example, that portion of each gasket 25 which extends along the top, bottom and the hinged side of edges of doors 16 and 17 is of ordinary or conventional cross-sectional contour and includes a resilient bead 27 formed integral with the mounting portion 26 thereof (see Figure 3). That portion of each gasket which extends along the mating edge 19 of door 16 and 20 of door 17 (see Figures 1, 2 and 4) is of special cross-sectional contour and includes, in addition to a bead 28, substantially corresponding to bead 27 and which lies over and conceals the screws 23, a soft movable or resilient hinge portion 29 (see Figures 4 and 5) formed integral with the bead 28 and mounting portion 26 thereof. Portions 29 of the gaskets 25 are very flexible and are of special formation for a purpose to be presently described.

Any suitable or conventional latching means may be employed to hold the doors 16 and 17 in closed position. In the present disclosure, I mount spring brackets 31 on the inside of food compartment 15, at the top and bottom thereof, for the reception of headed studs 32 (see Figure 2) carried upon the inner pan 22 of doors 16 and 17. Legs of the spring bracket 31 embrace and frictionally grip the enlarged head portion of studs 32 when the doors are closed and thus only a stationary handle, such as handles 34 (see Figure 1), are required on the doors 16 and 17 to break the frictional engagement between the brackets 31 and studs 32. It is to be understood that such door latching means may, if desired, be provided on the front edge of a stationarily mounted shelf located within compartment 15.

Metal pans 21 of doors 16 and 17 are recessed as at 36 along the adjacent mating edges thereof (see Figures 2 and 4) for the reception of hinge portions 29 of the gaskets 25. In this manner the gaskets 25 along the mating edges of the doors are substantially concealed from view when the doors are closed. The hinge portion 29 of gaskets 25 is hollowed out as at 37 and 38 (see Figures 4 and 5) to increase the flexibility of the gaskets at this point and to provide a sealing lip on the gaskets adapted to sealingly engage one another. A round hole is also provided in portion 29 of each gasket 25, intermediate the hollowed out portions 37 and 38, and contains a plurality of artificial permanent magnets 42 which are stacked one upon another throughout substantially the entire length of the gasket portion 29 (see Figures 4 and 6). The magnets 42 are placed one on top the other with opposite poles in each stack thereof abutting one another. It is to be noted that the plurality of magnets 42 in the adjacent gasket portions 29 are arranged in reverse order so as to horizontally align contrary ends or poles of the magnets in the gaskets along mating edges 19 and 20 of doors 16 and 17 respectively. Magnets 42 form in the present disclosure means responsive to closing both doors 16 and 17 for moving the sealing lips of the gaskets 25 into engagement with one another.

When the doors 16 and 17 are closed, the spring brackets 31 embrace and grip the head of studs 32 to latch or maintain the doors in this position. The joint exposed to the interior of compartment 15 and extending across the access opening thereof at the adjacent or mating edges 19 and 20 of doors 16 and 17 is effectively sealed by the present gasket arrangement. For example, the closing of doors 16 and 17 brings the plurality of magnets 42 in each door gasket 25 into close proximity to one another, with the ends or poles thereof of contrary name in horizontal alignment, whereby the magnets are strongly attracted to one another. This strong attraction of the

magnets to one another causes the sealing lips to move about the hinge portion 29 of the gaskets on each door in a direction away from the mating edge thereof, to which the magnets are attracted when the doors are opened, and into engagement with one another. In this manner the magnets 42 are responsive to the closing of both doors 16 and 17 for moving the sealing lips of the gaskets into sealing engagement with one another whereby heat leakage into the refrigerated compartment 15 at the joint between mating edges of the doors is prevented. As long as the doors remain closed, the magnetic attraction of the magnets for one another holds the flexible sealing lips of the adjacent gaskets along the mating edges 19 and 20 of the doors in sealing contact. Pulling on handle 34 of either door 16 or 17 releases stud 32 from its holding bracket 31, during the act of opening one door independently of movement of the other door. Movement of one door relative to the other door breaks the strong magnetic attraction of the magnets 42 in the adjacent gasket portions 29 to one another, and the magnets 42 in each gasket portion 29 are thereupon attracted to the depressed part 36 of metal outer door pans 21. The attraction of magnets 42 to door pan part 36, when a door is opened to break the seal at the joint of the mating edges of the doors, causes the movable sealing lip portion of gaskets 25 to move toward and lie against the depressed part 36 of the door pans 21 (see Figure 5). Movement of the gasket sealing lips into engagement with the part 36 of door pans 21 permits opening and closing of the doors 16 and 17 independently of one another without unduly scraping or rubbing the sealing portions of the adjacent gaskets against one another.

While the sealing lip portion of gaskets 25 provide an effective seal at the joint between the vertical mating edges 19 and 20 of doors 16 and 17 respectively and the bead portion 27 effectively seals the other vertical edges and the horizontal edges of doors 16 and 17 to cabinet 10 that point adjacent to the juncture of the beaded portions 27 and 28 of gaskets 25, where the rows of magnets terminate, must also be sealed to the cabinet front wall. For this purpose, I provide an integral soft boss 46 (see Figure 7) on each adjacent gasket near the top and bottom thereof. The opposed bosses 46 engage one another when doors 16 and 17 are closed and also engage the outer front wall 11 of cabinet 10 at the upper and lower ends of the adjacent gasket portions beyond the food compartment access opening, as indicated by the dot-dash line 47 in Figure 7 of the drawing. These bosses 46 seal the joint formed by the adjacent gaskets 25 at the point where the columns of magnets end. It is, of course, preferable to form the two portions, of different cross-sectional contour, of gaskets 25 as an integral unit. However, these portions of the gaskets may be separate pieces and cemented or vulcanized together so as to extend entirely around edges of the doors.

In Figure 8 of the drawings, I show a modification of my invention wherein the vertical part of one of the gasket units is omitted from the mating edge of door 17a. In this form of my invention the gasket 25a extends only along the top, bottom and the outer hinged edge of door 17a only, and a single gasket sealing lip or portion of special cross-sectional contour extends along the mating edge 19a of door 16a and is employed to seal the joint between the mating edges of doors 16a and 17a. The sealing lip portion beyond the hinge portion 29a of gasket 25a on door 16a contains a vertical row or stack of magnets 42a. When doors 16a and 17a are closed, the continuously flat mating edge 20a of pan 21a on door 17a is moved closer to the magnets 42a than their normal spacing from depressed portion 36a on the pan 21a of door 16a. This causes the magnets 42a to move the sealing lip portion of gasket 25a on door 16a outwardly of its mating edge 19a and into engagement with the mating edge 20a of door 17a to seal the joint be-

5

tween the mating edges of the doors. Thus magnets 42a form means responsive to the closing of both doors in this modified showing of my invention for moving a sealing portion of a gasket into sealing engagement with one of the doors. Either door 16a or 17a in this modified form of the invention is also movable independently of movement of the other. When either door 16a or 17a is moved to open a portion of the compartment access opening, as shown in Figure 9 of the drawings, the distance between the vertical row of magnets 42a and the mating edge 20a of door 17a is increased and the magnetic attraction of the magnets for the edge of door 17a is broken. Thereupon magnets 42a are attracted to the depressed metal portion 36a of pan 21a on door 16a to move the sealing lip portion of the gasket 25a toward and against this pan portion. Moving the sealing lip portion about the hinge portion 29a in the manner described when either door is opened prevents undue rubbing or scraping of the gasket. The gasket on door 16a is provided with a boss 46a which registers with and abuts against the bead 27a of the gasket on door 17a, and both boss 46a and bead 27a engage the front wall of the cabinet to seal the doors 16a and 17a at the top and at the bottom thereof beyond the row or stack of magnets 42a.

From the foregoing, it should be apparent that I have provided an improved sealing arrangement of a joint between mating edges of two doors employed to close a compartment within a refrigerator cabinet. By thoroughly 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 is eliminated and the cabinet structure is less complicated and more inexpensive to produce. My improved sealing arrangement is constructed to permit either of the two doors to be opened independently of movement of the other door to thus open a portion of the open front or access opening of the food storage compartment.

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, the front wall of said cabinet having an opening therein providing access to the interior of said compartment, two doors pivotally mounted upon said cabinet in side-by-side relationship normally closing the access opening of said compartment, said doors having portions thereof adapted to abut said cabinet front wall and having adjacent mating edges forming a joint exposed to the interior of said compartment, means for sealing the joint between the mating edges of said doors, said means comprising a rubber-like gasket extending along the mating edge of one of said doors, said gasket including a mounting portion secured to said one door, and a flexible movable portion formed integral with and projecting from said mounting portion, magnetic means in said movable portion of said gasket, said magnetic means being arranged in said movable portion of said gasket for attraction to the mating edge of said one door when the same is opened to hold said movable gasket portion thereagainst, said magnetic means also being arranged in said movable portion of said gasket for greater attraction to the other of said doors when

6

both doors are closed whereby said gasket movable portion is moved away from the mating edge of said one door into engagement with a part of said other door to seal the joint between the mating edges of the doors, said gasket also including another integral portion extending beyond the top and the bottom of said compartment access opening at the joint between said doors and overlappingly engaging said cabinet front wall when the doors are closed, said overlapping portions of said gasket each being provided with an integral boss, said bosses each having a first surface abutting said cabinet front wall and a second surface abutting said part of said other door to form a continuous seal extending entirely across the opening, and each of said doors being movable independently of movement of the other to break the seal at said joint for opening a portion of said compartment open front.

2. In combination, walls forming a cabinet having a compartment therein, the front wall of said cabinet having an opening therein providing access to the interior of said compartment, two doors pivotally mounted upon said cabinet in side-by-side relationship normally closing the access opening of said compartment, said doors having portions thereof adapted to abut said cabinet front wall and having adjacent mating edges forming a joint exposed to the interior of said compartment, means for sealing the joint between the mating edges of said doors, said means comprising a rubber-like gasket extending along the mating edge of each of said doors, each gasket including a mounting portion secured to a door and a flexible movable portion formed integral with and projecting from said mounting portion, magnetic means in said movable portion of each of said gaskets, said magnetic means in each gasket being arranged for attraction to the mating edge of the door upon which it is mounted when the same is opened to hold the movable portion of the gasket thereagainst, said magnetic means in each gasket also being arranged for greater attraction to one another when both doors are closed whereby the movable portion of each of said gaskets is moved away from the mating edge of the door upon which it is mounted into engagement with one another to seal the joint between the mating edges of the doors, each of said gaskets having portions thereof extending beyond the top and the bottom of said compartment access opening at the joint between said doors and overlappingly engaging said cabinet front wall when the doors are closed, said overlapping portions of each of said gaskets being provided with an integral boss, said bosses each having a first surface and a second surface, said first surface of each of said bosses abutting said cabinet front wall and the second surface of the boss on one of said gaskets abutting the second surface on the boss of the other said gaskets to form a continuous seal extending entirely across the opening, and each of said doors being movable independently of movement of the other to break the seal at said joint for opening a portion of said compartment open front.

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