Dec. 23, 1947. D. J. GREILING 2,433,272

REINFORCING MEANS FOR DOOR PANELS

Filed July 11, 1945

FIG-1-

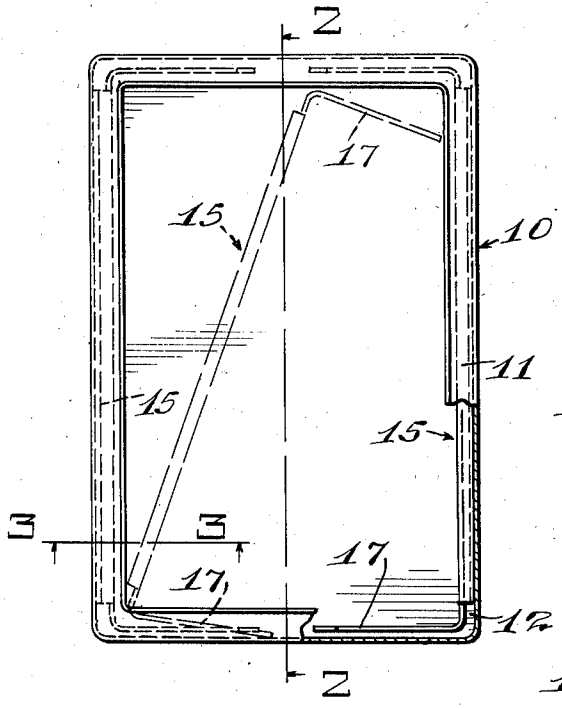


FIG-2-

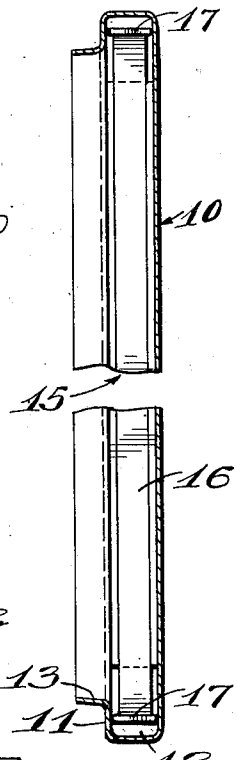


FIG-5-

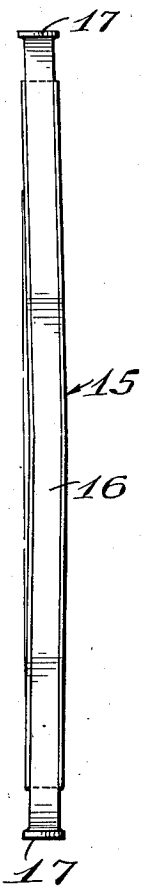


FIG-3-

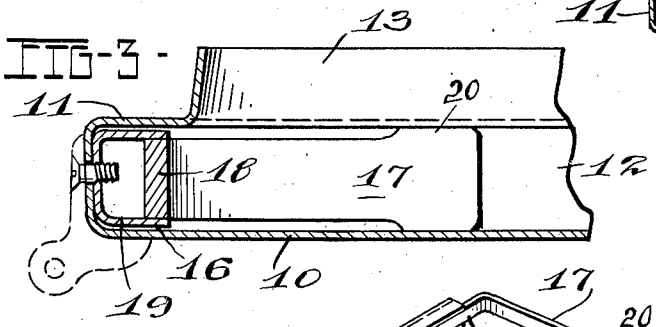


FIG-4-

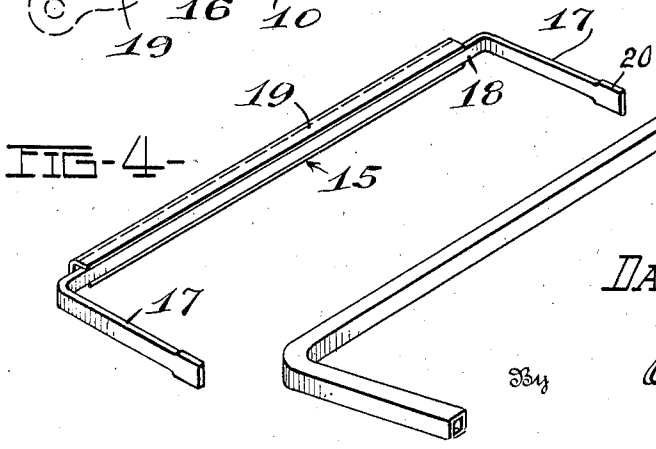


FIG-6-

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REINFORCING MEANS FOR DOOR PANELS

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7 Claims. (Cl. 20—38)

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This invention relates primarily to refrigerator door constructions, and particularly to stiffening or reinforcing means therefor.

It is customary in the construction of such doors to provide inner and outer panel or casing parts of sheet material, usually sheet metal, and to fill the hollow interior with a heat insulating material. A door of this character is subject to warping and distorting in shape so as not to have a close sealing fit entirely around the casing opening and causing loss of cooling efficiency in the refrigerator. Such faulty sealing may occur between the hinges at the hinged edge of the door, but more frequently occurs above and below the lock at the free swinging corner portions of the door.

The object of the invention is the provision of simple and efficient means within the outer panel or casing member of the door to strengthen and reinforce it against warping or becoming distorted in use and which is of a deformable character to permit adjustment to compensate for and correct warping or distorting, whereby an efficient uniform gasket sealing of the door in the casing opening can be effected and maintained.

Another object of the invention is the provision of a reinforcing means of this character which is capable of being easily removed from a door casing, then adjusted and replaced in the casing to correct any warping or distorting of the door.

Further objects and advantages of the invention will be apparent from the following detailed description and from the accompanying drawings, illustrating preferred embodiments thereof, in which—

Fig. 1 is an inner side view of the outer casing or panel member of a refrigerator door, with the reinforcing members embodying the invention in position in the inwardly facing edge recess thereof and showing, in dotted lines, the manner of insertion or removal of such a member; Fig. 2 is a slightly enlarged section thereof on the line 2—2 in Fig. 1; Fig. 3 is an enlarged fragmentary section on the line 3—3 in Fig. 1, showing in dotted lines an attached hinge; Fig. 4 is a perspective view of the reinforcing member; Fig. 5 is an enlarged view of the reinforcing member with the loop portion thereof bowed or

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deformed to correct door warping, and Fig. 6 is a modified form of reinforcing member.

Referring to the drawings, 10 designates the outer casing or panel member, in the present instance of a refrigerator door, which is customarily of sheet metal externally enamelled, and has its edge turned inwardly and flanged at 11 to form an endless inwardly facing U-recess 12 around the casing edge. The free edge of this flange terminates in a rearwardly extending slightly inwardly tapered flange 13 to which the customary breaker edge portion of the inner casing member of the door is attached.

The reinforcing means for the door, and which embodies the present invention, includes two U-shaped bars 15 mounted in reversed opposing relation in opposite side portions of the recess 12 with the loop portions 16 of the bars preferably disposed in the long portions of the recess at the side edges of the door and with the leg portions 17 thereof disposed in the shorter recesses at the end edges of the door. These bars have a sufficiently loose fit in the recesses to permit movement of the bars therein and are of a length to dispose the leg portions within the end recesses, as shown in Fig. 1. The bars 15 are of a nature to be sprung or deformed so that their loop portions 16 may be bowed or the legs 17 twisted transverse to the plane of the legs to exert the desired torque on the panel 10 to correct any warping or distorting tendencies and thereby cause its edge to properly seat against the edge wall of the casing opening. In Fig. 5 the bowed form of the loop portion 16 of a bar is shown, and it is apparent that such a bar applied to the edge recess of a panel 10 will exert either a rearward or a forward spring pressure against the end portions of the respective side edge of the panel, depending on whether the convex side of the bow faces rearwardly or forwardly. In this manner the hinged edge of a panel intermediate the hinges may be sprung rearwardly, or the swinging edge of the panel may be sprung rearwardly at opposite sides of the attached catch means to correct any warping tendencies of such parts and maintain a close uniform seating of the panel edge against a casing.

While the material of the bars 15 is adapted to maintain a permanent set when sprung, it also

preferably has a limited spring or resiliency so as to enable it to be forced into bowed or spring form and to exert the desired stiffening and strengthening action on the panel to correct a warped or sprung condition thereof, thus causing a close gasket seating of the panel edge against an associated casing.

To facilitate insertion of a stiffening bar into or its removal from a panel recess, its legs, in particular, are capable of being sprung so as to shorten the distance therebetween and enable the bar, while pivoting on one end, to be swung inwardly relative to the panel to free its opposite end from the flange 11 and permit it to be drawn rearward from the panel through the opening formed by the flange 13, as shown by dotted lines in Fig. 1. During such movement, the leg 17 at the pivoting end of the bar is forced inward by reinforced pressure applied to the bar and the pivoting action is on the tip end of the leg.

The preferred form of stiffening bar is shown in Figs. 1 to 5 and includes a U-member 18 of substantially flat bar stock and a reinforcing or stiffening body member 19 of channel-bar form for the loop portion of the bar. The loop portion of the member 18 is fitted widthwise in the channel mouth of the member 19 and welded or otherwise fixedly secured therein. By this construction the leg portions of the composite bar are relatively thin in an inwardly springing direction to facilitate removal of the bar from and its insertion into a panel recess, and such legs are relatively of greater stiffness against bending transverse to a plane common to the legs and loop portion. The loop portion of the member 18 also provides an increased stiffness in the direction needed and this is augmented by the body channel 19. The free ends of the leg portions of the U-member 18 are preferably broadened, as at 20, to compensate for the added thickness of the member 19 and to bear against the respective walls of the recess. Another form of stiffening bar is shown in Fig. 6 and consists of a tubular member preferably square in cross-section and bent longitudinally into U-form.

The stiffening members may also provide adjustable means for anchoring hardware or other attachments without welding clips to the panels. Securing screws for the hardware may be inserted through clearance holes in the recess walls and threaded into the body or loop portions of the stiffening bars or into "speed-nuts" attached thereto. The long body portions of the bars are very efficient for such anchoring purposes.

It is apparent from the foregoing description that the stiffening bars constitute reinforcing means for the casing or panel member 10 to resist or correct warping action as well as to tend to maintain the edge of the panel in close seating relation with the edge wall of an opening in which it is fitted. Also that if such a door, including such a panel and stiffening means, becomes warped, bowed or sprung so as not to have close seating engagement with the opening wall, either or both of the stiffening bars may be easily removed from the panel and bent in a plane transverse to the legs so that the bowed bar after being replaced in the recess will exert the desired pressure on the panel to correct a faulty seating condition. The legs may also be twisted one way or the other to exert the desired correcting pressure on the end portions of the panel.

I wish it understood that my invention is not limited to any specific construction, arrangement or form of the parts, as it is capable of numerous modifications and changes without departing from the spirit of the claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent, is:

1. The combination with a rectangular panel for a door or the like having an inwardly facing recess therein extending along at least three connecting side edges thereof, of a U-shaped stiffening member disposed in said recess with its loop portion in one side edge and its legs extending lengthwise in opposing connecting side edges, said member being adjustably deformable to coact with opposing walls of the recess to apply torque to the panel to correct and resist warping, the said leg portions being flexible in a common plane flatwise of the panel to facilitate insertion of the member into or its removal from the recess.

2. The combination with a rectangular panel for a door or the like having an inwardly facing recess therein extending along at least three connecting side edges thereof, of a U-shaped stiffening member disposed in said recess with its loop portion in one side edge and its legs extendng lengthwise in opposing connecting side edges, said member being adjustably deformable to coact with opposing walls of the recess to correct deformance or apply a warp-resisting torque thereto and including a bar part having the U-form of the member and a reinforcing part disposed lengthwise of the loop portion of the bar part to strengthen it against deformance.

3. An arrangement as called for in claim 2 wherein the bar part of the U-member is of less thickness in the plane of its legs than in a transverse plane whereby the legs are of greatest resiliency in said first plane.

4. The combination with a panel for a door or the like having an inwardly facing recess thereon extending along at least three connecting side edges thereof, of a single-piece U-shaped stiffening member disposed in said recess with its loop portion in one side edge and its legs extending lengthwise in opposing connecting side edges, said member being adjustably deformable to coact with the opposing walls of the recess to correct deformance or to apply a warp-resisting torque therto, at least the leg portions of said member being of greater strength against deformance in a plane transversed to the member than in the plane of the member.

5. A stiffening means for door panels or the like having an inwardly facing edge recess thereabout in substantially the plane of the panel including a single-piece U-shaped reinforcing bar disposed in the panel recess with its loop portion along one edge of the panel and its legs projecting lengthwise in adjoining edges of the panel, the bar being deformable transverse to the plane of the panel to obtain a permanent set with the bar legs coacting with the opposing walls of the recess to exert a warp-resisting or correcting torque on the panel.

6. An arrangement as called for in claim 5 wherein the stiffening bar is of strap metal with its broad dimension crosswise of the panel recess to permit ready flexing in the plane of the bar and to provide stiffness transverse to such plane.

7. A stiffening means for door panels or the like having an inwardly facing edge recess thereabout in substantially the plane of the panel, including a single-piece U-shaped reinforcing bar disposed in the panel recess with its loop portion along one edge of the panel and its legs projecting lengthwise in adjoining edges of the

panel, the bar by a twisting force, being deformable transverse to the plane of the panel to obtain a permanent set with the bar legs coacting with the opposing walls of the recess to exert a warp-resisting or correcting torque on the panel, the leg portions of the bar being resiliently bendable inwardly toward its loop portion in substantially the plane of the legs to permit easy insertion into and removal from a panel recess of the bar.

DAVID J. GREILING.

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