

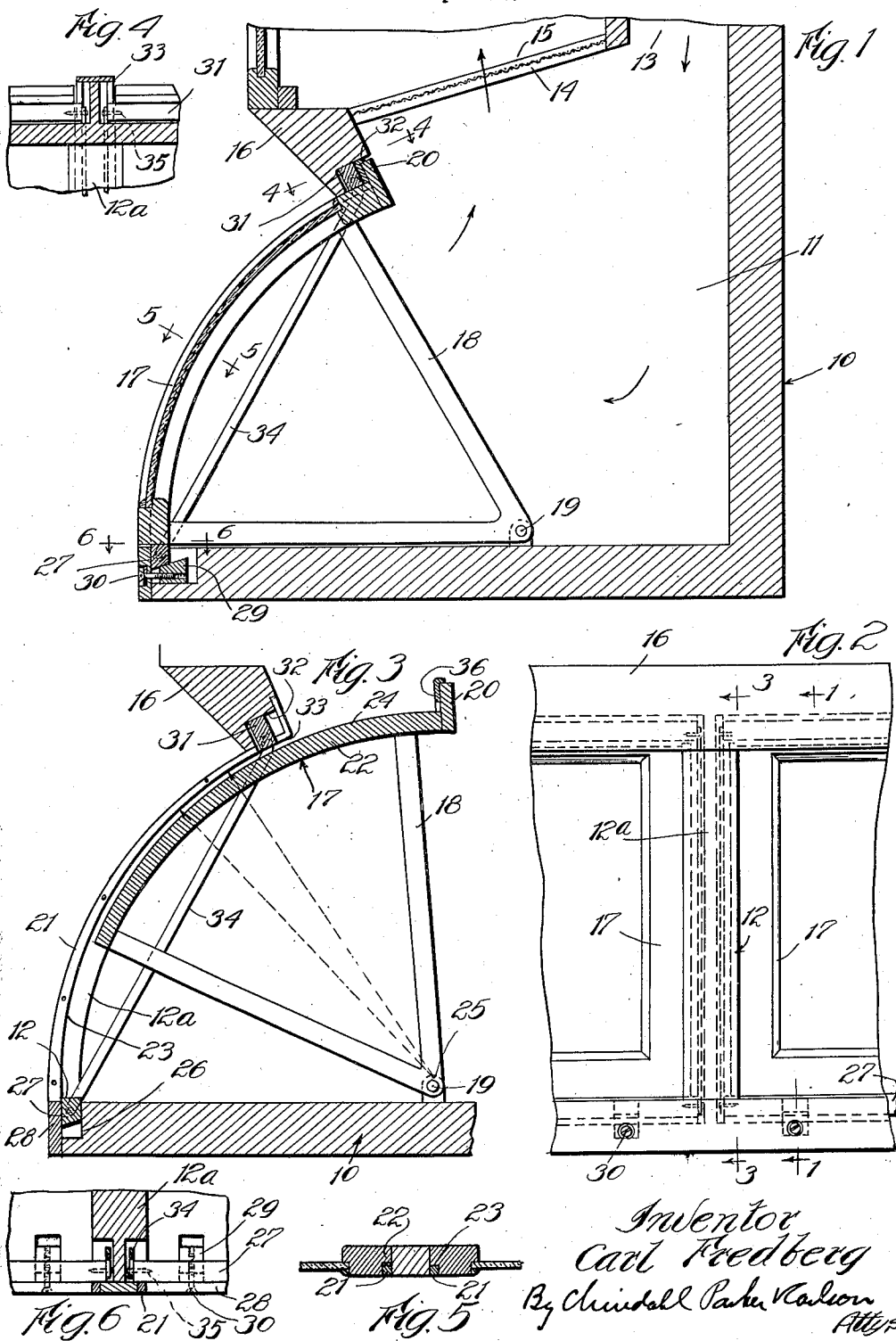
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CLOSURE CONSTRUCTION FOR REFRIGERATORS AND THE LIKE

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CLOSURE CONSTRUCTION FOR REFRIGERATORS AND THE LIKE

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In many types of refrigerators and other similar housings wherein a temperature is maintained which differs from the temperature surrounding the housing, it is the common practice to use doors which are movable transversely across the door openings, either a sliding or pivoted mounting being provided for the doors.

It has been found that doors of this character, in order to be conveniently movable, must be so loosely mounted that the temperature within the housing is modified considerably by air passing into the housing about the sides of the doors. This condition is aggravated by the expansion and contraction of the doors and the housing which causes sticking of the doors and renders permanent adjustment of the door mountings practically impossible.

The primary object of the present invention is to provide a new and improved door construction of this character for refrigerators and the like, arranged to provide an exceptionally tight joint about the door when closed and to permit free movement of the door as it is moved between open and closed positions.

Another object is to provide such a door construction capable of being readily adjusted to compensate for expansion or contraction of the door or door frame.

Another object is to provide such a door construction having a wedging relation between the door and door frame when the door is in closed position and embodying means whereby the contact between the door and door frame on all four sides thereof may be adjusted so as to insure against passage of air therebetween.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawings, in which:

Figure 1 is a fragmentary vertical sectional view taken through a refrigerator embodying the invention in its preferred form, the section being taken along the line 1—1 of Fig. 2.

Fig. 2 is a fragmental front elevational view of the refrigerator shown in Fig. 1.

Fig. 3 is a fragmentary vertical sectional view similar to Fig. 1 taken along the line 3—3 of Fig. 2 to illustrate the wedging means along the side edges of the doors.

Fig. 4 is a fragmental sectional view taken along the line 4—4 of Fig. 1.

Fig. 5 is a fragmental sectional view taken along the line 5—5 of Fig. 1 showing one of the doors in partially open position.

Fig. 6 is a fragmentary sectional view taken along the line 6—6 of Fig. 1.

For purposes of disclosure the preferred form of the invention is illustrated in the drawings and will hereinafter be described in detail as applied to a refrigerator of a particular form, but it is to be understood that this disclosure is not intended as a limitation of the invention to refrigerators, it being contemplated that various changes might be made by those skilled in the art to adapt the various features of the invention to doors used for other purposes without departing from the spirit and scope of the invention as defined by the appended claims.

In the drawings the invention is illustrated as embodied in a refrigerator having insulated walls designated generally as 10 defining a display compartment 11 having a plurality of openings 12 in its forward side wall separated by post 12^a. The compartment 11 may be cooled by any preferred means (not shown) supplying a current of cooled air through a passage 13, and the air thus supplied circulates through the compartment and passes out of the compartment through screened openings 14 in a wall 15 which forms the top of the compartment.

The compartment 11 in the form herein shown is adapted to be positioned below the height of an ordinary observer's eye so that goods within the compartment will ordinarily be viewed along a downwardly inclined line of vision. In order that goods within the compartment 11 may be clearly visible along such a line of vision the upper edges of the openings 12, which are formed by a horizontal header 16, are disposed a substantial distance rearwardly of the low-

er edges of the openings 12, and a plurality of transparent doors 17 which serve to close the openings are mounted so as to slope upwardly and rearwardly when in their closed positions. By this arrangement, undesirable reflection of light rays from the doors is avoided.

The doors 17 are supported and guided for movement transversely across the opening 12 from the closed position shown in Fig. 1 to an open position within the compartment. In the present case the doors 17 are arcuate in form as shown in Figs. 1 and 3, the arc being centered on a horizontal axis within the compartment.

The supporting and guiding means comprises a pair of brackets 18 for each door 17, pivoted on a horizontal axis 19 on the lower wall 10 of the compartment 11. Thus the upper and lower edges of the doors 17 are perpendicular to the path of movement of the doors and when the doors are in closed position, the lower edges thereof rest along the lower edges of the openings 12 so as to prevent passage of air into or out of the compartment, the upper edge being sealed by a lip 20 projecting upwardly and forwardly along the upper edge of each door 17 so as to abut the upper edge of the opening 12.

The other two edges of the doors 17 which are disposed parallel to the path of movement of the doors are also arranged so as to be tightly sealed when the doors are closed and the means employed to attain this result is preferably of such a nature that the doors are freely movable as soon as they have been displaced a slight distance from their closed positions. To this end complementary opposed wedging surfaces are provided on the adjacent door edges and the edges of the openings, the surfaces being disposed at an angle to the path of movement of the door so that the opposed surfaces are brought into wedging relation by the last portion of the closing movement of the doors. Thus in the present instance an arcuate strip 21 is secured to the side of the post 12^a adjacent to the side edges of each door (Figs. 3 and 5) in overlapping relation to a flange 22 projecting from the side edge of the door 17 so that an inwardly facing arcuate surface 23 on the strip 21 is in opposing relation to an outwardly facing arcuate surface 24 on the flange 22.

In order that the surfaces 23 and 24 may be brought into wedging relation at the end of the closing movement of the doors 17, the fixed surface 23 is centered about an axis 25 (Fig. 3) parallel to the axis 19 about which the doors swing but positioned a slight distance above that axis. The surface 24 on the door is formed on a similar arc so that it will abut the surface 23 when the door 17 is in substantially closed position.

Thus in Fig. 3 it will be seen that that distance from the axis 19 to the surface 23 becomes gradually greater from the bottom of the opening to the top and that as the door 17 is moved toward closed position, the distance between the surface 23 and a given point in the surface 24 will become gradually less until movement of the door is stopped by the wedging abutment of the surfaces 23 and 24. This arrangement of wedging surfaces insures proper sealing along the sides of the doors so that sufficient clearance may be provided between the doors and the sides of the opening to insure easy operation of the doors.

Thus the two edges of the doors 17 which are parallel to the path of movement of the doors are effectively sealed against the passage of air while the doors are in closed position and yet the doors are freely movable as soon as they have been raised a short distance from their closed position.

In refrigerators and other devices of a similar character, the expansion and contraction of the various parts due to various causes is quite marked, and it is of course desirable that the sides of the doors be effectively sealed under all conditions. Provision is therefore made for adjustment of the relation of the wedging surfaces 23 and 24 and in the form herein shown, the adjustment is obtained by changing the closed position of the doors 17. To this end the upper forward corner of the bottom wall 10 is recessed as at 26 to receive a horizontal bar 27 which is held in position against the rear face of the recess 26 by a strip 28 fixed on the wall 10 against the outer side of the bar 27. The bar 27 lies in the path of the lower edge of the door 17 as it moves toward its closed position and thus forms an abutment which determines the closed position of the door.

To provide for adjustment of the closed position of the door, the bar 27 may be adjusted vertically substantially along the path of movement of the door by means of a plurality of wedges 29 positioned beneath the bar and movable transversely thereof by screws 30 engaging the wedges and secured against longitudinal displacement in the strip 28. When the dimensions of the door and door frame have been changed so that the surfaces 23 and 24 no longer come into firm wedging relation when the door 17 is closed, the bar 27 may be lowered until the desired wedging relation is obtained. In case the doors tend to stick in closed position due to too great a wedging action between the surfaces 23 and 24, the bar 27 may be raised until the proper wedging is obtained without a tendency of the door to stick.

When the closed position of the door 17 is altered by adjustment of the bar 27, the

relation of the lip 20 to the upper edge of the door opening 12 is correspondingly changed and to insure proper sealing along the upper edge of the door at all times, an adjustable abutment in the form of a bar 31 is mounted on the header 16 in the path of the lip 20. A surface 32 on the header 16 and a cleat 33 secured to the header in spaced relation to the surface 32 engage each end of the bar 31 so as to support and guide the bar for adjusting movement substantially along the path of movement of the door 17. Thus when the lower bar 27 has been raised or lowered to alter the closed position of the door 17, the upper bar 31 may be adjusted a corresponding distance along the path of the door so as to insure a proper air-tight seal along all four edges of the door.

In the preferred form of the invention this adjustment of the upper bar 31 is obtained automatically as an incident to the adjustment of the bar 27, this result being attained by interconnecting the two bars. The connection between the bars 27 and 31 preferably comprises a pair of rods 34 positioned at opposite ends of the bars and pivotally connected thereto by screws 35 extending through the rods 34 and into the bars 27 and 31 longitudinally thereof. Thus when the bar 27 is adjusted up or down the bar 31 will be moved substantially the same distance in a corresponding directions. To avoid leakage of air due to unequal movement of the two bars, a resilient pad 36 is secured on the side of the lip 20 so as to abut the bar 31 when the door is closed.

From the foregoing it will be apparent that the invention provides a transversely movable door for refrigerators or the like which may be easily operated and still provides an air-tight seal around all four edges when the door is closed. It will also be seen that the wedging relation of the door and door frame may be readily adjusted to compensate for expansion or contraction of all various parts.

I claim as my invention:—

1. In a refrigerator or the like having a wall with an opening therein, the combination of a door for closing said opening, means to support and guide the door for movement along a definite path transversely across said opening between open and closed positions, means on the sides of said door which are parallel to said path to provide surfaces disposed at an angle to said path, and means on said wall at the corresponding sides of the door opening arranged to provide opposing surfaces to abut said first-mentioned surfaces when the door is in closed position.

2. A refrigerator or the like having a wall with an opening therein, a door, means

to support and guide said door for movement along a definite path across said opening between open and closed positions, said door and said wall having complementary surfaces formed thereon along the sides of the door and the sides of the opening which are substantially parallel to said path, said surfaces being disposed at an angle with relation to the path of movement of the door and the surfaces on said door being arranged to move into wedging relation with the other surfaces as the door is moved to its closed position, and means lying along one of the other sides of said opening in the path of the door as it moves to its closed position to form an abutment which determines said closed position and prevents passage of air between the edge of said opening and said door, said last-mentioned means being adjustable substantially along the path of said door so that the wedging relation of said surfaces may be adjusted by changing the closed position of said door.

3. A refrigerator or the like having a wall with an opening therein, a door, means supporting and guiding said door for movement along a definite path across said opening between open and closed positions, said door and said wall having complementary surface formed thereon along the sides of the door and the sides of the opening which are substantially parallel to said path, said surfaces being disposed at an angle with relation to the path of movement of the door and the surfaces on said door being arranged to move into wedging relation with the other surfaces as the door is moved to its closed position, and means lying in the path of the door as it moves to its closed position to form an abutment which determines said closed position, said last mentioned means being adjustable substantially along the path of said door so that the wedging relation of said surfaces may be adjusted by changing the closed position of said door.

4. In a refrigerator or the like having a wall with an opening therein, the combination of a door, means supporting and guiding said door for movement along a definite path transversely of said opening between open and closed positions, wedging means along the side of the opening and the door which lie parallel to said path, said wedging means being arranged to form an air-tight seal along said side of said door when the door is in its closed position, and a pair of abutments mounted on said wall one along each of the other two sides of the opening to engage the other two sides of the door to form an air-tight seal along said other two sides when the door is in closed position, one of said abutments serving to determine the closed position of said door and means for adjusting said abutments

along said path whereby the closed position of the door may be varied to insure proper wedging action along the first mentioned sides of the door.

5 5. In a refrigerator or the like having a wall with an opening therein, the combination of a door, means supporting and guiding said door for movement along a definite path transversely of said opening between
10 open and closed positions, wedging means along the sides of the opening and the door which lie parallel to said path, said wedging means being arranged to form an air-tight seal along said side of said door when
15 the door is in its closed position, and to be moved out of such wedging relation when the door is moved from its closed position toward its open position, a pair of abutments mounted on said wall one along each
20 of the other two sides of the opening to engage the other two sides of the door to form a substantially air-tight seal therealong when the door is closed, one of said abutments serving to determine the closed position of said door, means for adjusting said
25 last mentioned abutment along said path whereby the closed position of the door may be varied to insure proper wedging action along the first mentioned two sides of said door, and means connecting said two abutments whereby adjusting movement of said last mentioned abutment is transmitted to the other abutment.

35 6. In a refrigerator or the like having a wall with an opening therein, the combination of a door, means supporting and guiding said door for movement along a definite path transversely of said opening between open and closed positions, wedging means
40 along the sides of the opening and the door which lie parallel to said path, said wedging means being arranged to form an air-tight seal along said side of said door when the door is in its closed position, and to be
45 moved out of such wedging relation when the door is moved from its closed position toward its open position, a pair of abutments mounted on said wall one along each of the other two sides of the opening to engage the other two sides of the door to form
50 a substantially air-tight seal therealong when the door is closed, one of said abutments serving to determine the closed position of said door, means for adjusting said last mentioned abutment along said path whereby the closed position of the door may be varied to insure proper wedging action along the first mentioned two sides of said door, and rigid means extending between
55 said abutments and pivotally connected thereto, said means being operable to transmit adjusting movement of one abutment to the other.

7. A refrigerator or the like having a forward wall arcuate in form centered about a

horizontal axis spaced rearwardly of said wall, said wall having an opening therein, a door for closing said opening and formed arcuately to correspond to the form of said wall, means supporting said door for movement about a horizontal axis and along an arcuate path upwardly and rearwardly across said opening from a position in which it closes said opening, complemental wedging means on the side edges of said door and said opening which lie parallel to said path, said means providing inwardly facing arcuate surfaces on said wall centered on a horizontal axis above the pivotal axis of said door, and also providing opposed outwardly facing arcuate surfaces on said door.

8. A refrigerator or the like having a wall with an opening therein, a door, means to support and guide the door for movement along a definite path transversely across said opening between open and closed positions, means on said door and said wall about the edges of said opening operable to provide a substantially air-tight seal about the edges of the door, and means for simultaneously adjusting said means on all of the edges of said door.

9. A refrigerator or the like having a wall with an opening therein, a door, means supporting and guiding said door for movement along a definite path across said opening between open and closed positions, said door and said wall having complemental surfaces formed thereon along the sides of the door and the sides of the opening which are substantially parallel to said path, said surfaces being disposed at an angle with relation to the path of movement of the door and the surfaces on said door being arranged to move into wedging relation with the other surfaces as the door is moved to its closed position, and adjusting means movable longitudinally along said path to vary the wedging relation of said means.

10. In a refrigerator or the like having a wall with an opening therein, the combination of a door for closing said opening, means to support and guide the door for movement along a definite path transversely across said opening between open and closed positions, means on the sides of said door which are parallel to said path to provide surfaces disposed at an angle to said path, means on said wall at the corresponding sides of the door opening arranged to provide opposing surfaces to abut said first-mentioned surfaces in wedging relation thereto when the door is in closed position, and means operable to vary the relation of said opposed surfaces whereby to increase or decrease the wedging action between said surfaces.

11. In a refrigerator or the like having a wall with an opening therein, a door for closing said opening, means supporting said

door for pivotal movement about a horizontal axis between open or closed positions with relation to said opening, means forming an arcuate surface on said door centered about an axis parallel to and offset a short distance laterally from said horizontal axis, and means on said wall forming an opposing arcuate surface also centered on an axis parallel to and offset laterally from said horizontal axis, said surface on said door being arranged to move into wedging relation with said surface on the wall when said door is moved to its closed position.

12. In a refrigerator or the like having a wall with an opening therein, a door for closing said opening, means supporting said door for pivotal movement about a first horizontal axis between open or closed position with relation to said opening, means forming an arcuate surface on said door centered about an axis parallel to and offset a short distance laterally from said axis, means on said wall forming an opposing arcuate surface also centered on an axis parallel to and offset laterally from said first axis, said surface on said door being arranged to move into wedging relation with said surface on the wall when said door is moved to its closed position, and means for adjusting the wedging relation of said arcuate surfaces.

In testimony whereof, I have hereunto affixed my signature.

CARL FREDBERG.