April 17, 1956 L. A. RASMUSSEN 2,741,808

DOOR TENSIONING AND VENTING DEVICE

Filed Dec. 1, 1950

Fig. 1

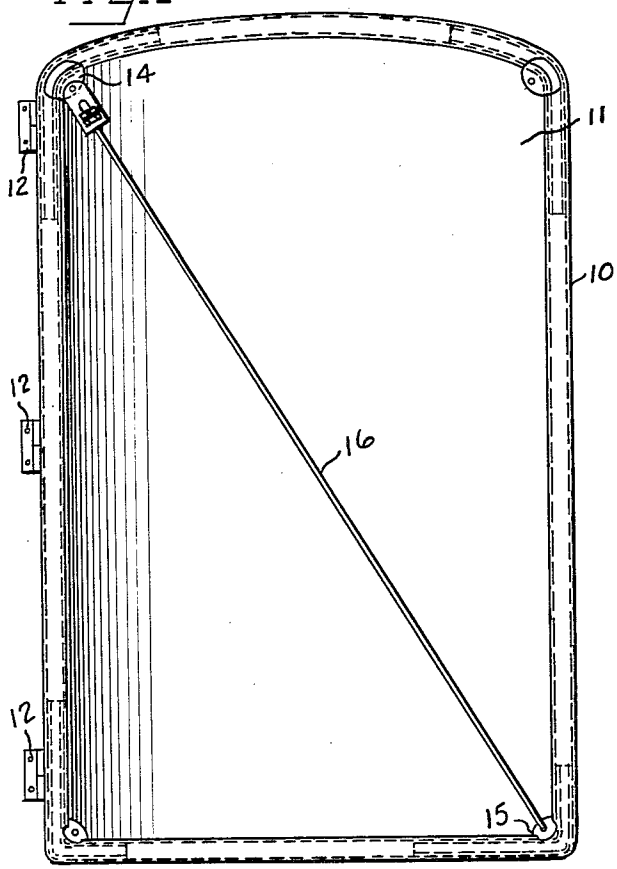


Fig. 2

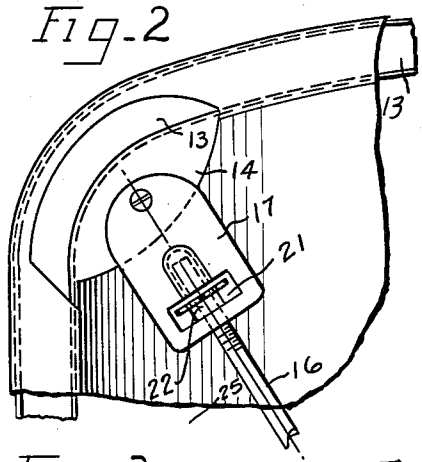


Fig. 3

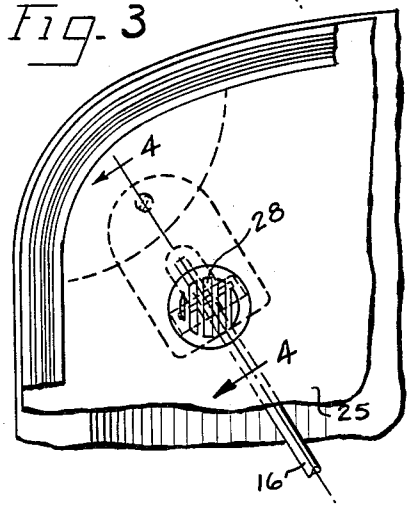


Fig. 4

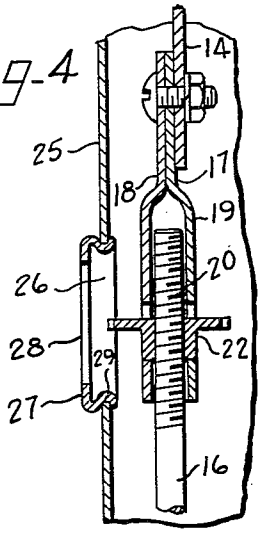


Fig. 5

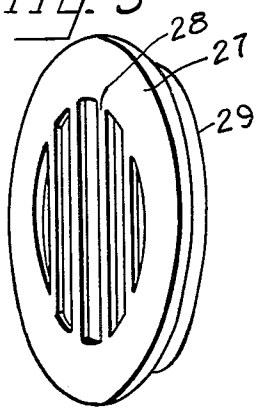
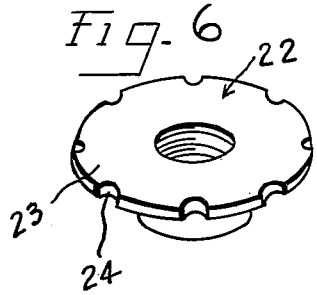


Fig. 6



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DOOR TENSIONING AND VENTING DEVICE

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Application December 1, 1950, Serial No. 198,620

4 Claims. (Cl. 20—38)

This invention relates to a door tensioning and venting device, and is particularly useful in connection with a refrigerator door and the like.

In a refrigerator door of the so-called "full covering" type, the door is usually formed with a generally rectangular, concavo-convex door pan composed of relatively flexible metal or material and stiffening means is employed within the pan for connecting corner portions of the door. Such means usually consists of one or more tie members joining the door portions and provided with turnbuckles or nuts which engage threaded portions of the tie members for increasing or decreasing the tension upon the corner portions. The door is usually made flexible enough to warp slightly to conform to the cabinet, thus maintaining a heat seal. The inner part of the door is closed with a thin liner, and the liner is usually provided with a vent opening.

Under usage and under varying conditions, the door tends to warp and by reason of the excess weight of the door, certain portions of it tend to sag, thus causing the breaking of the heat seal with the cabinet. Particular difficulty is experienced with the lower outer corner of the door (away from the hinged side) where the excess weight of the door and some warping thereof tends to cause a breaking of the seal. Under such conditions, it is necessary to enter the door by removing the liner and adjust the turnbuckle or other means, which is usually located in the center of the door. The foregoing operation is expensive, time-consuming, and places the refrigerator out of use for some time during the period of repair.

An object of the present invention is to provide an extremely simple and inexpensive structure which overcomes the above difficulties while enabling the adjustments to be made with an ordinary screwdriver and in a modicum of time. A further object is to provide a refrigerator door equipped with means providing the desired venting of the interior of the door, while at the same time utilizing the venting means for providing access at a point within the door where quick adjustment of the tie member structure can be made. Yet another object is to provide a door structure equipped with an opening while providing means aligned with the opening to enable the tie member of the door to be adjusted for properly supporting the door. Other specific objects and advantages will appear as the specification proceeds.

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

Figure 1 is a rear view in elevation of a refrigerator door equipped with supporting or stiffening means, the liner of the door being removed; Fig. 2, an enlarged broken detail view showing the connection of the tie member to the door frame; Fig. 3, a broken enlarged detail view showing a vent opening and tension adjusting means embodying my invention; Fig. 4, a sectional view, the section being taken as indicated at line 4—4 of Fig. 3; Fig. 5, a perspective view of a vent opening plug provided with a grill; and Fig. 6, a perspective view of an adjustment nut which may be employed.

In the illustration given, 10 designates a refrigerator door which preferably comprises a hollow pan 11 which may be of a generally concavo-convex shape, as shown in greater detail in Drake Patent No. 2,432,563. Such a door is formed of flexible sheet metal or other material, and is provided with supporting hinges 12 along one lateral edge. To the border frame 13 are secured gussets or plates 14 and 15, plate 14 being at the upper inner corner of the door, and plate 15 being at the lower outer corner of the door. A tie rod or member 16 is passed through an opening in plate 15 to secure it to the plate and the rod then extends diagonally across the interior of the door and almost to the upper plate 14. To the upper plate 14 is secured an anchor member 17, as shown more clearly in Fig. 4. The member 17 is preferably formed from a pair of plates 18 and 19 which are channeled to receive the upper threaded end 20 of the rod 16. The plate members 18 and 19 may be spotwelded or otherwise secured about the channel receiving the rod 16. A slot 21 is formed in the plates 18 and 19 to receive a nut 22 threadably engaging the threaded portion 20 of the rod. The nut 22 is provided with a circular flange 23, which may be provided at spaced intervals with notches 24. With this structure, the nut 22 may be rotated to exert greater or less tension upon the tie member 16 and cause the threaded portion 20 to advance or retract, depending upon the direction of rotation of nut 22.

The inner lining 25 of the refrigerator is provided with a vent 26, which is preferably aligned with the nut 22. I prefer to equip the vent opening with a closure plug 27, which may be slotted to provide ventilation spaces 28. I prefer to provide the plug 27 with a spring flange portion 29 adapted to be pressed into locking engagement with the edges of the liner 25 about the vent opening 26. The spring flange 29 permits the plug to be inserted in position by simply pressing it into position, and similarly permits its ready removal from the liner 25 when desired.

Operation

In the operation of the structure, when it is desired to increase or diminish the tension upon rod or tie member 16, the vent plug 27 may be removed and a screwdriver or other metal edge employed for rotating the nut 22 to extend the rod or tie member 16 longitudinally in one or the other direction to effect the desired adjustment. The plug 27 may then be snapped back into position. For some adjustments, it is possible to extend a blade through the openings 28 of the grill to make the necessary change. Further, if desired, the closure 27 may be omitted and the unclosed opening of the liner employed for making the adjustment. I prefer, however, to employ a removable plug which provides the desired amount of aperture space for ventilating the interior of the door, while at the same time providing a larger area for adjusting the nut of the tie member when the plug is withdrawn.

In the foregoing structure, it will be noted that the tie member supports the lower outer corner of the door where the difficulty with sagging and breaking of the seal is greatest, and further accomplishes such support while providing a single adjustment point near the upper inner corner of the door. At this least exposed point, there is provided the vent opening for the adjustment of the tie member.

While in the foregoing specification, I have shown a single structure in considerable detail for the purpose of illustrating an embodiment of my invention, it will be understood that the details of the structure may be varied greatly by those skilled in the art without departing from the spirit of my invention.

I claim:

1. In a full covering refrigerator door structure adapted to be hingedly supported along a vertical edge thereof for swinging movement into and out of a sealing closure position about an access opening, a peripheral frame, an inner door panel secured to said frame, an outer door panel carried by said frame and being spaced from said inner door panel, an elongated tie member extending diagonally across said door structure between said inner and outer panels and being secured adjacent its ends to said frame, adjustable nut means operatively arranged with said tie member for adjusting the tension thereof and comprising a nut equipped with a laterally extending flange having a plurality of peripheral notches thereabout and being oriented in a plane substantially normal to the surface of said inner panel, and a closure plug carried by said inner panel and having a plurality of ventilation openings therethrough aligned with said flange to afford adjustment of said nut through the inner panel.

2. In a full covering refrigerator door structure adapted to be hingedly supported along a vertical edge thereof for swinging movement into and out of a sealing closure position about an access opening, generally rectangular inner and outer door panels spaced from each other and being connected together about the peripheral edge portion thereof, said door panels being generally rectangular and providing corner portions, an elongated tie member extending diagonally across said door structure between said panels and being secured adjacent one end thereof to the outer lower corner portion and adjacent its other end to the upper inner corner portion of the door structure, said inner panel being provided with an opening therethrough, a closure plug carried in said opening and having a plurality of elongated ventilation slots therethrough communicating with the space between said panels, and a nut threadedly engaging said tie member and being arranged therewith for adjusting the tension of said tie member, said nut being equipped with a laterally extending flange in substantial alignment with the slots through said plug and said flange being oriented in a plane substantially normal to the surface of said inner panel, said flange having a plurality of spaced apart notches about the periphery thereof, whereby said nut is adjustable by manipulating a blade passed through said ventilation slots.

3. In a refrigerator door structure for sealingly closing an access opening and having spaced apart inner and outer door panels, an elongated tie member extending diagonally across said door structure between said panels and being secured thereto adjacent its end portions, adjustable nut means operatively arranged with said tie member for adjusting the tension thereof and comprising a nut equipped with a laterally extending flange having a plurality of peripheral notches thereabout and being oriented in a plane generally normal to the surface of said inner panel, said inner panel being provided with an opening therethrough in alignment with said nut, and a closure plug carried in said opening and having a ventilation opening therethrough adapted to receive an instrument for manipulating said nut.

4. In a full covering refrigerator door structure adapted to be hingedly supported along a vertical edge thereof for swinging movement into and out of a sealing closure position about an access opening, a peripheral frame, inner and outer door panels carried by said frame and being spaced from each other, an elongated tie member extending diagonally across said door structure between said inner and outer panels and being secured adjacent its ends to said frame, adjustable nut means comprising a notched nut operatively arranged with said tie member for adjusting the tension thereof, and a closure plug carried by said inner panel in alignment with said nut and having a ventilation opening therethrough for receiving an instrument to manipulate said nut and adjust the tension of said tie member.

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