June 17, 1969 L. F. BARROERO 3,449,925

REFRIGERATOR WITH HEATED DOOR FRAME

Filed Jan. 24, 1968 Sheet 1 of 4

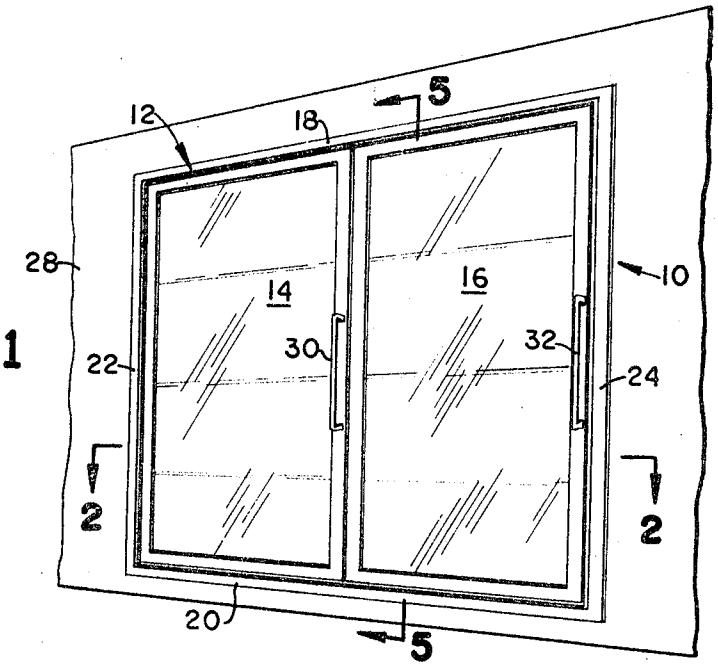


FIG_1

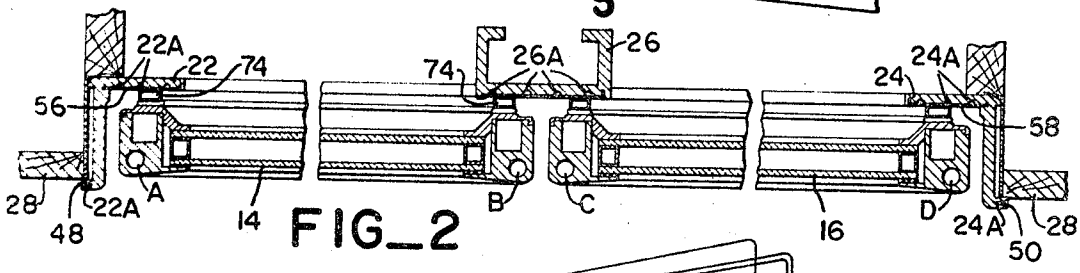


FIG_2

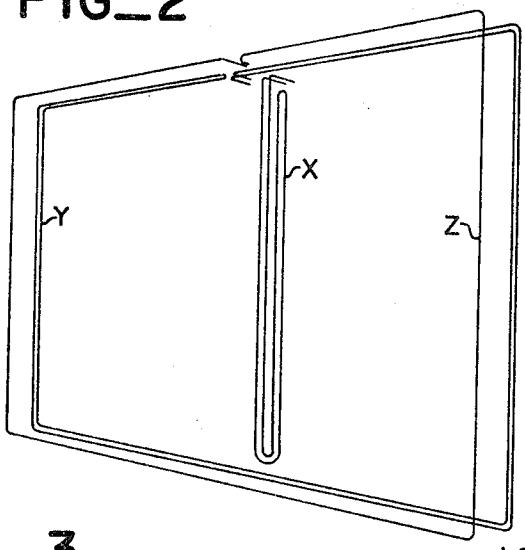


FIG_3

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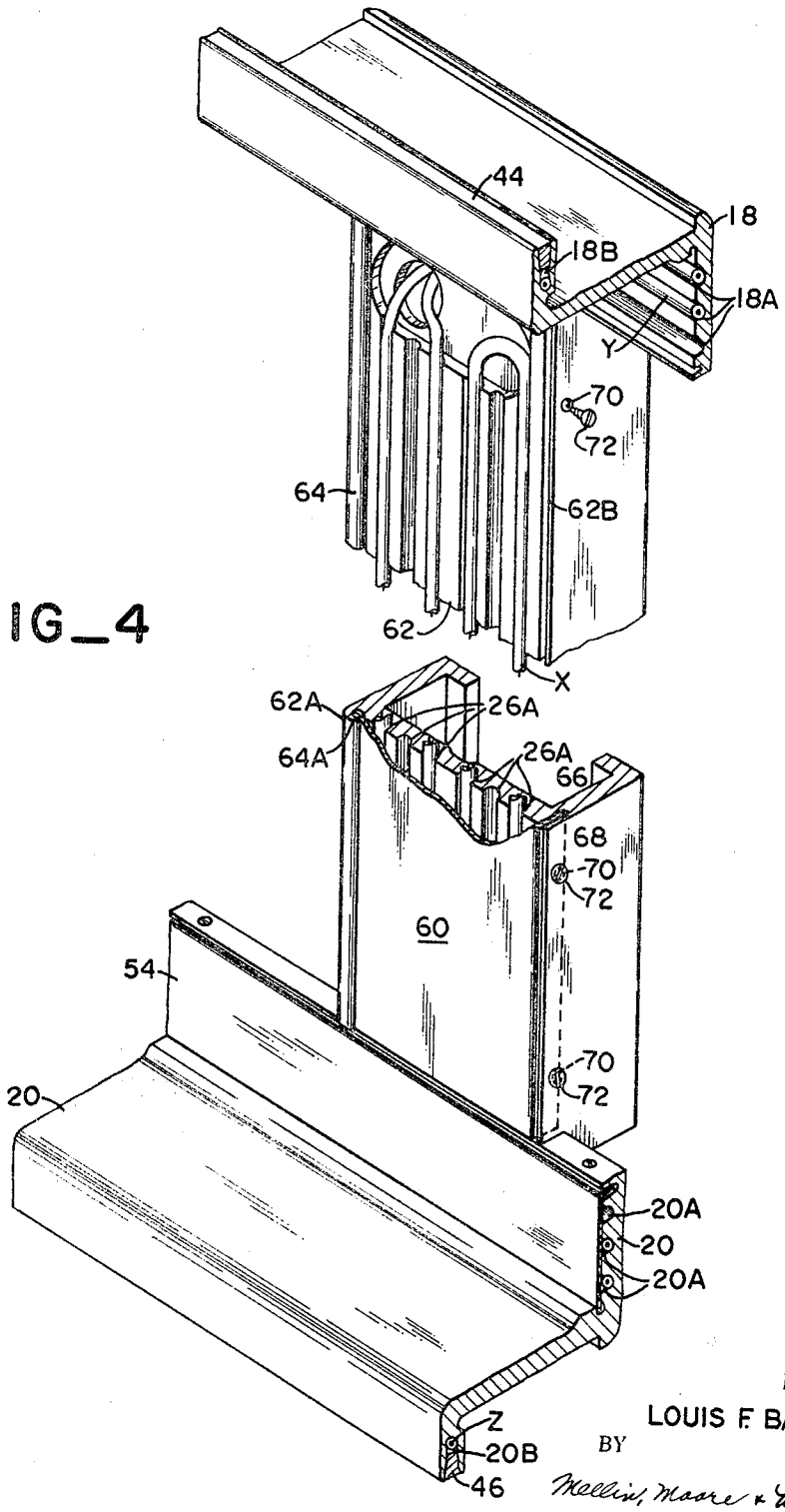
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June 17, 1969 L. F. BARROERO 3,449,925

REFRIGERATOR WITH HEATED DOOR FRAME

Filed Jan. 24, 1968 Sheet 2 of 4

FIG_4

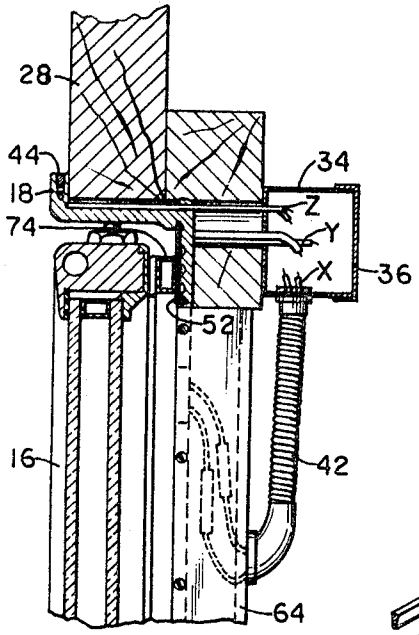


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REFRIGERATOR WITH HEATED DOOR FRAME

Filed Jan. 24, 1968 Sheet 3 of 4



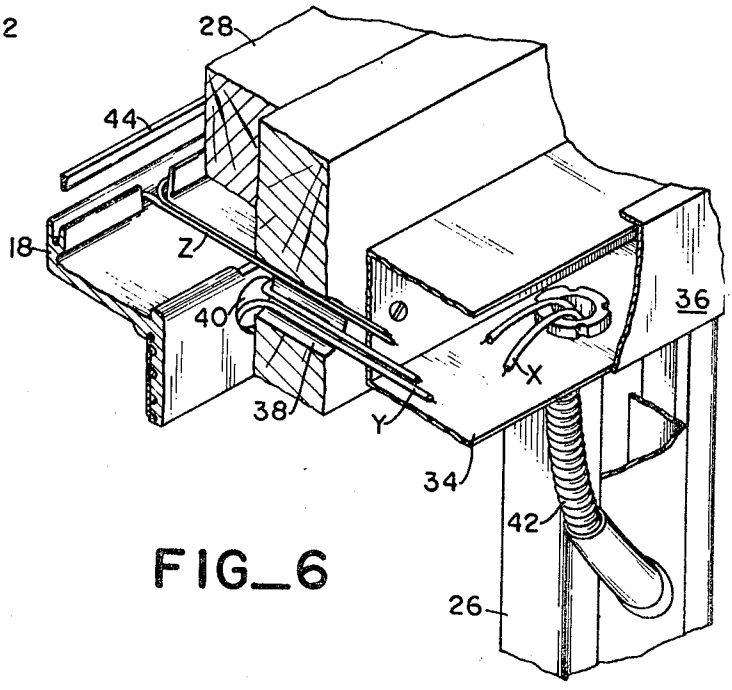


FIG_6

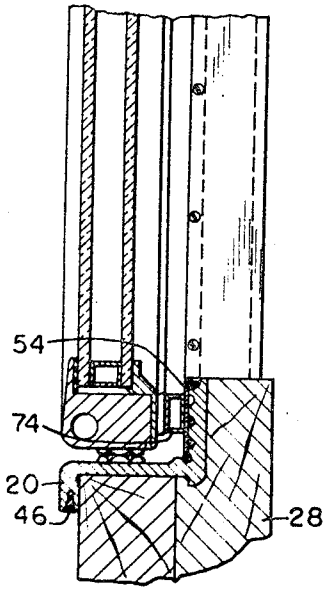


FIG_5

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June 17, 1969 L. F. BARROERO 3,449,925

REFRIGERATOR WITH HEATED DOOR FRAME

Filed Jan. 24, 1968 Sheet 4 of 4

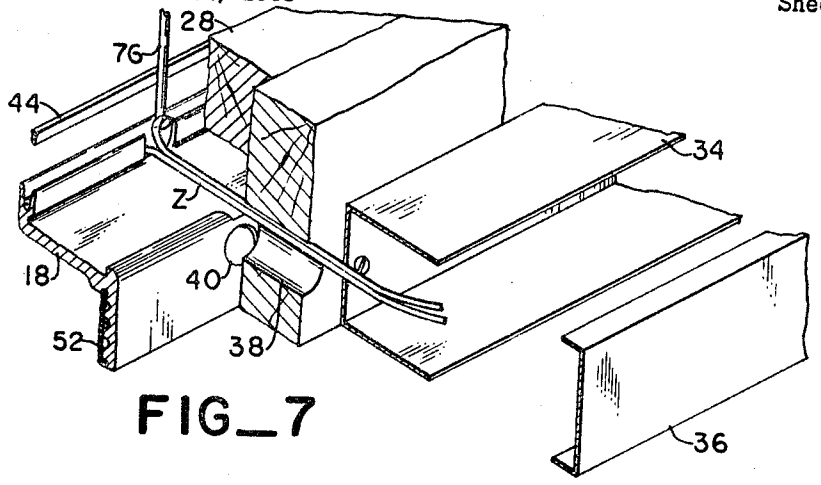


FIG_7

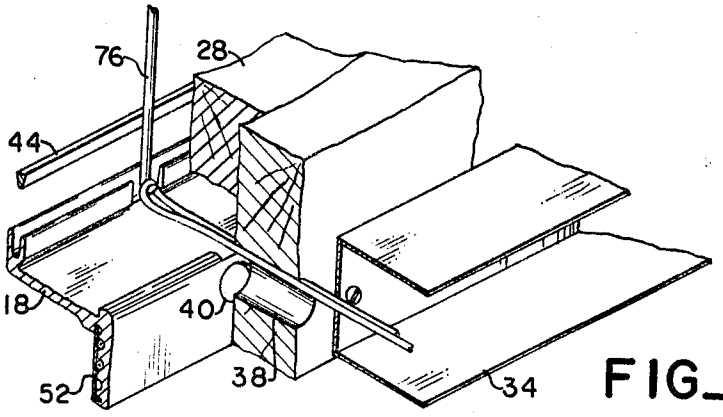


FIG_8

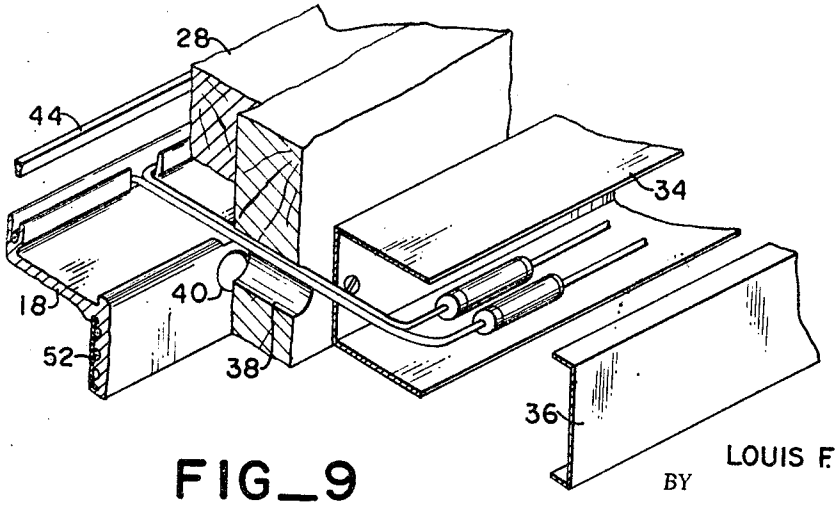


FIG_9

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United States Patent Office 3,449,925 Patented June 17, 1969

3,449,925

REFRIGERATOR WITH HEATED DOOR FRAME

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Filed Jan. 24, 1968, Ser. No. 700,165
Int. Cl. F25d 21/04, 23/02
U.S. Cl. 62—275 4 Claims

ABSTRACT OF THE DISCLOSURE

A refrigerator having a frame which has a plurality of grooves in which heating wires are disposed, and plates removably held over the heating wires to allow easy access to the wires for their removal and replacement.

Background of the invention

This invention relates to refrigerators and, more particularly to a refrigerator the frame of which contains heating elements.

In refrigerators or freezers, it has been found highly desirable to provide heating means in the areas of contact between the door and frame thereof. These heating means insure that jamming due to freezing of moisture in the air will not occur when the door of the refrigerator or freezer is opened. Refrigerators or freezers which provide such heating means are, of course, known. See, for example, United states Patents 2,858,408, (Barroero), 3,038,319 (Kesling), 2,811,406 (Moore et al.), 1,710,405 (Copeman), 1,915,704 (Warren), and 2,731,804 (Grubbs).

While the heaters used in each of these devices are, for the most part, resistance wires, which are effective for a relatively great time, even these are subject to breakdown, in which event the heating means must be replaced. It would obviously be desirable to provide a device wherein these heating means can be easily, quickly and conveniently replaced in the event of such a breakdown. A study of the patents above reveals that in most cases a change of heating means would be extremely difficult. In the patent to Barroero, heating elements are wound around the frame, and other heating elements are disposed within the door. In the patents to Kesling and Moore et al., the heating elements are disposed within rubber gaskets. Copeman and Warren disclose heating elements held in place by cementitious material. Obviously, the heating element of each of these could not be easily and conveniently replaced, and would be almost impossible in certain of these devices. The Grubbs device discloses heating elements which are covered by plates and can be exposed only by removal of the many screws holding such plates on. But this could not be considered easy and convenient. Rather, thte number of screws shown would indicate that it is quite a task. The Grubbs device has the added disadvantage that the multiplicity of screw heads holding the plates on are exposed to the door gasket. This is undesirable because these screw heads are relatively rough and would result in relatively rapid wear and resultant failure of the door gasket.

It is an object of this invention to provide a refrigerator having a heated door frame, the heating elements of which are easily and conveniently replaceable.

It is a further object of this invention to provide a refrigerator having a heated door frame which, while fulfilling the above object, presents to the door gasket seating thereon a smooth and even surface, so that proper sealing therebetween is effected.

Summary of the invention

Broadly stated, the refrigerator door frame heater comprises a longitudinal door frame member defining a face having a pair of longitudinal edges. A lip is formed on the face adjacent one longitudinal edge thereof and has a portion extending inwardly of the one longitudinal edge thereof and spaced from the face. A slot is formed in the face adjacent the other longitudinal edge thereof. At least one groove is formed in the face intermediate the lip and the slot, and a heating element is disposed in this groove. Included are plate means having one edge disposed between the face and the inwardly extending portion of the lip, and another, opposite, edge defining a flange disposable in the slot where the one edge of the plate means is so disposed, the plate means covering at least a portion of the heating element when the one edge of the plate and the flange are so disposed. Further included are means for releasably holding the flange in the slot when the one edge of the plate is so disposed between the face and the inwardly extending portion of the lip, whereby the plate means is held relative to the frame member, the release of the releasable holding means allowing the flange to be removed from the slot and the one edge of the plate means from between the face and the inwardly extending portion of the lip, whereby the plate means may be removed from the frame member.

Brief description of the drawings

These and other objects of the invention will become apparent from a study of the following descirption and drawings, in which:

FIG. 1 is a perspective veiw of a refrigerator incorporating the invention;

FIG. 2 is a sectional view taken along the lines 2—2 of FIG. 1;

FIG. 3 is a schematic view of the heating wires of the device of FIG. 1;

FIG. 4 is a perspective view, partially broken away and with a portion removed, of the center frame portion of the device of FIG. 1;

FIG. 5 is a sectional view taken along the line 5—5 of FIG. 1;

FIG. 6 is a perspective view of that portion of the edvice where the heating wires are introduced;

FIG. 7 is a view similar to FIG. 6 but showing removal of one of the heating element;

FIG. 8 is a view similar to FIG. 6 but showing a step in the installation of a new or replacement heater element;

FIG. 9 is a view similar to FIG. 6 but showing the new heating element installed.

Description of the preferred embodiment

Referring to the drawings, there is shown in FIGS. 1 and 2 a refrigerator **10**, which includes a frame **12**

and doors 14 and 16. Frame 12 is made up of upper and lower elongated members 18 and 20, vertical or side elongated members 22 and 24, and mullion 26 interconnecting top and bottom members 22 and 24. The frame 12 is mounted in wall 28. Doors 14 and 16 are pivotally mounted to the framework by means as shown in FIG. 5. The doors 14 and 16, it will be seen, may be pivotally connected thereto at points A, B, C and D as shown in FIG. 2. Handles 30 and 32 are fixed to doors 14 and 16 respectively so that they may be opened and closed. Frame members 18 and 20 have formed thereon longitudinal grooves 18A and 20A respectively (FIG. 4). Frame members 22 and 24 have formed thereon longitudinal grooves 22A and 24A, respectively (FIG. 2). Mullion 26 has longitudinal grooves 26A formed thereon (FIG. 4). Formed about the outside edges of members 18, 20, 22, 24, respectively, are longitudinal grooves 18B, 20B, 22B, 24B which interconnect to form a continuous groove about the frame 12. A wireway 34 having a removable cover 36 is fixed to the wall 28 inwardly of the refrigerator 10. Wall 28 has an aperture 38 therein which communicates with an aperture 40 in the frame member 18.

Resistance wire X is disposed in grooves 26A in mullion 26 in the path shown in FIG. 3, the grooves 26A being interconnected to allow the wire X to fully seat therein. Resistance wire Y is disposed in grooves 18A, 22A, 20A, 24A in the path shown in FIG. 3, the grooves being interconnected to allow full seating of the wire B therein. Wire Z is disposed about the framework in grooves 18B, 20B, 22B, 24B, in the path shown in FIG. 3. Wires Y and Z pass through apertures 38 and 40 and into wireway 34 where they are connected to a power source. Wire X passes through a sheath 42 which interconnects the mullion 26 with the wireway 34. Wire Y is connected to a power source within the wireway 34. Fitted into the grooves 18B, 20B, 22B, 24B, respectively, are longitudinal removable plugs 44, 46, 48 and 50, which serve to protect and hold the wires.

Removably mounted to the faces of the frame members 18, 20, 22, 24 and the mullion 26, respectviely, are plates 52, 54, 56, 58 and 60. These plates, and their mounting means, are similar in each case, and so only one, that which attaches to mullion 26, will be described.

It will be noted (FIG. 4) that the mullion 26 defines a face portion 62 in which the grooves 26A are formed. A lip 64 is formed on the face 62 along one longitudinal edge 62A of the face 62. The lip 64 has a portion 64A which extends inwardly of that edge of the face 62 and spaced from the face 62. A slot 66 is formed in the face 62 adjacent the opposite edge 62B of the face 62. The lip 64 and slot 66 run subsatntially the full length of mullion 26. Disposed against the face 62 and running substantially the full length of the mullion 26 is plate 60. One edge of plate 60 is disposed between the face 62 and the inwardly extending portion 64A of the lip 64. The opposite edge of the plate 60 defines a flange 68 which fits into slot 66. When the plate 60 is in such position the wire X is covered thereby.

A plurality of apertures 70 are provided in the mullion 26 adjacent edge 62B, each leading into slot 66 (but being removed from the face 62). These apertures 70 communicate with apertures in the flange 68 when the plate 60 is disposed as described above. Screws 72 pass through apertures 70 and serve to hold the plate in place. The plate 60 may be removed from the mullion 26 by the removal of the screws 72.

It will be seen that, as is usual, gaskets 74 are disposed about the insides of doors 14, 16 to seat against plates 52, 54, 56, 58 and 60. It will also be seen that opening both doors 14 and 16 exposes plates 52, 54, 56, 60. If it is desired to replace wire X, the doors 14, 16 are opened and plate 60 removed. Cover 36 is then removed and wire X disconnected. Wire X may then be completely removed and a new wire put in, which the ends thereof passing through apertures 38, 40 and through casing 42 when they are connected to the power source. Cover 38 and plate 60 are then replaced.

If it is desired to replace wire Y, the doors 14, 16 are again opened and the plates 52, 54, 56, 58 removed. Cover 36 is then removed and wire Y disconnected. Wire Y may then be completely removed and a new wire put in, with the end thereof passing through apertures 38, 40 where they are connected to the power source. Cover 36 and plates 52, 54, 56, 58 are then replaced.

The removal and replacement of wire Z is shown in FIGS. 7–9. First, plugs 44, 46, 48, 50 are removed, as is cover 38. Wire Z is then disconected within wireway 34. Wire Z is then pushed outward from within the wireway 34 so that it can be grabbed by hooked instrument 76. Wire Z may then be completely removed. In replacing wire Z, the center of the new wire is located. This is fed from the wireway 34 through apertures 38 and 40, where it is grabbed by hooked instrument 76. The new wire is then pulled through, and installed about the frame 12. The ends of the new wire are connected to the power source, and cover 36 and plugs 44, 46, 48 and 50 are replaced.

It will be apparent from the above description that wires X, Y, Z or any combination are easily and conveniently replaced, requiring no disassembly of the framework of the device. This is made possible because of the design of the face of each frame member (having a lip thereon and a slot therein) and the design of each plate which fits over such face. Furthermore, it will be seen that the gaskets of doors 14 and 16 seat against a smooth surface, resulting in an effective seal. This is so because the means for holding each plate against a frame face are removed from such face and are along the side of the frame member. Finally, the fact that each resistance wire is disposed in a groove not only results in a compact design, but also results in maximum heating efficiency, due to the fact that each wire contacts a relatively great surface area of the associated frame member.

Obviously, the invention can be carried out in many different ways and the embodiments shown are merely illustrative. Consequently, I do not desire to be limited by the embodiments shown and described, but only by the scope of the following claims.

I claim:

1. A refrigerator door frame heater comprising:
   (a) a longitudinal door frame member defining a face having a pair of longitudinal edges;
   (b) a lip formed on the face adjacent one longitudinal edge thereof and having a portion extending inwardly of the one longitudinal edge thereof and spaced from the face;
   (c) a slot formed in the face adjacent the other longitudinal edge thereof;
   (d) at least one groove formed in the face intermediate the lip and the slot;
   (e) a heating element disposed in the groove;
   (f) plate means having one edge disposed between the face and the inwardly extending portion of the lip, and another, opposite, edge defining a flange disposable in the slot when the one edge of the plate means is so disposed, the plate means covering at least a portion of the heating element when the one edge of the plate and the flange are so disposed, and
   (g) means for releasably holding the flange in the slot when the one edge of the plate is disposed between the face and the inwardly extending portion of the lip, whereby the plate means is held relative to the frame member, the release of the releasable holding means allowing the flange to be removed from the slot and the one edge of the plate means from between the face and the inwardly extending portion of the lip, whereby the plate means may be removed from the frame member.

2. A refrigerator door frame heater according to claim 1 wherein are included a plurality of grooves running

substantially the length of the door frame member and a plurality of heating elements each disposed in a groove, and wherein the plate means runs substantially the length of the frame member.

3. A refrigerator door frame heater according to claim 2, wherein the slot and flange disposable therein run substantially the length of the door frame member.

4. A refrigerator door frame heater according to claim 3, wherein the means for releasably holding the flange in the slot comprise a plurality of screws each disposable in an aperture in the frame member leading into the slot but removed from the face thereof and into an aperture in the flange in registry with the aperture in the frame.

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WILLIAM J. WYE, *Primary Examiner.*

U.S. Cl. X.R.

62—245