April 13, 1937. G. H. YOUNG 2,076,835

REFRIGERATOR

Filed Dec. 5, 1934 2 Sheets-Sheet 1

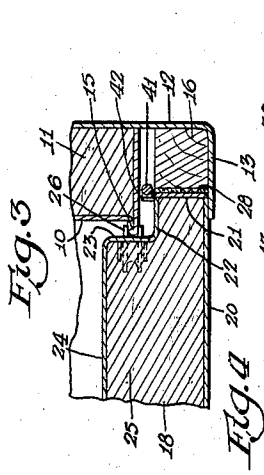

Fig. 3

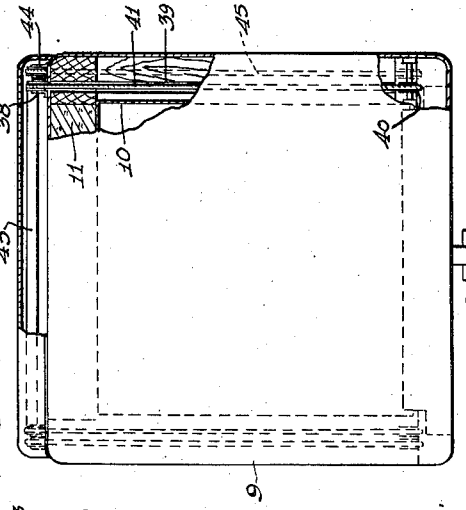

Fig. 4

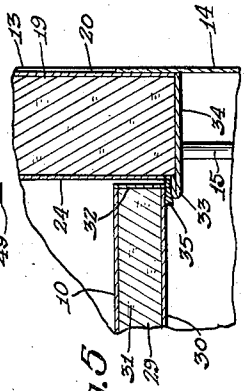

Fig. 5

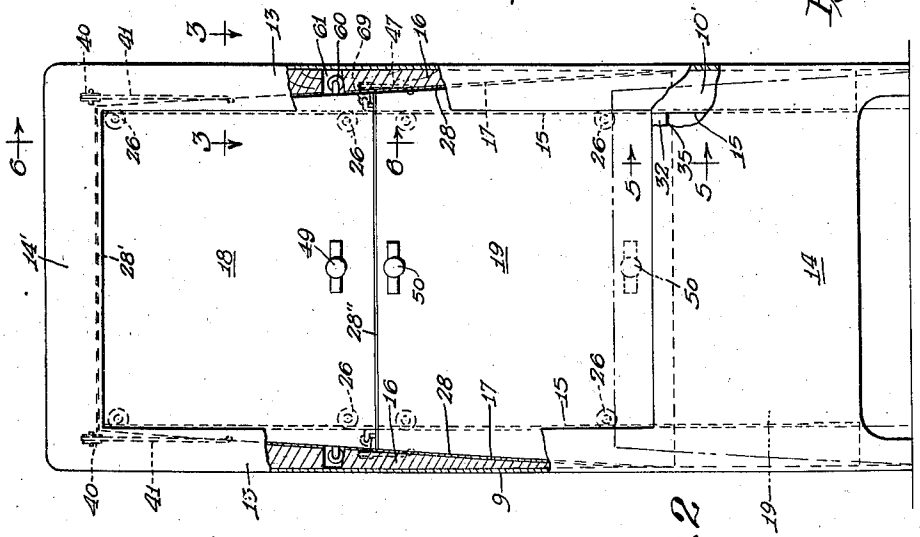

Fig. 2

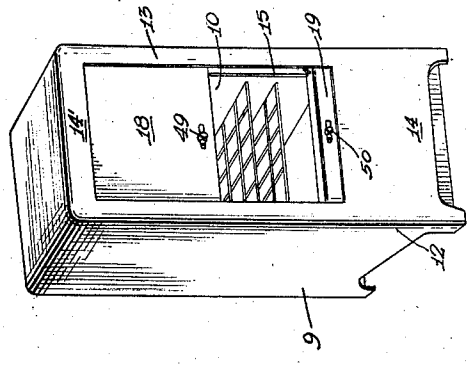

Fig. 1

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Fig. 6

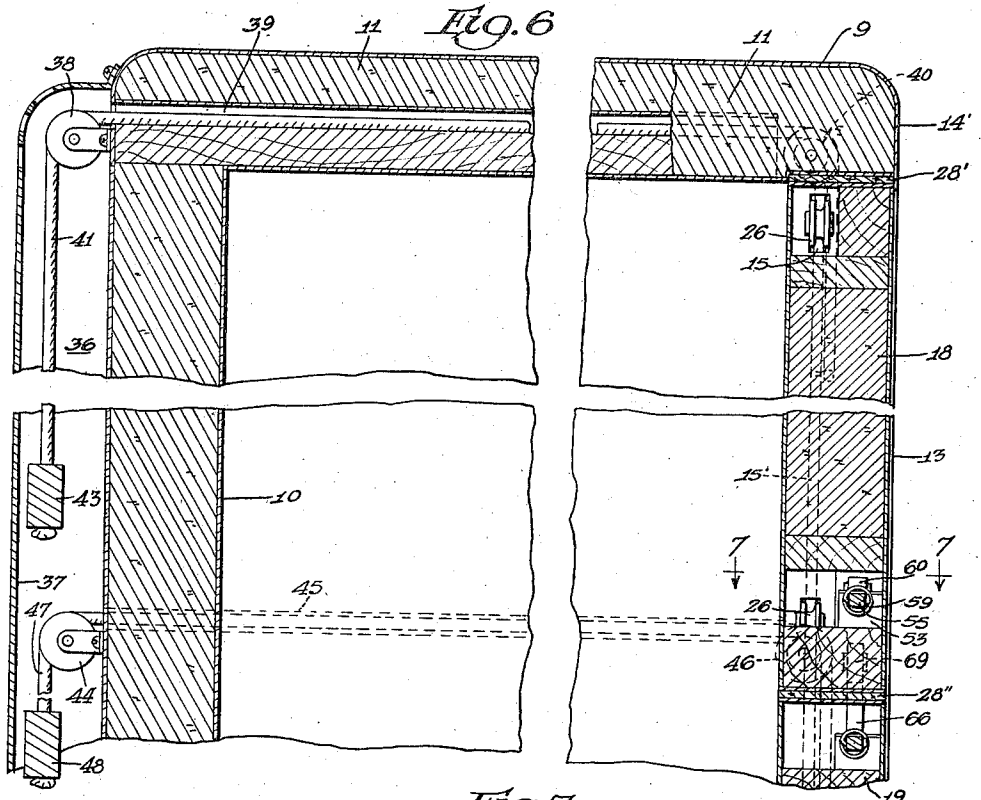


Fig. 7

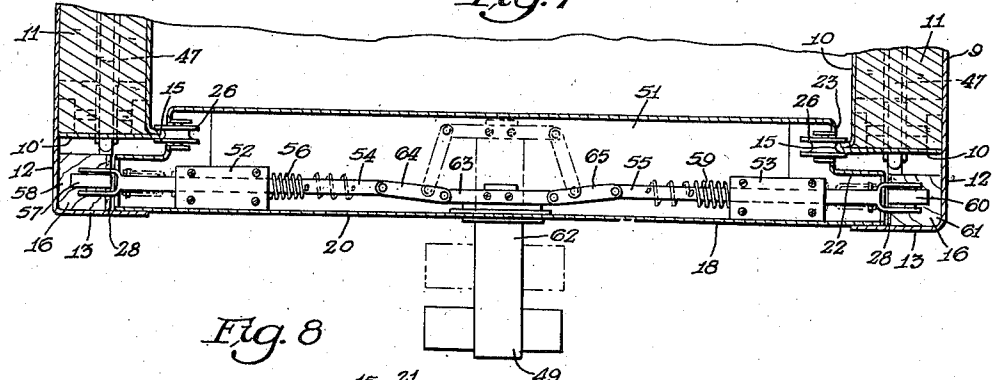
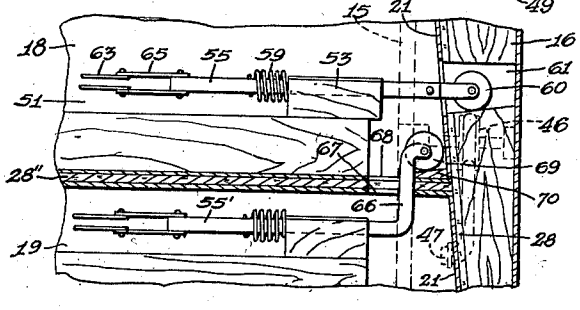


Fig. 8



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UNITED STATES PATENT OFFICE

2,076,835

REFRIGERATOR

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Application December 5, 1934, Serial No. 756,009

7 Claims. (Cl. 312—189)

This invention relates to refrigerators and more particularly to doors therefor.

It has been the custom heretofore to hingedly connect the doors of a refrigerator thereto at either the right or left hand side thereof to permit the doors to be swung to and from closed position in a direction which would afford easiest access to the storage compartments in each particular installation. Because of this, the merchandisers of refrigerators have been required to carry what has amounted to practically a double inventory so as to always be ready to furnish a refrigerator suitable for the installation. Moreover, circumstances have been encountered in which a refrigerator equipped with hinged doors could not be used because there was not sufficient room to permit the doors to be swung to and from closed position.

Hence, the primary object of my invention is to equip a refrigerator with doors that can be moved to and from closed position within the confines of the refrigerator whereby hinged mounting of the doors at the right or left hand side of the refrigerator may be avoided and the refrigerator may be used in those places whereat there is not sufficient room to enable a door to be swung to and from closed position.

Other objects of the invention are to move the doors of a refrigerator vertically to and from closed position; to mount the doors for conjoint or individual movement; to counterbalance the doors to facilitate movement thereof; to firmly secure the doors in closed position and to secure one door by engagement of the securing parts with the refrigerator and to secure the other door or doors one to the other; to seal the edges of the doors against leakage and to prevent sweating thereabout; and to provide a refrigerator door arrangement of simple and economical construction and expeditious and positive operation.

A selected embodiment of my invention is illustrated in the accompanying drawings wherein

Fig. 1 is a perspective view showing a refrigerator constructed in accordance with my invention and wherein one of the doors is in open position disclosing the food compartment;

Fig. 2 is a front elevation and in which certain parts are broken away;

Fig. 3 is a horizontal sectional detail view taken substantially on the line 3—3 on Fig. 2;

Fig. 4 is a top plan view in which certain parts are broken away;

Fig. 5 is a vertical section detail view taken substantially on the line 5—5 on Fig. 2;

Fig. 6 is a vertical sectional view taken substantially on the line 6—6 on Fig. 2;

Fig. 7 is a horizontal sectional detail view showing the latching mechanism and taken substantially on the line 7—7 on Fig. 6; and

Fig. 8 is a fragmentary vertical section detail view showing parts of the locking device illustrated at the right hand end of Fig. 7.

In the embodiment of my invention shown in the accompanying drawings, 9 generally indicates the housing of my refrigerator, preferably made of metal and suitably finished on the outer surface thereof, as by enameling or the like, to enhance the appearance thereof. The refrigerator also has a metallic lining 10 spaced from the housing 9 and suitably finished on the inner surface thereof to enhance the appearance thereof, expedite cleaning, and enable a sanitary condition to be maintained in the storage compartment of the refrigerator. The bottom wall of the lining is spaced above the bottom of the refrigerator whereby a chamber is defined in the refrigerator below the bottom of the lining. The space between the housing 9 and the sides, back and top of the lining 10 is preferably filled with suitable insulating material such as corkboard or the like. The space enclosed by the lining 10 is open at the front and is preferably divided into refrigerating and food compartments, access to which is had through the open front, and my invention particularly relates to doors for closing the open front of the refrigerator. In the illustrated form of the invention the refrigerating compartment is positioned above the food compartment. It is to be understood that the construction of the refrigerator thus far described is only illustrative, for my invention is not limited to use with this particular type of refrigerator.

As best shown in Fig. 7 the side walls of the housing 9 include forwardly extending parts 12 which terminate in flanges 13 that provide the front wall of my refrigerator, a panel 14, unitary with the flanges 13, being provided between the flanges on that part of the front wall below the bottom of the food compartment in the refrigerator. A panel 14', unitary with flanges 13, is provided between the upper parts of these flanges 13 above the top of the refrigerating compartment.

The insulation 11 between the side walls of the housing 9 and the lining 10 terminates inwardly of the flanges 13 and panels 10' (Fig. 7)

extend across the front ends of the insulation 11 between the side walls and the lining and these panels 10' are thus spaced from the flanges 13. The panels 10' are unitary with the lining 10 and at the juncture of the lining and these panels, the lining is folded upon itself to provide tracks 15 that extend toward each other at opposite sides of the open front of the space confined by the lining 10. These tracks extend vertically throughout the height of the lining 10 and tracks 15' on the frame of the refrigerator are aligned with the tracks 15 and extend to the bottom of the refrigerator. The tracks 15 and 15' guide the doors to which my invention appertains in their movement to and from closed position.

Posts 16 are provided in the space between the panels 10' and the flanges 13 and are located at the corners defined between the parts 12 and the flanges 13. These posts, as best illustrated in Fig. 2, are of a length equal to the height of the lining 10 and provide jambs for the door. The sides 17 of the posts 16, which face toward each other, are tapered outwardly and downwardly so that they are spaced apart the greatest amount at the lower ends thereof.

The doors 18 and 19 are mounted between the jambs afforded by the tapered faces 17 of the posts 16 and are adapted to move vertically to and from closing position. The door 18 closes the refrigerating compartment while the door 19 closes the food compartment. Each of these doors includes a front wall 20 that is similar to the housing 9 in finish and material. The doors also include side walls 21 (Fig. 3) which are tapered complementary to the faces 17 and which are of a depth equal to the depth of the posts 16. Right angularly extending flanges 22 and 23 (Fig. 3) interconnect the side walls 21 with the linings 24 of the doors which linings correspond in finish and material to the lining 10. The flanges 23, as best shown in Fig. 3, extend inwardly of the tracks 15 but are spaced therefrom. Insulation 25 is provided between the front wall 20, the lining 24, the flanges 22 and 23, and the side walls 21 of each of the doors and this insulation is similar to the insulation 11.

Wheels 26 are provided near each corner of each door and these wheels are peripherally grooved to receive and ride on the tracks 15 and 15'. The insulation 25 is cut away in each of the doors at the places whereat the wheels 26 are to be mounted and lugs formed on the flanges 23 provide bearings to receive the axles of the wheels 26 as is illustrated in Fig. 7.

Strip gaskets 28 of cork, rubber or the like are mounted on the faces 17 and when the doors are in closing position the side walls 21 thereof engage these gaskets to prevent leakage past the doors and also to prevent sweating and other undesirable conditions. A similar gasket 28' is provided between the top wall of the door 18 and the face of the door jamb at the top of the door as illustrated in Fig. 6. Likewise a gasket 28'' is provided between the bottom of the door 18 and the top of the door 19 for these parts of the doors engage when the doors are in closing position shown in Fig. 2.

As best shown in Fig. 5 the door 19 extends slightly below the bottom wall 29 of the food compartment. The top of this bottom wall is provided by the lining 10 and the bottom thereof is provided by a plate 30, insulation 31 being provided between the lining 10 and the plate 30. The front wall 32 of the bottom wall 29 is spaced from the lining 24 of the door 19. A lip 33 is provided at the juncture of the lining 24 of the door 19 with the bottom wall 34 of this door and this lip extends below the lower wall 29. A gasket 35 is provided at the front end of the plate 30 and when the door 19 is in closing position the lip 33 engages this gasket and seals the lower edge of the door 19.

Since the doors 18 and 19 move vertically to and from closing position it is advantageous to counterbalance these doors and while such counterbalancing may be effected in a number of ways, I have found the use of counterbalancing weights to be desirable, and such weights may be conveniently mounted at the back of the refrigerator. A weight chamber 36 (Fig. 6) is provided at the back of the refrigerator and is defined between the rear wall of the refrigerator and a plate 37 which has an inwardly extending flange at the upper end thereof that is suitably secured to the refrigerator.

Peripherally grooved rollers 38 are provided at the top of the compartment 36. Passages 39 are provided through the insulation 11 at the top and at each side of the refrigerator. Rollers 40 are provided in a recess in the insulation at the top of the space between the panels 10' and the flanges 13. Cords 41 have corresponding ends thereof connected to lugs such as 42 (Fig. 3) on the flanges 22 of the door 18 and these cords pass about the rollers 40, through the passages 39 and about the rollers 38 and the opposite ends thereof are secured to a counterbalancing weight 43 in the compartment 36.

Rollers 44 similar to the rollers 38 are mounted in the chamber 36 slightly above the plane of the bottom of the door 18 when it is in closing position. Passages 45 extend through the insulation 11 in the side walls of the refrigerator in alignment with the tops of the rollers 44. The insulation at the forward ends of the passages 45 is cut away so that the rollers 46 may be mounted at this position. Corresponding ends of cords 47 are secured to lugs on the door 19, similar to the lugs 42 on the door 18, and these cords pass about the rollers 46 through the passages 45 and about the rollers 44 and the opposite ends thereof are secured to a counterbalancing weight 48 in the compartment 36.

The weight 43 is sized to counterbalance the door 18 and the weight 48 is sized to counterbalance the door 19 and therefor these doors will freely move to and from closing position or they may be retained in positions intermediate the open and closed positions thereof because of the counterbalancing thereof.

It has been explained that the door 18 closes the refrigerating compartment and that the door 19 closes the food compartment and also that these doors move vertically. When both of these doors are in their uppermost positions in the vertical movement thereof, they are in compartment closing position. Hence when it is desired to have access to the food compartment the door 19 is lowered into the position shown in Fig. 1. However, when it is desired to have access to the refrigerating compartment, it is necessary to move both of the doors and when this is done the door 19 moves into position shown in Fig. 1 and the door 18 moves into a position such that it closes the food compartment. In order to attain such movement of the doors it is necessary that the door 19 be capable of movement independently of the door 18 and also that the doors 18 and 19 be

capable of conjoint movement. I therefore latch the door 19 to the door 18 and I latch the door 18 to the refrigerator. Then when the door 19 is unlatched from the door 18 it is capable of its required independent movement, but when the door 19 is latched to the door 18 and the door 18 is unlatched from the refrigerator, the doors are capable of the conjoint movement described.

One form of latching means suitable for such operation is illustrated in the accompanying drawings and while this latching means attains a desired end it is to be understood that other forms may be used without departing from the purview of my invention. The operating parts of the latch mechanisms provided in both of the doors 18 and 19 in the illustrated forms are similar. The latch mechanism in the door 18 is controlled by a handle 49 while the latch mechanism for the door 19 is controlled by a handle 50. These latch mechanisms are operated by pressing these handles inwardly as by moving the handle 49 from the full line position in Fig. 7 into the dotted line position thereof.

The operating mechanisms for the latch provided in the door 18 are shown in Fig. 7. The insulation in the door 18 is cut away near the lower end thereof to provide a chamber 51. Bearings 52 and 53 are provided in this chamber at opposite ends thereof and plungers 54 and 55 are respectively mounted in these bearings for reciprocal movement. A spring 56 is provided about the plunger 54 and normally urges this plunger outwardly to seat the roller 57 at the free end of the plunger in the pocket 58 (Fig. 2) formed in the post 16 at the left hand side of the refrigerator as viewed in Fig. 2. A spring 59 acts on the plunger 55 to force it outwardly to seat the roller 60 at the free end of this plunger in the pocket 61 in the post 16 at the right hand side of the refrigerator as viewed in Fig. 2. The handle 49 includes a plunger 62 mounted for reciprocal movement in the front wall of the door 18. An arm 63 is fast on the plunger 62 in the chamber 51. A link 64 is pivotally connected to the arm 63 and the inner end of the plunger 54. A link 65 is pivotally connected to the arm 63 and the inner end of the plunger 55. The springs 56 and 59 normally act to urge rollers 57 and 60 into the pockets 58 and 61 respectively to thereby latch the door 18 in its uppermost and compartment closing position and in so doing these springs effect substantial alignment of the links 64 and 65 with the arm 63. However, when the handle 49 is forced inwardly the links 64 and 65 move into angular relation with the arm 63, as shown in Fig. 7, and retract the plungers 54 and 55 so that the rollers 57 and 60 are retracted from the pockets 58 and 61 whereupon the door 18 may move relative to the jamb therefor.

A similar operating arrangement under the control of the handle 50 is provided at the top of the door 19 but, as shown in Fig. 8, the plunger 55' thereof includes an upwardly extending part 66 which projects through aligned openings 67 and 68 respectively provided in the top of the door 19 and the bottom of the door 18. The roller 69 is mounted at the top of part 66 and is engageable with a block 70 at the bottom of the compartment 51. The arrangement just described is provided in the door 19 at the right side of the refrigerator as viewed in Fig. 2 and a similar arrangement is provided at the left hand side of this door. It will thus be seen that the latching rollers controlled by the handle 50 latch into the door 18. Thus, when the door 18 is unlatched in the manner previously described, the door 19 will remain latched thereto unless the handle 50 is manipulated to unlatch the door 19 from the door 18 for the springs which act on the roller carrying plungers normally hold the rollers in latching position. Of course, if the door 18 is not unlatched, the door 19 may nevertheless be unlatched therefrom so that it can be lowered into its open position shown in Fig. 1.

If the lining 10 was divided into three or more compartments an additional door or doors could be provided below the door 19 and the first additional door would latch to the door 19 as the door 19 latches to the door 18, for each door, except the top door, latches to the one above it and the top door latches to the refrigerator. Thus access can be had to any compartment merely by releasing the latch which retains the door for that compartment in position.

In the movement of the doors to and from closed position, the wheels 26 travel on the tracks 15 and 15' and prevent undesirable side sway of the doors. Furthermore, as soon as one of the doors moves from its closed position, the side walls 21 thereof disengage the gaskets on the faces 17 and the space between these side walls and the faces increases as the doors move further away from their closed positions. For this reason it is essential that the doors be latched when in closed position for such latching tightly engages the side walls of the doors with the gaskets on the faces 17 and prevents leakage, such latching also tightly engaging the horizonal parts on the doors with the gaskets therefor to prevent leakage.

As explained, when the doors 18 and 19 move together, the door 18 tends to move into the position occupied by the door 19 when this door is in closing position. And since the doors are mounted inwardly of the flanges 13, the door 19 moves behind the panel 14 when it moves from closed position as is shown in Fig. 1.

From the foregoing description it will be apparent that I have provided a refrigerator wherein the doors move vertically to and from closing position and therefore a dealer need not carry a double inventory such as is required when refrigerators are equipped with swinging doors mounted at the right or left hand sides of the refrigerator. Moreover, since the doors move to and from closing position within the confines of the refrigerator, it is possible to use this refrigerator at those places whereat it is not possible to swing a hinged door. Furthermore, the doors are effectively latched in closing position and by providing tapered side walls on the doors adapted to cooperate with tapered jambs, I attain tight seating of the doors and I thereby prevent leakage, sweating and the like.

In the foregoing description I have described a selected embodiment of my invention but it is to be understood that this is capable of variation and modification and I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alterations as fall within the ambit of the following claims:

I claim:

1. In a refrigerator having refrigerating and food compartments therein, one above the other, each of said compartments having an open side, jambs along the side edges of the open sides of said compartments, vertically moveable doors and

said jambs each adapted when in closing position to close the open side of one of said compartments, tracks on said jambs, means on said doors engageable in said tracks to guide said doors in the vertical movement thereof, said jambs including tapered portions, and tapered portions on said doors adapted to engage the tapered portions on said jambs when the doors are in closing position to effectively seal the open sides of said compartments against leakage.

2. In a refrigerator having refrigerating and food compartments therein, one above the other, each of said compartments having an open side, jambs along the side edges of the open sides of said compartments, vertically moveable doors and said jambs each adapted when in closing position to close the open side of one of said compartments, tracks on said jambs, means on said doors engageable in said tracks to guide said doors in the vertical movement thereof, said jambs including tapered portions, tapered portions on said doors adapted to engage the tapered portions on said jambs when the doors are in closing position to effectively seal the open sides of said compartments against leakage, and releaseable means for latching said doors in closing position to retain the tapered portions on said doors in engagement with the tapered portions on said jambs.

3. In a refrigerator including a lining having an open side at one side of the refrigerator and enclosing an area adapted to be refrigerated and wherein the bottom of the lining is spaced above the bottom of the refrigerator to provide a compartment in the refrigerator below the bottom of the lining, a pair of vertically moveable doors for closing the open side of said lining, vertically extending tracks in said refrigerator, means on said doors and engageable with said tracks to guide said doors in their vertical movement, said refrigerator having a panel on the side thereof whereat the open side of said lining is disposed for closing said compartment, said panel being spaced forwardly of the front of said lining in an amount sufficient to permit the lowermost of said doors to move therebehind when the lowermost door is lowered to afford access into said refrigerated area, and means for latching said doors in position to close the open side of said lining to thereby close off access to said refrigerated area.

4. In a refrigerator having refrigerating and food compartments therein, one above the other, each of said compartments having an open side, jambs along the side edges of the open sides of said compartments, vertically moveable doors and said jambs each adapted when in closing position to close the open side of one of said compartments, tracks on said jambs, means on said doors engageable in said tracks to guide said doors in the vertical movement thereof, said jambs including tapered portions, tapered portions on said doors adapted to engage the tapered portions on said jambs when the doors are in closing position to effectively seal the open sides of said compartments against leakage, means for releasably latching one of said doors to the refrigerator when said door is in closing position, and means for latching the other of said doors to said one door when said other door is in closing position, said latching means releasably retaining the tapered portions on said doors in engagement with the tapered portions on said jambs, the release of the latching means for said one door without release of the latching means for said other door permitting conjoint movement of said doors, the release of the latching means for said other door without release of the latching means for said one door permitting said other door to be moved relative to said one door.

5. In a refrigerator including a lining having an open side at one side of said refrigerator and enclosing an area adapted to be refrigerated, jambs on the side of said refrigerator into which said lining opens and positioned outwardly of said lining at opposite sides of the open side of said lining, a pair of vertically moveable doors mounted between said jambs and adapted to close the open side of said lining, said doors having tapered sides, said jambs being tapered complementary to said tapered sides whereby the tapered sides of said doors may engage therewith when the doors are in closed position, vertical tracks in said refrigerator, and means on said doors engaged with said tracks and adapted to move therealong to guide said doors in the movement thereof to and from closed position.

6. In a refrigerator including a lining having an open side at one side of said refrigerator and enclosing an area adapted to be refrigerated, jambs on the side of said refrigerator into which said lining opens and positioned outwardly of said lining at opposite sides of the open side of said lining, a pair of vertically moveable doors mounted between said jambs and adapted to close the open side of said lining, said doors having tapered sides, said jambs being tapered complementary to said tapered sides whereby the tapered sides of said doors may engage therewith when the doors are in closed position, said lining having vertically extending tracks formed thereon, tracks in said refrigerator in vertical alignment with the tracks on said lining, and rollers on said doors engaged with said tracks and moveable therealong to guide said doors in the vertical movement thereof to and from closed position.

7. In a refrigerator having refrigerating and food compartments therein arranged one above the other and opening through one wall of said refrigerator, doors for closing the open sides of said compartments and having tapered side walls, jambs at the side of said doors and having the faces thereof tapered complementary to the sides of said doors whereby said doors tightly engage said jambs when in compartment closing position to prevent leakage thereby, means providing vertical tracks, and rollers on said doors and engaged with said tracks to guide said doors to and from compartment closing position.

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