This invention relates to a refrigerator door, and more particularly to a refrigerator door of the so-called "full covering" type, in which the pan of the door is stiffened and supported particularly with respect to its outer, lower corner, so that an effective seal is maintained between the door and the cabinet in the operation of the door.

In the full covering type of refrigerator door, considerable difficulty has been experienced in obtaining a good seal between the door and the refrigerator cabinet to which it is attached, and particularly between the outer lower end portion of the door and the cabinet. Any difference in parallelism of the front of the cabinet and the inner face of the door results in a variation in contact between the door and the cabinet gasket or the cabinet gasket, depending upon which member the gasket is attached to, and heat leaks occur. Such a door is preferably constructed of sheet metal and the door cabinet flexible enough to permit it to warp slightly to conform to the cabinet, but such a door, as a result of excess weight and warping, has a tendency to sag at its lower outer corner, and tends to lose its heat seal. The hinged side of the door does not present much of a problem because of the adjacent support provided by the hinges. However, the free side of the door, being far removed from the hinges, has a tendency, and particularly the lower free end corner of the door has the tendency, to lose its heat seal due to the accumulating result of excess weight and warping. While stiffening means and measures have heretofore been provided, such means have exerted substantially equal tension upon the four corners of the door and have made no provision for applying the exact tensioned or support for the outer lower corner of the door wherein the difficulty lies and where the heat seal is destroyed.

An object of the present invention is to provide means for supporting the lower outer corner of the door to prevent the door from collapsing or sagging and to maintain its alignment with the cabinet. Another object is to provide means for compensating for the resultant excess weight and warping tending to break the seal at the lower outer corner of the door while permitting the flexing of the door for sealing and while also permitting the door latch to be located off-center. Yet another object is to provide a structure wherein the lower outer corner of the door is supported by a substantially diagonal structural members placed between the upper inner corners of the door and the side of the cabinet, whereby the strain upon the lower corner of the door is disposed directly by the inner top portion of the door supported by a hinge. A further object is to provide means for adjusting the tension upon the respective lower corner members to provide the desired tension or support for the outer corners of the door.

Other specific objects and advantages will appear as the specification proceeds.

The invention is shown in an embodiment, by the accompanying drawing, in which—

Figure 1 is a front view in elevation of a refrigerator equipped with a door embodying the invention; Fig. 2, a rear view in elevation of the door; Fig. 3, a sectional view, the section being taken as indicated at line 3--3 of Fig. 2; and Fig. 4, an enlarged, broken perspective view showing specific supporting means employed.

In the illustration given, there is shown a refrigerator cabinet to which a refrigerator door 11 is secured by means of hinges 12 and 13.

The door 11 comprises an outer door pan 14 of generally concavo-convex shape. It has a relatively flat front, outer wall, and a perimetric side wall 15. The perimetric wall 15 is provided at its rear with an inwardly-turned flange 16, to which is secured an angle iron brace of support 17.

Tie members are secured to the border angle members 17 to provide support for the corners of the door and particularly to support the lower free corner 18 of the door. In the structure shown, I provide a tie member 19 secured to the upper inner corner 20 of the door, a tie member 21 secured to the lower outer corner 18 of the door. The two tie members (19 and 21) I prefer to connect in such a manner that the two tie members constitute a substantially diagonal support extending all the way from the upper corner 20 to the lower corner 18. In the structure shown, I connect the lower end of the tie member 19 to one end of a transverse bar 22. The other end of the transverse bar is connected by a tie member 23 to the upper outer corner 24 of the door. The upper end of the tie member 21 is connected to the end of a cross bar 25, and the opposite end of cross bar 25 is connected by tie member 26 to the lower supported corner 27 of the door.

As indicated in the drawings, the bolt 28 connects the inner end of the bar 22 to the outer end portion of the bar 25, thus bringing the tie members 19 and 21 into generally diagonal alignment so that the lower outer corner 18 of the door is thus supported directly from the upper inner corner portion of the door. I prefer, however, to have the cross bars arranged very much as shown, so that the upper link or tie member 19 is substantially diagonally aligned with the lower strip or tie member 21. Thus the tension exerted upon the tie members 19 and 21 is supported by the upper inner corner 20 of the door lying adjacent the supporting hinge 12.

By this means, I find that the tendency of the lower, outer side of the door to lose its heat seal by reason of the accumulations of excess weight and warping is prevented. The diagonal arrangement of tie members 19 and 21 acts as a compensator for the weight of the door. Even if the door is warped by excessive weight and abuse, the lower, outer side of the door is supported by the arrangement shown and a seal between the door and the cabinet is maintained. Further, the arrangement shown permits the door latch to be maintained off-center and at a position more convenient for opening the door.

In the specific structure shown, the tie members provide support for all four corners, but in equal amounts, the cross bar 25 being arranged for distributing the support to meet the demands of the door and providing the extra, needed support for the lower, outer side thereof. At the same time, however, there is provided tension for all four corners.

In any structure employed, I prefer to provide means for adjusting the tension upon the tie members. In the specific structure illustrated, the bolt 28 is provided with a relatively long, threaded section at each end engaged by nuts 29 and 30, and the nuts may be adjusted to place increased or diminished tension upon the tie members. In effect, the two members 19 and 21 which are connected by the adjusting bolt 28 constitute a single tie member structure extending diagonally across the rear of the door.

The door may be provided with an inner metal liner, or finished in any other desired manner.

While in the foregoing specification, I have set forth a specific structure in considerable detail for the purpose of illustrating my invention, it will be understood that such details of structure may be varied widely by those skilled in the art without departing from the spirit of my invention.

I claim: 1. In combination, a door comprising a generally rectangular concavo-convex door pan composed of relatively flexible material and adapted to be supported from an inner lateral edge thereof, a plurality of tie members extending inwardly from the top corners of the door and two tie members extending inwardly from the lower corners of the door, a bar connected to the inner ends of each pair of tie members,
In combination, a door comprising a generally rectangular concavo-convex door pan composed of relatively flexible material and adapted to be supported from one lateral edge thereof, a pair of spaced-apart and generally horizontal bars, tie members extending from the uppermost bar to the two upper corners of the door, tie members extending from the lowermost bar to the lower corners of the door, said bars being positioned in the same vertical plane and being staggered with respect to each other, and bolt and nut means connecting said bars.

3. The structure of claim 2, in which the tie member extending to the upper supported corner of the door and the tie member extending to the outer lower corner of the door lie substantially in the same diagonal line.

4. In a door structure having a relatively flexible, generally rectangular, concavo-convex door pan adapted to be supported along one lateral edge thereof, a pair of generally horizontal spaced-apart bars lying in substantially the same vertical plane centrally of said door structure, upper tie members secured at their outer ends to said door structure adjacent the upper corners thereof and at their inner ends to the uppermost bar at spaced-apart points, at least one additional tie member secured at its outer end to said door structure adjacent the lower outer corner thereof, all of said tie members lying substantially in said vertical plane and the inner end of said additional tie member being secured to the lowermost bar, said bars being oriented so that an axial extension of said additional tie member at its inner end would pass through the uppermost bar and into the inner end of the tie member extending therefrom, and adjustable means connecting said bars respectively adjacent the tie members extending toward the upper inner corner and lower outer corner of said door structure.

5. In a door structure having a relatively flexible, generally rectangular concavo-convex door pan adapted to be supported along one lateral edge thereof, a pair of generally horizontal spaced-apart bars lying in substantially the same vertical plane centrally of said door structure, lower tie members secured at their outer ends to said door structure adjacent the lower corners thereof and at their inner ends to the lowermost bar at spaced-apart points, at least one additional tie member secured at its outer end to said door structure adjacent the upper inner corner thereof, all of said tie members lying substantially in said vertical plane and the inner end of said additional tie member being secured to the uppermost bar, said bars being oriented so that an axial extension of said additional tie member at its inner end would pass through the lowermost bar and into the lower outer corner of said door structure.

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