

Dec. 30, 1958

K. K. KESLING
REFRIGERATOR

2,866,675

Filed Dec. 19, 1957

2 Sheets-Sheet 1

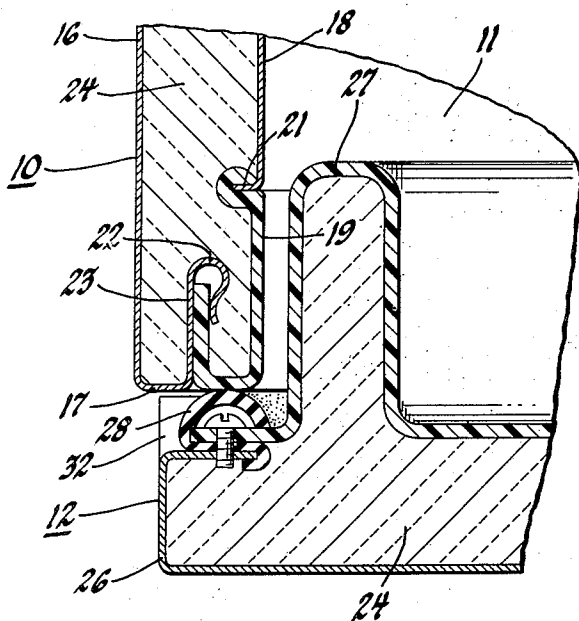


Fig. 4

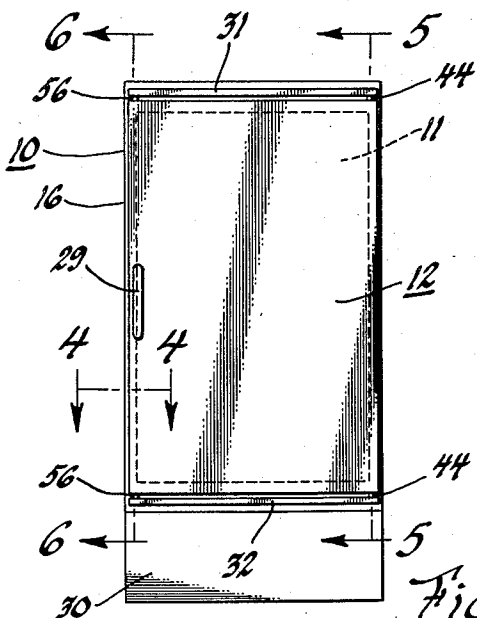


Fig. 1

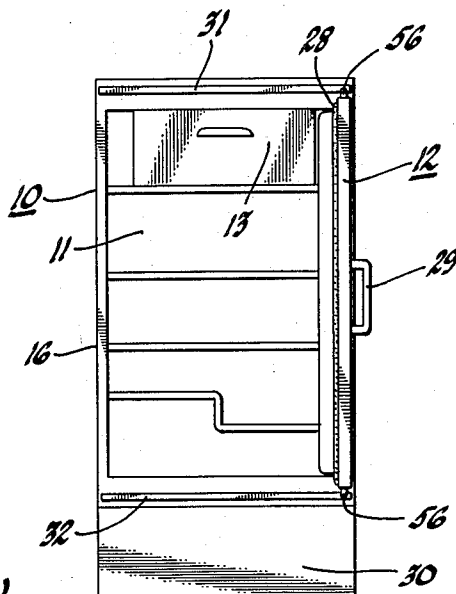


Fig. 2

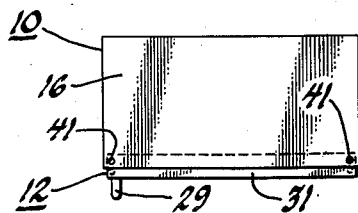


Fig. 3

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2 Sheets-Sheet 2

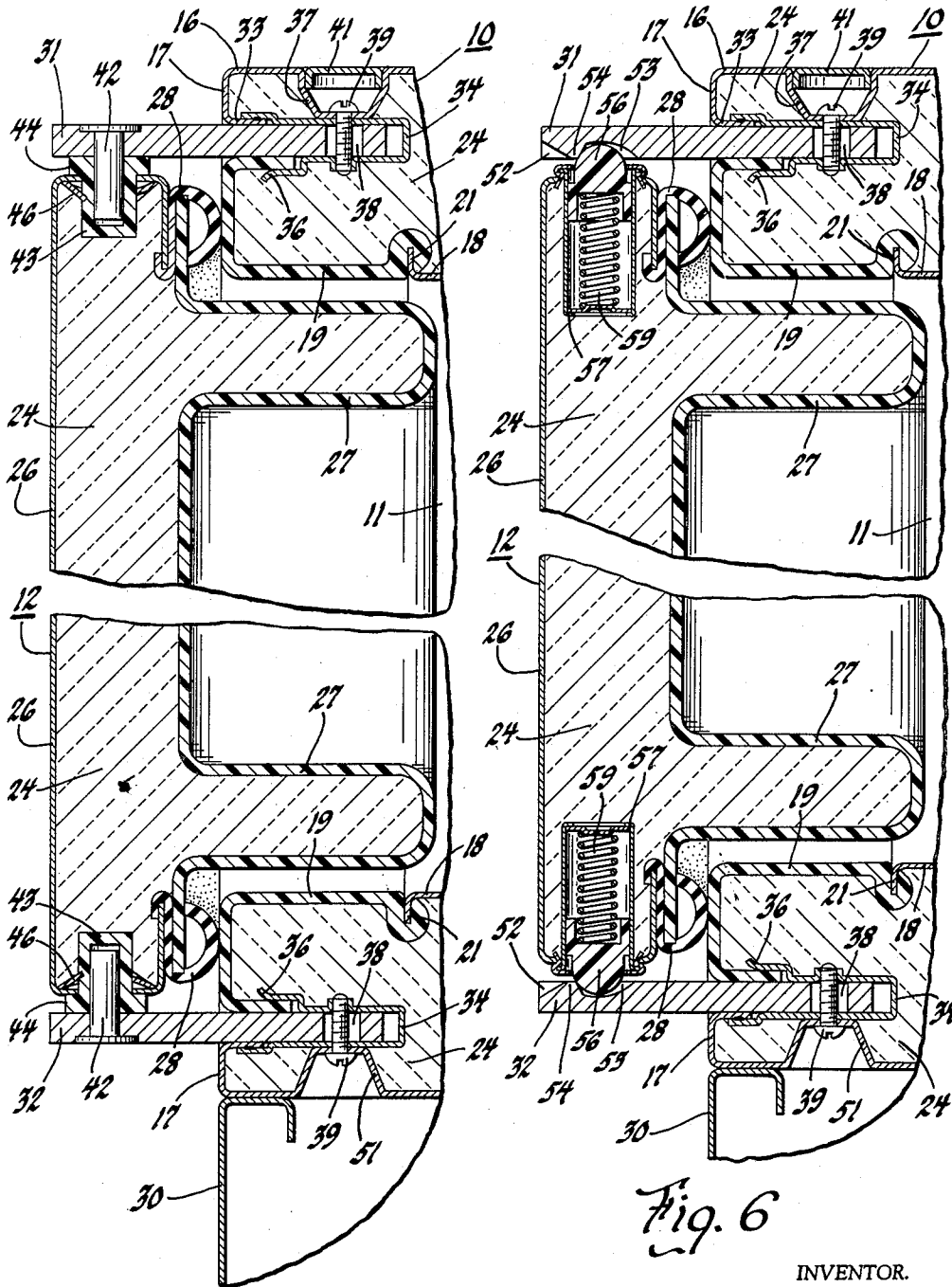


Fig. 5

Fig. 6

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REFRIGERATOR

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9 Claims. (Cl. 312—214)

This invention relates to refrigerators and particularly to the construction of food storage refrigerator cabinets.

In the development of refrigerator cabinet art the insulated walls of such cabinets are becoming thinner and thinner, due to improved and more effective insulating material used therein, and at the present time the overall thickness of the walls is so small that there is insufficient space therein to mount a door latching mechanism in a wall of the cabinet. In addition it is highly desirable to eliminate a large complicated door latching mechanism from a refrigerator cabinet construction in order to reduce manufacturing costs of the cabinet. Heretofore a single, rather heavy and bulky mechanical latch mechanism was employed on refrigerator cabinets intermediate the top and bottom of a door thereon for latching the door thereto. Such a single latch mechanism was usually provided with means for adjusting the closing position of a door against a refrigerator cabinet so that the compressive force applied to a resilient gasket on the door could be varied to effect sealing of the door about a refrigerated chamber in the cabinet and yet prolong the life of the gasket. This has been essential due to manufacturing tolerances between a cabinet construction, its door structure and the mounting of a latch on the cabinet. Thus to eliminate such a latch mechanism from a refrigerator cabinet construction and to provide for varying the compressive force to be applied to a gasket between the cabinet and its door at a refrigerated chamber access opening renders the provision on a refrigerator for changing the distance between a wall thereof and the door thereon necessary. I therefore contemplate the construction of a refrigerator cabinet having an improved arrangement for latching a door shut thereagainst and for adjusting the closed position of the door whereby a refrigerated chamber in the cabinet can be effectively sealed in air-tight fashion entirely around the chamber access opening.

An object of my invention is to provide a unique refrigerator cabinet construction and an improved arrangement for adjusting the mounting of a door thereon to vary the compressive force applied by the door to a resilient gasket seal between the cabinet and its door when the door is latched shut.

Another object of my invention is to provide a novel arrangement of mounting a door on a refrigerator cabinet wherein bars adjustable relative to the cabinet form a hinge connection of a door thereon, a part of the latching means for holding the door shut against the cabinet and which bars also serve as trim strips on the front of the cabinet to enhance its appearance.

A further object of my invention is to attach bars inwardly of the front face of a refrigerator cabinet member above and below a swingable door member thereon which bar attachment is adjustable relative to the cabinet from exteriorly of walls thereof for changing the distance between the door and cabinet front wall whereby to afford proper alignment of the door member with the cabinet member for varying the compressive force applied

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to a gasket located between the members and utilized to seal, in air-tight fashion, an access opening to a refrigerated food storage chamber in the cabinet.

In carrying out the foregoing objects it is a still further and more specific object of my invention to provide an improved arrangement for pivotally mounting a door member on a cabinet member and for latching the door to the cabinet which arrangement is adjustable on opposite sides of the door member to vary the compressive force applied to a gasket between the members both on the latch side and on the hinged side of the door.

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 constructed in accordance with my invention with the refrigerator door shown latched to the cabinet;

Figure 2 is a view similar to Figure 1 showing the refrigerator cabinet door in open position;

Figure 3 is a top view of the refrigerator disclosed in Figures 1 and 2;

Figure 4 is an enlarged fragmentary sectional view taken on the line 4—4 of Figure 1 of a vertical door jamb structure of the refrigerator cabinet;

Figure 5 is an enlarged broken fragmentary sectional view taken on the line 5—5 of Figure 1 showing an adjustable hinge mounting of the door on the refrigerator cabinet; and

Figure 6 is an enlarged broken fragmentary sectional view taken on the line 6—6 of Figure 1 showing an adjustable arrangement for the latch side of the refrigerator cabinet door.

Referring to the drawings, for illustrating my invention, I show in Figures 1, 2 and 3 thereof a refrigerator including a cabinet member, generally designated by the reference numeral 10, provided with a plurality of insulated walls defining a food storage chamber 11 therein having a front access opening normally closed by an insulated door structure or member 12. Chamber 11 is adapted to be cooled by a refrigerant evaporator of a closed refrigerating system associated with cabinet 10 and which evaporator may be located in the upper part of the food chamber behind an inner door 13 as is conventional in the art for preserving food products stored in the chamber. As best shown in Figure 4 of the drawings cabinet 10 includes a metal shell 16 having an inward flange 17 therearound and forming the outer top, bottom and sides of insulated walls of the cabinet. The food storage chamber 11 is formed by a metal liner 18 separated from shell 16 by a non-metallic or molded plastic breaker strip 19. Breaker strip 19 forms a part of the front face or door jamb of cabinet 10 and has an end portion hooked over an outwardly bent flange 21 on liner 18. The other end of breaker strip 19, along vertical sides of cabinet 10, fits between a rolled over spring-like edge portion 22 of a rearwardly directed integral extension 23 on the flange 17 of shell 16. Liner 18 is spaced from shell 16 and the space therebetween is filled with any suitable or desirable insulating material 24. The access opening to food storage chamber 11 at the front of cabinet 10 is normally closed by insulated door member 12 and this door comprises an outer metal pan 26 and an inner preferably molded plastic panel 27 spaced therefrom and having some of the insulating material 24 disposed therebetween. A resilient gasket 28 is secured between edges of the door pan 26 and panel 27, by screws or the like as is conventional in the art, and extends continuously around door member 12 on an inwardly facing shoulder thereon. Gasket 28

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is adapted to be compressed between the members 10 and 12 for sealing food storage chamber 11 in an air-tight fashion about its front access opening. A stationary handle 29 is mounted on door member 12 (see Figures 1 and 2) but the door is devoid of a latch mechanism in the vicinity of and adapted to be actuated by this handle. The cabinet 10 is provided with walls below shell 16 to form a machine compartment, beneath the insulated chamber 11, closed at the front thereof by a removable or detachable cover or panel 30 and which compartment usually houses the refrigerant translating device or unit of the refrigerating system associated with the cabinet.

According to and in order that the aforesaid objects may be accomplished I provide means for adjustably mounting door member 12 on cabinet member 10 for horizontal swinging movement relative thereto for closing and sealing the access opening of food storage chamber 11. As hereinbefore stated it is desirable to mount door member 12 on cabinet member 10 so that the distance therebetween can be changed to take care of manufacturing tolerances, to align door 12 with the front of cabinet 10 and to vary the compressive force to be applied to gasket 28 when door 12 is latched shut against cabinet 10. Accordingly I mount door 12 on cabinet 10 by upper and lower rigid metal bars 31 and 32 respectively which are attached at their ends to the cabinet inwardly of outer wall surfaces thereof and particularly inwardly of its front face by attaching means which permit adjustment of the bars 31 and 32 toward and/or away from the front of cabinet 10. The front face of cabinet 10 is provided with a horizontally elongated aperture adjacent the top and bottom of the food chamber access opening. An elongated metal bar 31 fits in and substantially fills the aperture above the chamber access opening and the other bar 32 fits in and substantially fills the aperture below the chamber access opening. These bars 31 and 32, project from the forward face of cabinet 10 and are spaced from and extend continuously along the upper and lower peripheral edges of door 12. It will be noted that an inturned edge 33 on flange 17 of the top wall of cabinet shell 16 (see Figures 5 and 6) has the edge portion of one leg of a side-wise disposed U-shaped metal strip 34 welded or otherwise rigidly secured thereto and that the edge portion of the other leg of this metal strip is bent outwardly as at 36. The bent out portion 36 of the leg of metal strip 34 forms a spring-like clip for receiving one end portion of a breaker strip or molding 19 so that the molding is secured to the upper part of cabinet 10 in a manner similar to that along vertical sides thereof. The top wall of shell 16 adjacent corners of cabinet 10 is depressed or cupped downwardly, as at 37, and punched out to provide a screw hole therein. This screw hole in shell 16 is aligned with a screw hole provided in the upper leg of U-shaped strip 34 and with an extruded and tapped hole in the lower leg of strip 34. The ends of bar 31 along its inner edge are each provided with a hole 38 which holes are elongated in a direction transverse to the length of the bar. A screw 39 extends through the screw hole in cup portion 37 of shell 16, through the screw hole in strip 34, through the elongated hole 38 in bar 31 at each end of the bar and is tightly threaded into the tapped hole in the lower leg of strip 34. These two screws 39 rigidly and adjustably attach the bar 31 to cabinet 10 inwardly of the front surface of the cabinet within the apertures provided therefor. A snap disc-like cap 41 is pressed into the depression or cupped down portions of shell 16 to conceal the heads of screws 39 and to provide a continuous flat surface along the top of cabinet 10 at the front portion thereof. A hinge pin 42 is welded or otherwise rigidly secured to one end of bar 31 forwardly of the elongated hole 38 therein. A shank portion of this upper hinge pin 42 depends from bar 31 and fits into a bore provided in a non-metallic socket element

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43, shouldered as at 44, and locked upon door 12 by a spring lock clip 46 which bears against door pan 26 and bites into element 43. The construction of the hinge connection of door 12 to cabinet 10 and of attachment of bar 32 to the cabinet below the bottom of the door is quite similar to the connections just described but are substantially inverted. It will be noted that the bottom of shell 16, forming the top of the machine compartment in cabinet 10 and closed at its front panel 30, is cupped upwardly, as at 51, at the two front corner portions of the machine compartment. The structure of adjustably attaching the two bars 31 and 32 inwardly of outer wall surfaces of cabinet 10 at the upper and lower front corner portions of the cabinet on the side thereof opposite the hinge connection of door 12 thereto is the same (see Figure 6) as above described. Thus it should be apparent, without a detailed description of each one of the four separate and similar adjustable attachments, that the door mounting means includes attachment of bars 31 and 32 at their two ends to cabinet 10 for movement toward or into the cabinet and outwardly relative thereto. Each bar 31 and 32 is provided with cut away portions 52 and 53 providing a striking boss 54 therebetween at the end of the bars opposite their hinge pins 42 and forwardly of their attachment to cabinet 10 (see Figure 6). Cut away portion 53 of bars 31 and 32 form a latch part or button keeper of upper and lower latch means for door 12. The other latch part of the latching means for door 12 comprises a spring pressed device carried by each of the top and bottom peripheral edges of door member 12 and has a non-metallic button 56 protruding therefrom into the cut away portion 53 or button keeper of bars 31 and 32 to maintain the door latched shut against cabinet 10 with the gasket 28 slightly compressed therebetween to seal the access opening of chamber 11 in air-tight fashion therearound. Button 56 of each of the spring pressed latch parts is anchored in a cage 57 for reciprocating movement which cage is locked to door 12 by being snapped in an opening in the pan 26 thereof at the upper and lower peripheral edges of the door. A spring 59 within cage 57 biases button 56 outwardly thereof so that upon a closing movement of door 12 the protruding button of the one latch part of the door latching means swings into cut away portion 52 of the bars 31 and 32, strikes and rides over the boss 54 and comes to rest in the cut away portion or button keeper 53 of the bars to latch the door shut against the cabinet. An outward force applied to the handle 29 on door 12 will cause the one latch part, button 56, of each of the spring pressed devices to be depressed into cages 57 so that they will ride forwardly past the other latch part, bosses 54, to open the door about its pivotal mounting or hinge pin connections 42. In this manner access to food storage chamber 11 may be had. The socket elements 43 and the buttons 56 of the door latching means are preferably formed of super poly-amide material which is sold on the market under the trade name of nylon. The shouldered portion 44 of elements 43 and the buttons 56 break any metal-to-metal contact between pan 26 of door 12 and bars 31 and 32. Shouldered portion of socket elements 43 provides a substantially frictionless-like bearing between bars 31 and 32 and the door thus rendering door 12 easily and quietly swingable about the hinge pins 42 relative to cabinet 10.

The adjustable mounting of bars 31 and 32 within the apertures in the front wall of cabinet 10 inwardly of outer wall surfaces of the cabinet conceal the attachment of the bars to the cabinet. Bars 31 and 32 are plated and highly polished to form decorative or trim strips across the front of cabinet 10 to improve or enhance its appearance. The adjustable attachment of bars 31 and 32 while being concealed within the confines of cabinet 10 are accessible from points exteriorly

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thereof for adjustment both during assembly of the door to the cabinet and after the cabinet is installed. This permits proper alignment of door 12 with the front of cabinet 10 both at the hinged side and at the latched side of the door and insures that a predetermined compressive force will be applied to gasket 28 entirely around the access opening of chamber 11. Should the gasket 28 become worn or lose some of its resiliency or flexibility, after cabinet 10 has been in use for a period of time, whereby the door latching means will no longer maintain a substantially air-tight seal about the chamber access opening the distance between door 12 and the front face of cabinet 10 can be readily changed to compensate for wear or loss of resiliency of gasket 28. The snap caps 41 on top of cabinet 10 at the front corners thereof are removed from cabinet shell 16 and the machine compartment front closure or panel 30 is detached from the cabinet. Thus both the upper and lower attachments of bars 31 and 32 to cabinet 10 at their ends are accessible for adjustment. Screws 39 at one more corner of cabinet 10 may be loosened to permit either or both ends of the bars 31 or 32 to be adjusted inwardly of the cabinet and/or outwardly relative thereto within the apertures which they occupy. This adjustment of the bars 31 and 32 alters the distance between cabinet 10 and door 12 at any desired point about the periphery of the door so that gasket 28 may be compressed with a uniform greater or lesser force between the cabinet and door members. Thus the compressive force applied to gasket 28, even though the attaching points of bars 31 and 32 to cabinet 10 are concealed, may be varied during assembly of the refrigerator or after the same has been in use over an extended period of time from exteriorly of the cabinet.

It should from the foregoing be apparent that I have provided an improved refrigerator construction the appearance of which is greatly enhanced by a novel hinge connection and a novel latching arrangement for the door thereon. In my improved refrigerator construction the ordinary large bulky single expensive latch mechanism for the door thereof is eliminated whereby such a mechanism does not determine the thickness of the insulated cabinet walls or its door jamb to thus render the cabinet capable of thinner wall construction as more effective insulating material therefor is developed. A thinner walled cabinet such as is depicted by the present disclosure is also advantageous in that a greater cubic foot storage space within a food chamber of a cabinet having predetermined exterior dimensions is had.

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 a refrigerator, a cabinet member having insulated walls defining a food storage chamber therein provided with an access opening and an insulated door member normally closing the opening, a resilient gasket on one of said members around said chamber opening adapted to be engaged by the other of said members for sealing the opening in air-tight fashion, means pivotally mounting said door member on said cabinet member for swinging movement relative thereto, said means comprising a first bar and a second bar attached to said cabinet and projecting outwardly therefrom adjacent said chamber access opening continuously across opposed peripheral edges of said door; one side of said door having a hinge pin connection to one end portion of each of said bars for swinging said door between the bars, latching means on the side of said door opposite said hinge pin connections including a latch part on said opposed edges of the door and another latch part adjacent the other end portion of each of said bars, and the attachment of said bars to said cabinet being adjustable independently of one another for shifting the bars toward and outwardly of the

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cabinet for changing the distance between said door member and said cabinet member whereby to align them with one another and to vary the compressive force applied to said gasket therebetween.

2. The combination defined by claim 1 wherein the hinge pin connections each include a pin projecting from the bars into opposed peripheral edges of the door member.

3. In a refrigerator, a cabinet having insulated walls defining a food storage chamber therein provided with an access opening and an insulated door normally closing the opening, a resilient gasket on said door adapted to engage said cabinet about said chamber access opening for sealing the chamber thereat in air-tight fashion, means pivotally mounting said door on said cabinet for swinging movement relative thereto, said means comprising a first bar and a second bar attached to said cabinet inwardly of an outer wall thereof and projecting outwardly therefrom adjacent said chamber access opening continuously across opposed peripheral edges of said door, one side of said door having a hinge pin connection to one end portion of each of said bars for swinging said door between the bars into abutment with said cabinet, latching means on the side of said door opposite said hinge pin connections including a spring pressed button protruding from each of said opposed edges of the door and a button keeper adjacent the other end portion of each of said bars, and the attachment of said bars to said cabinet being adjustable from exteriorly of the cabinet independently of one another for shifting the bars toward and outwardly of said cabinet outer wall for changing the distance between said door and said cabinet outer wall whereby to align them with one another and to vary the compressive force applied to said gasket when the door is closed against and latched to the cabinet by said latching means.

4. The combination defined by claim 2 wherein the hinge pin connections each include a pin projecting from the bars into opposed peripheral edges of the door.

5. In a refrigerator, a cabinet member having insulated walls defining a food storage chamber therein provided with an access opening in the front wall of said cabinet normally closed by an insulated door member, a resilient gasket on one of said members around said chamber opening adapted to be engaged by the other of said members for sealing the opening in air-tight fashion, means pivotally mounting said door member on said cabinet member, said means comprising a first bar disposed in an elongated aperture provided in the front wall of said cabinet spaced from and located above the chamber access opening therein and a second bar disposed in an elongated aperture provided in the front wall of said cabinet spaced from and located below the chamber access opening, each of said bars being attached to said cabinet inwardly of its said front wall, the upper bar projecting forwardly of said cabinet front wall continuously across the top peripheral edge of said door and the lower bar projecting forwardly of said cabinet front wall continuously across the bottom peripheral edge of said door, one side of said door member having a hinge pin connection to one end portion of each of said bars for swinging the door between the bars into abutment with said cabinet member, latching means on the side of said door opposite said hinge pin connections including a latch part on said top and said bottom peripheral edges of the door and another latch part adjacent the end portion of each of said bars opposite said one end portion thereof, and the attachment of said bars to said cabinet inwardly of its front wall being adjustable from exteriorly of the cabinet member independently of one another for shifting the bars within the apertures relative to said cabinet member for changing the distance between said door member and the front cabinet wall whereby to align said members with one another and to vary the compressive force applied to said gasket therebetween.

6. The combination defined by claim 4 wherein the hinge pins are on the bars and fit in non-metallic socket elements carried by the door member having an enlarged portion disposed between the door and the bars forming a bearing therebetween.

7. In a refrigerator, a cabinet having insulated walls defining a food storage chamber therein provided with an access opening in the front wall of said cabinet normally closed by an insulated door, a resilient gasket on and extending around said door adapted to engage the front wall of said cabinet about said chamber access opening for sealing the chamber thereat in air-tight fashion, means pivotally mounting said door on said cabinet, said means comprising a first bar disposed in and substantially closing an elongated aperture provided in the front wall of said cabinet spaced from and located above the chamber access opening therein and a second bar disposed in and substantially closing an elongated aperture provided in said cabinet front wall in spaced relation to and located below said chamber access opening, each of said bars being attached to said cabinet inwardly of its said front wall, the upper bar projecting forwardly of said cabinet front wall continuously across the top peripheral edge of said door and the lower bar projecting forwardly of said cabinet front wall continuously across the bottom peripheral edge of said door, one side of said door having a hinge pin connection to one end portion of each of said bars for swinging the door between the bars into abutment with said cabinet, latching means on the side of said door opposite said hinge pin connections including a spring pressed button protruding from each of the top and bottom peripheral edges of said door and a button keeper adjacent the other end portion of each of said bars, and the attachment of said bars to said cabinet inwardly of its front wall being adjustable from exteriorly of the cabinet independently of one another for shifting the bars into and outwardly from said cabinet front wall for changing the distance between said door and the front wall of said cabinet whereby to align them with one another and to vary the compressive force applied to said gasket when the door is closed

against and latched to the cabinet by said latching means.

8. The combination defined by claim 6 wherein the hinge pins are on the bars fitting in non-metallic socket elements carried by the door and having an enlarged portion disposed between the bars and door providing a bearing therebetween.

9. In a refrigerator, a cabinet member having insulated walls defining a food storage chamber therein provided with an access opening in the front wall of the cabinet and a door member therefor, a resilient gasket on one of said members around said chamber opening adapted to be engaged by the other of said members for sealing the opening in air-tight fashion, means for pivotally mounting said door member on said cabinet member and for latching the door to the cabinet to compress said gasket therebetween, said means comprising a first bar and a second bar adjacent said chamber access opening and extending continuously across opposed peripheral edges of said door, said bars being attached at each of their ends to said cabinet inwardly of walls thereof and projecting outwardly beyond the front thereof, one side of said door having a hinge connection to an end portion of each of said bars for swinging the door between the bars against said cabinet, said means also comprising a pair of latches on the side of said door opposite said hinge pin connections each including a latch part on said opposed edges of the door and another latch part adjacent the other end portion of each of said bars and the attachment of said ends of said bars inwardly of walls of said cabinet being adjustable from exteriorly thereof independently of one another for shifting the bars relative to said cabinet front whereby to align said door member therewith and to vary the compressive force applied to said gasket.

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