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REFRIGERATOR EVAPORATOR DOOR

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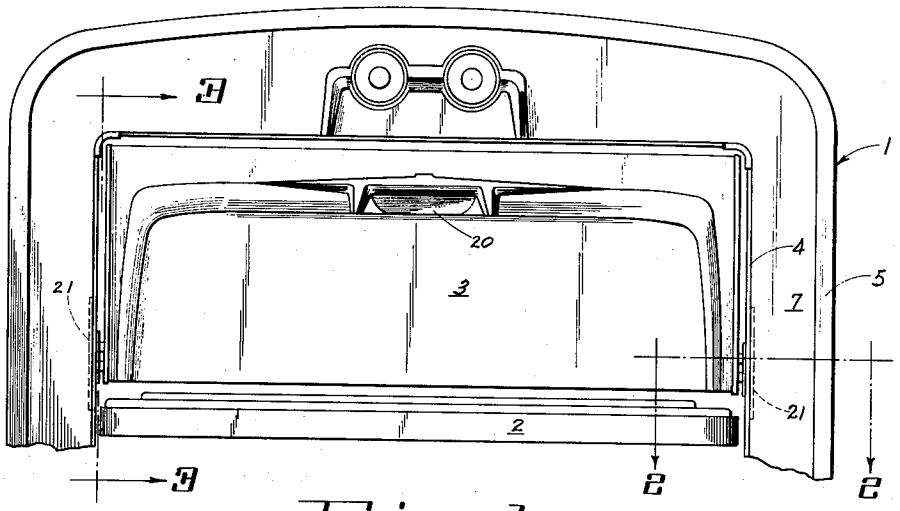


Fig. 1

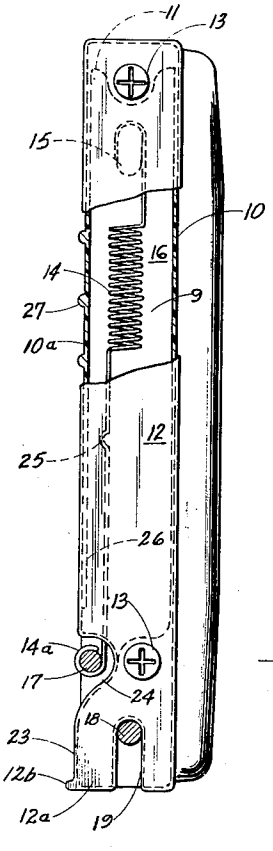


Fig. 3

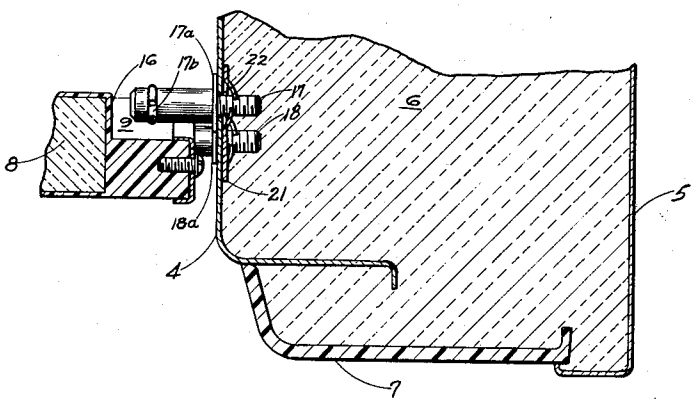


Fig. 2

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REFRIGERATOR EVAPORATOR DOOR

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4 Claims. (Cl. 20—35)

The present invention relates generally to refrigerators, more specifically to an improved construction for an evaporator door and its mounting within a refrigerator.

During recent years horizontally disposed evaporators have become quite popular and are used in a number of household refrigerators. It is customary when such an evaporator is used to provide a door, hinged about a horizontal line, which in its closed position isolates the volume within the evaporator from the remaining food storage space of the refrigerator. Doors of this type may be made in a variety of ways, although for the purposes of the present invention it is considered desirable, though not necessary, to employ molded plastic components for the door.

The present invention concerns the provision of a pair of springs disposed substantially within the evaporator door so as to be invisible to the user of the refrigerator. More particularly it is an object of the present invention to provide return springs for restoring the door to its closed position which also act to hold the door against a pair of stationary pins mounted on the side walls of the refrigerator cabinet to insure pivotal motion of the door about the pins at all times.

An important object of the present invention is to provide an improved means for mounting an evaporator door which is not only attractive and economical to produce but also extremely simple and very easily assembled to the associated refrigerator cabinet.

A still further object of the present invention is to provide an improved structure for mounting an evaporator door which supports the door so that it may be used in its horizontal open position as a supporting surface for ice trays and other utensils.

A particular advantage of the invention is that conventional hinges, usually used with evaporator doors, are eliminated and are replaced merely by a pair of return springs and two pairs of simple transverse pins secured to the side walls of the refrigerator.

A further object of the invention is to provide for an evaporator door a return spring, the body of which remains spaced from the interior of the door at all times so as to preclude the transmission thereto of objectionable vibrations.

The novel features that are considered characteristic of the invention are set forth in the appended claims; the invention itself, however, both as to its organization and method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in conjunction with the accompanying drawing, in which:

Fig. 1 shows in vertical elevation to a reduced scale the upper portion of a household refrigerator having a horizontal evaporator and an evaporator door, shown in its closed position;

Fig. 2 is a cross-sectional view taken on plane 2—2 of Fig. 1 showing the construction at the edge of the evaporator door and the side wall of the refrigerator cabinet; and

Fig. 3 is an end view of the evaporator door taken on plane 3—3 of Fig. 1 showing the installation of a return spring within the door, parts of the door being broken away to facilitate the following description.

The preferred embodiment of the present invention is shown associated with a household refrigerator, generally designated 1, having a horizontal evaporator 2 at the lower edge of which is pivotally positioned an evaporator door 3. The refrigerator includes an inner liner 4 and an outer shell 5 between which is disposed thermal insulation 6 maintained in position by a forwardly disposed breaker strip 7, thereby defining the walls of a refrigerator cabinet. Evaporator 2 and door 3 define a frozen food storage space which is accessible by opening the door.

The evaporator door may be made in a variety of ways but, preferably, is molded from a thermoplastic, such as polystyrene, in sections which may be joined to make an enclosure in which is disposed thermal insulation 8. With particular reference to Figs. 2 and 3, the present invention comprehends the provision of an integrally molded slot or recess 9 at each end of the evaporator door which is bounded by front and rear walls 10 and 10*a* respectively, and top wall 11. Removable metal end plates 12 are secured to the ends of the evaporator door by screws 13 and cooperate with recesses 9 in defining a box-like enclosure in which is positioned a return spring 14 at each end of the evaporator door.

As indicated in Fig. 3 each return spring is engaged at one end with a projecting lug 15, formed integrally with and projecting from end wall 16 of the evaporator door. The other end of each spring, 14*a*, passes through an opening at the lower end of slot 9 and engages a metal pin 17 which is removably secured to the refrigerator cabinet as will be described. Another pin 18 is also secured to the refrigerator cabinet at each end of the evaporator door and engages a U-shaped slot 19 formed at the lower end of each plate 12 as well as in the lower portion of the door proper. As will be described presently, the tension of spring 14 tends to hold the evaporator door in bearing relationship with pins 18 at all times so that the evaporator door may pivot about these pins when it is opened by being grasped by finger grip 20 and pulled forwardly and downwardly.

With particular reference to Fig. 2, it will be noted that a nut-strip 21 is secured to the interior surface of the inner liner at each end of the evaporator door. This strip is secured to the wall of the refrigerator by conventional fasteners before the evaporator door is assembled therewith. Holes 22 are provided in liner 4 to permit the passage of pins 17 and 18 through the liner and into threaded engagement with threaded openings provided in strips 21 corresponding to holes 22. Flanges 17*a* and 18*a* may be provided on pins 17 and 18, respectively, to increase the bearing area against the face of the liner.

Pins 17 and 18 may be identical in all respects to facilitate manufacture.

When the two pins have been secured to each refrigerator wall, the evaporator door, with springs 14 disposed in position within recess 9 and plates 12 in place, is lifted and slid into engagement with pins 18. During this engagement, lower corner portions 12*a* pass between pins 17 and 18 at each side of the refrigerator. When pins 18 are bearing against the top of slots 19, the lower ends 14*a* of springs 14 are gradually loaded and engaged with pins 17. This engagement of the springs with pins 17 completes the assembly of the evaporator door which can then be swung about the common transverse line, defined by the axes of pins 18, from an open horizontal position to a closed vertical position shown in Fig. 1. It is considered desirable to provide grooves 17*b* in pins 17 to hold ends 14*a* of the spring in engagement therewith.

Projections 12*b* may be provided on the lower ends of plates 12 to prevent the door from being pulled out of engagement with pins 18 when the door is open. The full open position of the door is determined by the engagement of pins 17 with edges 23 of plates 12.

In addition to being a decorative covering for recesses 9, plates 12 strengthen the assembled door, making possible the use of relatively weak plastics. For this reason, plates 12 are formed to engage fully the edges at the ends of the door thus increasing its beam strength. Furthermore, the lower ends of the plates improve the bearing strength of the assembled door on pins 18 and resist effectively the bending moments, particularly in corner portions 12*a*, incidental to use of the door as a supporting shelf when in its open position.

A review of the herein disclosed structure will reveal that springs **14** are almost totally enclosed and, with the exception of lower ends **14***a*, are not visible to the user of the refrigerator. At all times the evaporator door is held contiguous to pins **18** by the force of springs **14** acting on pins **17** and lugs **15** of the evaporator door proper. Pins **18** ride against the upper portions of U-shaped slots **19** functioning as hinges and eliminate the need for hinges of the conventional type usually used.

The energy stored in springs **14** is sufficient to return the door to its closed position after it is released from the open position. When fully closed, pins **17** are disposed within semi-circular notches **24** provided at the lower ends of plates **12**. It will be apparent that the springs are entirely invisible when the door is closed.

An important refinement of the present invention is the provision of bight **25** in each spring **14**. As the refrigerator door is opened bight **25** gradually approaches and comes into contact with inner surface **26** of wall **10***a*. Such engagement of the bight with the wall of the door reduces friction and prevents the body of the spring from setting up a vibratory, noisy chatter against the door.

Use of the present evaporator door makes possible the support of ice trays and other such utensils on the evaporator door when in its open position. To facilitate such use, ribs **27** are formed integrally with the rear wall of the door. These ribs not only strengthen the structure but provide narrow supporting surfaces for engaging the utensils, thus preventing scratching or marring of the door proper.

Should a spring **14** require replacement, it is merely necessary to open the evaporator door sufficiently to expose ends **14***a* of the springs which, after disengagement from pins **17**, permit the door to be withdrawn from pins **18**. It is then a simple matter to remove screws **13** and replace springs **14**, if necessary.

It will be obvious to those versed in the art that the herein disclosed structure simplifies the assembly of an evaporator door to the cabinet of a refrigerator. The simple construction eliminates standard hinges which must be accurately screwed or otherwise secured to the side walls of the refrigerator and also greatly simplifies the refrigerator assembly procedure with obvious resulting savings when used in mass production.

Having thus described a preferred embodiment of my invention, I claim:

1. An evaporator door installation for use in a refrigerator cabinet having side walls comprising an evaporator door formed to define open ended slots at its lower corners, rigid members projecting transversely from the side walls of the cabinet, the slots of said evaporator door being positioned to engage said projecting members, said evaporator door being further formed to define elongated substantially enclosed recesses at each side thereof, tension springs invisibly disposed within the recesses, anchoring means on said evaporator door and the refrigerator side walls between which said springs are stretched, whereby said evaporator door is maintained yieldingly against said projecting members.

2. An evaporator door installation for use in a refrigerator cabinet having side walls comprising a door formed to define open ended slots at the lower corners thereof, said slots extending parallel to the ends of the door, rigid members projecting transversely from the side walls of the cabinet, the slots of said door being engaged with said projecting members, said door being further formed to define elongated substantially enclosed recesses at each end thereof, openings through the rear face of said door in communication with the lower ends of said recesses, tension springs invisibly disposed within the recesses, one end of each tension spring being secured to an anchoring means within each recess, the springs extending through the openings at the lower ends of the recesses and being secured to the cabinet side walls adjacent said projecting members whereby the springs are tensioned thereby holding the slots of said door in bearing engagement with said projecting members at all times.

3. Apparatus as defined in claim 2 in which said tension springs are formed to define projections bearing against said evaporator door whereby transmission of vibration from said springs to said door is minimized.

4. An evaporator door installation for use in a refrigerator cabinet having side walls comprising an evaporator door having open ended slots at its lower corners, rigid members projecting transversely from the side walls of the cabinet, the slots of said evaporator door being in engagement with said projecting members, said evaporator door being further formed to define elongated substantially enclosed recesses at each side thereof, springs invisibly disposed within the recesses in bearing relationship with said evaporator door, anchoring means on the refrigerator side walls with which said springs are engaged, whereby said evaporator door is maintained yieldingly against said projecting members.

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