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REFRIGERATOR CABINET WITH INNER DOOR AND HINGE ASSEMBLY

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FIG. 1.

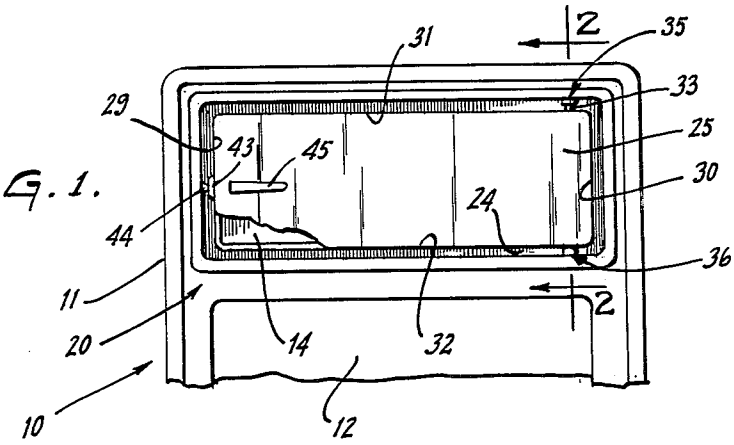
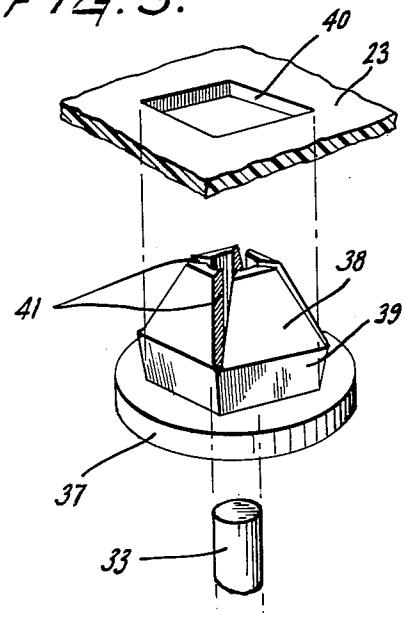


FIG. 3.



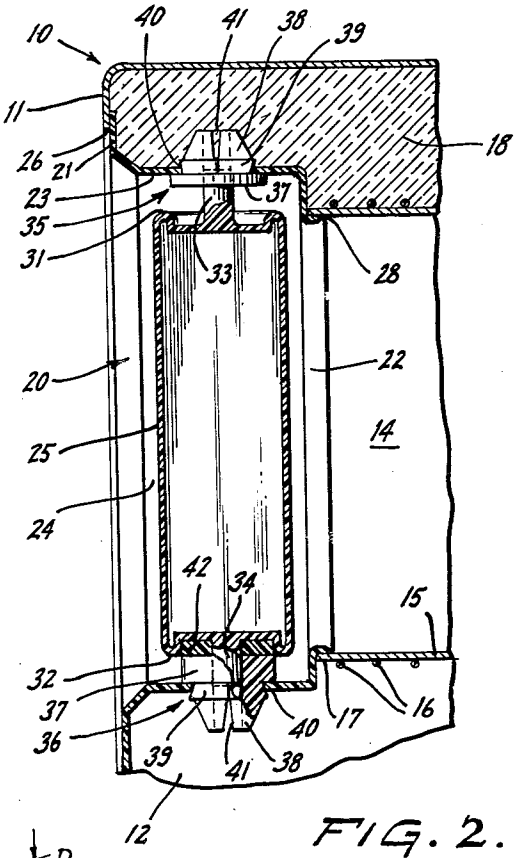


FIG. 2.

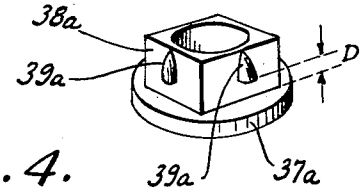


FIG. 4.

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REFRIGERATOR CABINET WITH INNER DOOR AND HINGE ASSEMBLY

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The present invention relates to cabinet structures and more particularly to cabinets for domestic refrigerators of the kind constructed with two adjacent compartments one of which is maintained at predetermined temperature and humidity conditions, for example within a freezing temperature range for storage of frozen food.

In a refrigerator of the above mentioned variety, it is customary to provide an inner door for closing the access opening to the freezer compartment in order to prevent spillage of cold air therefrom. Generally such a door is hinged for outward swinging movement, and the provision of a hinge structure for that purpose has given rise to complications and difficulties in mounting the door in proper relation to the access opening to the freezer compartment. These complications and difficulties become especially acute when the door is made of plastic material and is configured to sit within a low conductivity plastic framing member which serves to outline the access opening as well as to frame the door.

For example, it has been customary to affix hinges on the plastic door and surrounding portions of the plastic framing member by means of screws, bolts and like fastening elements, or to mount the plastic door by means of metal pins secured to metal brackets attached to the plastic framing member and projecting from the latter for engagement with metal bearing elements carried by the plastic door. These customary arrangements are subject to objections in that they involve the use of a multiplicity of parts which complicate the mounting of the door and, since such parts are normally exposed to moisture, they are likely to corrode and become defective thus requiring premature repair or replacement. Because of the nature of these known hinging arrangements, the dismounting and remounting of the door necessitates the use of special tools and techniques often involving disassembly of major portions of the cabinet structure to make the parts accessible to effect the required repair or replacement.

It is a primary objective of this invention to overcome the above complications and difficulties by providing a hinge arrangement which facilitates attachment of a plastic inner door to a plastic frame incorporated in the refrigerator cabinet to define the access opening for one compartment thereof.

It is also an object of the invention to simplify the association of the hinge structure with the framing member of a refrigerator compartment and with the door for closing the latter by providing a door mounting hinge arrangement employing few and simple parts capable of being readily associated with the framing member and door without the use of special tools.

Other and more specific objects and characteristic features of the invention reside in the provision of a refrigerator inner door hinge arrangement which is inexpensive to construct and to assemble, which employs no metallic parts thus eliminating rust problems, and which is resistant to wear and tear due to repeated opening and closing of the door.

To attain these general objectives and features, the invention utilizes a framing member of the so-called "heat breaker strip" type adapted to outline the access opening to a food storage compartment within a refrigerator cabinet and to frame the door for closing the access

opening. The framing member and door are made of plastic material having low heat conductivity, and means integral with and projecting from portions of the door serve as pivots rotatably receivable in mounting means engageable with the framing member and preferably made of plastic material adapted to provide noiseless bearings without requiring lubrication. In order to provide for centering of the door within the framing member, the door mounting and keeper arrangements are constructed and disposed to effect uniform spacing between the perimeter of the door and surrounding frame portions.

The nature of the invention, as well as the objectives and advantages thereof, will be more fully understood from the following description based on the accompanying drawings in which:

FIGURE 1 is a fragmentary front view of a refrigerator cabinet embodying the invention, the customary outer door of the cabinet being removed;

FIGURE 2 is an enlarged cross sectional view taken substantially along line 2—2 of FIGURE 1; and

FIGURE 3 is an exploded view showing on an enlarged scale and in perspective one of the two door-mounting bearings and a portion of the frame associated therewith, and

FIGURE 4 is a perspective view of a modified form of the bearing structure.

With more particular reference to the drawing, there is illustrated in FIGURES 1 and 2, a domestic refrigerator cabinet 10 provided with an outer wall structure 11 which has an open front adapted to be closed by the customary outer door (not shown). The cabinet includes a non-freezing compartment 12 and a freezing compartment 14, the latter being provided by a horizontally disposed evaporator shell 15 which is spaced from the inner wall structure. The shell 15 can and preferably is arranged in heat exchange relation with refrigerant circulating coil means 16, and has an open front defining an access opening 17 to the interior of the freezing compartment 14. As shown, the freezing compartment shell 15 is located above the non-freezing compartment 12 and is insulated from the cabinet outer wall structure 11 by means of suitable insulation 18 and also by means of a breaker strip frame 20 of plastic material characterized by its low thermal conductivity.

The breaker frame 20 is generally rectangular in shape and, as viewed in FIGURE 2, has an upper part of generally angular cross-sectional configuration to provide an outer marginal edge portion 21 and an inner marginal edge portion 22 with an intermediate portion 23 disposed between said marginal portions and constructed to define a door-receiving recess 24 within which an inner door 25 is mounted for opening and closing the access opening to the freezing compartment 14. As shown at 26 in FIGURE 2 of the drawing, the outer marginal edge portion 21 of the frame overlays the cabinet outer wall structure 11, and as shown at 28 in said FIGURE 2, the inner marginal edge portion 22 of the frame overlaps and snugly engages the freezer compartment shell 15 at the access opening 17 thereof.

As illustrated, the inner door is made of plastic material and with a hollow interior for insulating purposes. Also as illustrated, the door is of generally rectangular configuration having vertical side edge portions 29 and 30, and horizontal side edge portions 31 and 32. The horizontal side edge portions 31 and 32 are provided with cylindrical projections constituting upper and lower pintles or trunnions 33 and 34, respectively. These projections or trunnions are preferably formed integrally with the aforesaid respective horizontal side edge portions of the inner door 25 and are disposed in vertical alignment adjacent one of the mentioned vertical edge

portions which, as viewed in FIGURE 1, is the right vertical side portion 30.

The upper and lower pintles or trunnions 33 and 34 are rotatably received in upper and lower bearings 35 and 36, respectively, which bearings are preferably made of molded plastic material and are mounted in fixed position in the intermediate portion 23 of the frame 20 to support the inner door 25 for swinging motion about a vertical axis defined by said trunnions. The bearings 35 and 36 are disposed in vertical alingment and as can be seen in FIGURE 1 are located in a position to center the door within the aforesaid door receiving recess 24 provided by the frame 20. The bearings include an internally bored collar 37 and generally spearheaded portion 38 provided with a receding section 39.

As best seen in FIGURE 3, the spearheaded portion 38 and its receding section 39 are multi-sided for insertion through a correspondingly shaped multi-sided aperture 40 in the intermediate portion 23 of the frame. For that purpose the spearheaded portion 38 which at its base is slightly larger than the aperture 40, is formed with longitudinal slots 41 for allowing lateral deformation of the spearheaded portion when forced into the aperture 40 to effect seating of the receding portion 39 within the confines of the aperture after the wider base of said spearheaded portion passes beyond said aperture. Because of this construction, the bearings become affixed on the frame 20 to support and locate the inner door 25 in the manner described above and clearly shown in FIGURES 1 and 2. The two bearings 35 and 36 are of identical construction with the exception that the collar of the lowering bearing 36 on which the inner door rests is taller than the collar of the upper bearing and a spacer 42 is placed between said lower bearing and the inner door 25 in order to raise the latter for centering within the frame recess. The vertical side 29 of the door 25 is provided with a latching protuberance 43 disposed for engagement with a keeper 44 on the frame 20 to hold the door in closed position, a handle 45 being arranged on the door for manual movement thereof to open position.

With the arrangement shown in the drawing and described above, the inner door 25 can be mounted within the recess 24 for the frame 20 in the following very simple manner. The upper bearing 35 and lower bearing 36 are inserted and fixedly seated within their respective apertures 40 in the frame 20, and the spacer 42 is slipped down the lower trunnion 34 of the inner door 25. The inner door is then held in tilted position and the upper side edge portion 31 thereof is placed within the frame recess 24 to effect insertion of the upper trunnion 33 into the upper bearing 35. Thereafter the door is manipulated to bring the lower side edge portion 32 thereof in position to align the lower trunnion 34 with the lower bearing 36 whereupon the inner door is brought to its operative position by insertion of said lower trunnion into said lower bearing and seating the spacer 42 onto the latter.

In FIGURE 4 there is illustrated a modified form of bearing structure wherein a multi-sided upright portion 38*a* with lateral projections 39*a* replaces the spearheaded portion with the receding section of the form of bearing more clearly shown in FIGURE 3. As seen in FIGURE 4, the lateral projections 39*a* are located on the outside surfaces of the upright portions 38*a* and, as represented at D, are spaced from collar portion 37*a*. The spacing D corresponds to the thickness of the frame portion 23 (FIGURE 3) so that when the upright portion 38*a* is inserted within and occupies the multi-sided aperture 40 of said frame portion, the projections 39*a* overlap the latter and cooperate with the collar portion 37*a* to retain the bearing on the frame.

When using bearings of the above described modified form, the upper bearing is inserted within the upper aperture of the frame 20, and the lower bushing is slipped upon the lower trunnion of the door 25 without the spacer shown in FIGURE 2. The door is then tilted to effect insertion of the upper trunnion into the upper bearing and thereafter manipulated to bring the lower bearing in aligned position with respect to the lower aperture of the frame. While in this latter position, the lower bearing is forced into engagement with the frame whereupon the door is seated upon the collar portion of said lower bearing which collar portion as hereinbefore indicated is taller than the collar portion of the upper bearing so as to support the door in a centered position within the frame recess 24.

From the foregoing description it will be appreciated that the invention provides a simplified mounting arrangement for an inner door employed to close the access opening to a freezer compartment within a refrigerator cabinet. The arrangement utilizing only simple moldable parts makes it possible to effect mounting of the inner door quickly and without special skill. While a preferred embodiment of the invention has been illustrated and described, it is to be understood that the details of such embodiment are not to be construed as limiting of the invention except as is consistent with the scope of the subjoined claims.

We claim:

1. In a refrigerator cabinet including a refrigerated inner shell defining a freezing compartment with a generally rectangular open front, an inner door and hinge assembly comprising a frame having a generally rectangular recessed portion surrounding the compartment open front and provided with confronting apertured upper and lower corner areas, an upper bearing snugly fitted in the aperture of the mentioned upper corner area and having a pintle-receiving collar underlying the recessed portion at said upper corner area, a lower bearing snugly fitted in the aperture of the mentioned lower corner area and having a pintle-receiving collar overlying the recessed portion at said lower corner area, a generally rectangular door mounted within the recessed portion, and a pair of axially aligned pintles formed integrally with the door, one of said pintles extending upwardly and being slidably received in the upper bearing collar, the other pintle extending downwardly and being slidably received in the lower bearing collar, the lower bearing collar being extended upwardly in the recessed portion to support the door therein in alignment with the open front of the freezing compartment shell, and the upper bearing terminating at a level providing for movement of the door within the recessed portion and with respect to the bearings, whereby the pintles can be brought into and out of engagement with the bearing collars for mounting and dismounting of the door within the recessed portion.

2. In a refrigerator cabinet including a refrigerated inner shell defining a freezing compartment with a generally rectangular open front, an inner door and hinge assembly as set forth in claim 1, in which the mentioned frame, bearings, door and pintles are formed of plastic material.

3. In a refrigerator cabinet including a refrigerated inner shell defining a freezing compartment with a generally rectangular open front, an inner door and hinge assembly as set forth in claim 1, in which each of the first and second bearings includes a generally spearheaded portion passing through the aperture in the corresponding corner area of the recessed portion of the frame, and the receding section being seated within the said aperture.

4. In a refrigerator cabinet including a refrigerated inner shell defining a freezing compartment with a generally rectangular open front, an inner door and hinge assembly as set forth in claim 1, in which each of the mentioned bearings includes a generally upright portion, the latter having outer lateral projections which are spaced with respect to the bearing collar, said upright portion passing through the aperture in the corresponding corner

area of the recessed portion of the frame, and the aforesaid projections overlapping the frame adjacent said aperture.

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