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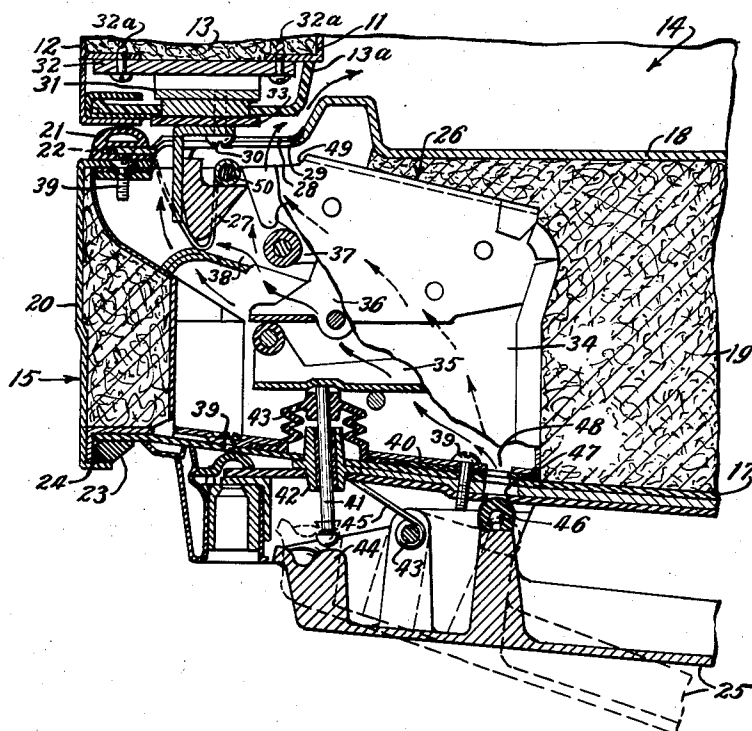
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VACUUM RELEASE MECHANISM FOR REFRIGERATED CABINET

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2 Sheets-Sheet 2

Fig-4



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VACUUM RELEASE MECHANISM FOR REFRIGERATED CABINET

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Original application May 11, 1955, Serial No. 507,617, now Patent No. 2,810,493, dated October 22, 1957. Divided and this application May 6, 1957, Serial No. 658,477

1 Claim. (Cl. 220—44)

This invention relates generally to refrigerated cabinets, but is more specifically directed to a vacuum release of pressure equalizing means applicable for incorporation in such cabinets.

The present application is a division of our application, Ser. No. 507,617, filed by the same applicants May 11, 1955, with the same title, now Patent No. 2,810,493.

There is in wide use on the commercial markets today a low-temperature refrigerated cabinet, commonly referred to as a vertical freezer, wherein the cabinet and food storage area are usually arranged with a front access opening that is covered with a hinged door or closure member, and such freezer cabinet most generally is adapted for maintaining temperatures in the order of zero degrees (0°) Fahrenheit therein. In order to economically maintain such low temperatures in these cabinets over appreciable lengths of time it was found necessary to minimize air leakage around the access opening thereof and, accordingly, a very efficient and highly effective gasket seal was developed. However, the application of such highly effective air sealing means forthwith introduced a new problem involving the release or opening of the door because of pressure differences between the interior and the outside atmosphere, and the solution of such problem forms an important feature of the present invention.

It has been found that when a vertical freezer cabinet of the type mentioned is either empty or nearly empty that the pressure differential between the interior and the exterior of the cabinet thereof may become sufficient to preclude or at least render difficult the reopening of the access or entry door immediately after it has been closed. It is believed this condition is brought about by the fact that when the door is opened the cold (zero degree) air in the cabinet falls out into the atmosphere, and then when the door is reclosed and the warmer air from the atmosphere outside the cabinet is forced thereinto the warm air immediately starts cooling and upon cooling contracts, thus reducing the pressure therewithin and forming a vacuum which must be overcome, preferably by equalizing interior and exterior pressures, before the door can again be readily opened. It was found in laboratory tests that it usually will require from five to six minutes before the air pressures inside and outside the cabinet are sufficiently equalized, through natural leakage of air around the sealing gasket and otherwise, to again permit easy opening of the door. At times, of course, such a delay becomes a definite nuisance as well as an exasperating inconvenience because the user thereof has to wait through the time of this pressure equalizing cycle to again gain entrance to the freezer. This would be particularly disturbing if some food article that should have been put into the freezer, such as one that required maintenance at a critical temperature to avoid spoilage, was inadvertently left out when the door was last opened. The present invention is directed to a novel solution of

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this unusual but heretofore not generally understood problem.

It is an important object of the present invention, therefore, to provide novel and simplified means for rapidly equalizing air pressure differences between the interior and exterior of refrigerated cabinets.

Another object is to provide pressure equalizing means between interior and exterior cabinet air pressures in a front opening type of refrigerated cabinet having a closure door hingedly mounted over said opening.

A further object is to provide a pressure-equalizing device incorporated in the door of a refrigerated cabinet and which cooperates with the door actuating handle mechanism to permit equalization of air pressures between the interior and exterior of the cabinet.

A still further object is to provide an air passageway communicating with the interior and exterior of a refrigerated cabinet and to additionally provide means whereby said passageway may be selectively opened or closed to the passage of air from outside said cabinet.

A yet still further object is to provide means for admitting air under atmospheric pressure into the interior of a refrigerated cabinet in order to minimize the air pressure differential between the interior and exterior of said cabinet.

The foregoing and other objects and features of the invention will become apparent as the disclosure is more fully made in the following detailed description of a preferred embodiment of the invention and as illustrated in the accompanying sheets of drawings in which:

Figure 1 is a front elevational view of a refrigerated cabinet employing the proposed invention;

Figure 2 is a top plan view of the refrigerated cabinet shown in Figure 1;

Figure 3 is a partial sectional view taken on line 3—3 of Figure 1 and shows generally the sealing means between the cabinet and the entry door;

Figure 4 is a partial sectional view taken on line 4—4 of Figure 1 and shows the application of a preferred embodiment of the proposed device to the door of a refrigerated cabinet.

A reference to the drawings will show that in the preferred embodiment selected for illustrating a general application of the present invention there is depicted an upright type of front-opening refrigerated cabinet which is represented generally by the numeral 10. This type cabinet usually is fabricated with an inner shell or liner 11 spaced from a similarly conformed outer shell or liner 12 and having heat insulating material 13 therebetween, while the the marginal edges of said inner and outer shells may be bridged with a breaker strip 13a of any suitable well-known low-heat conducting plastic material as is well understood. The inner liner 11 is formed to define a food storage area or compartment, indicated generally by the numeral 14, having a front access opening therein that is covered by an insulated entry door 15 which may be hingedly secured to the cabinet by suitable means such as the hinges 16. The double-walled access door 15 may be fashioned somewhat similarly to that of said cabinet with an outer panel 17 spaced from an inner panel 18 and having heat insulating material 19 in the space therebetween.

The marginal edges of the outer panel 17 of said door may be secured by suitable conventional affixing means to a peripherally extending channel-like member 20, whereas the marginal edges of the inner panel 18 extend into a resilient gasket sealing member 21 and are suitably secured along with said gasket, by conventional means such as the screws 22, to said channel member. If desired, a suitable trim member, such as the resilient member shown at 23, may be positioned in a peripherally ex-

tending recess or opening 24 adjoining the forward marginal edge of the channel member 20.

Since the refrigeration apparatus plays no particularly unusual role in the present invention it was not shown in the drawings and will not be described herein. Suffice it to say, however, that any conventional or well-known refrigeration system and apparatus may be used in its normal manner without deviating from any teachings or concepts of the instant invention.

The door 15 is provided with a handle 25 pivotally mounted on the exterior thereof, which is adapted to actuate a generally conventional latching mechanism, indicated generally by the reference numeral 26, that engages and interlocks with a strike 27 which, in turn, is affixed to the cabinet 10. An escutcheon-like frame or guard rim 28 having an opening 29 therein is suitably positioned over an opening provided in the inner door panel member 18 in the vicinity of the said latching mechanism. The opening 29 in said escutcheon is provided to accommodate the strike 27 which is suitably and adjustably secure, as by the screws 30, to a pedestal-like spacer member 31 that is fixedly secured by conventional means to a transverse supporting member 32 which, in turn, is rigidly fastened by conventional means such as the screws 32a between the inner and outer wall members 11 and 12, respectively, of said cabinet. The pedestal-like support member 31 of said latch strike is dimensioned to project through an opening in the breaker strip member 13a and, if desired, an escutcheon-like frame 33 may be positioned therearound for appearance improving purposes.

The latching device 26, which is a generally available item on the commercial markets, is fashioned with an outer casing or housing 34 which supports and encloses a plurality of pivotally mounted and sequentially motivated operating or latch members 35, 36, 37 and 38. The latch casing 34 may be fixedly positioned within the door, by suitable means such as the screws 39, while a resilient gasket-like sealing pad 40 may be positioned between said casing and the outer door panel 17. An actuating plunger 41 actuable by the handle 25 is slidably mounted in a bearing member 42 that is suitably secured to the door over an opening in the outer panel thereof and said plunger is disposed to extend through an adjoining opening in a side wall of the casing 34 so that the inner end of said plunger may engage the first operating member 35 of said latch mechanism. A resilient bellows-like sealing boot 43, having outwardly extending flange portions thereon that are fixedly positioned between the said casing and said outer door panel, is positioned over the adjoining openings in said door panel and casing and closely surrounds the plunger 41 so as to permit a sliding action thereof while at the same time sealing the area around said plunger against the admission of air from outside of said cabinet to the interior thereof. The handle 25 which is pivotally mounted on the pin 43 has a heel-like portion 44 which is disposed to contact and engage the outer end of the plunger 41 upon movement of said handle. A resilient restraining member, such as the spring 45, is disposed to bias the handle to a position normally out of engagement with said plunger. Mounted on a portion of the handle, disposed on the opposite side of the pivot 43 from that of the heel 44, is a button-like sealing pad member 46 which is positioned to seat on and to seal off or close the opening 47 through the door outer panel 17 together with the aligned opening 48 in a wall of the latch housing 34. An opening 49 in an opposite wall of said latch housing is provided to accommodate the latch strike 27 which engages the holding or interlocking roller 50 that is pivotally mounted on the latch member 38 forming part of the said latch mechanism.

In operation, when the door 15 is closed the gasket seal 21 engages and presses against the flanged over marginal edge portion of the cabinet outer wall 12 and thereby provides an air seal against the ingress and egress of air

to and from the food storage compartment 14. As the air within said compartment subsequently cools it contracts and a pressure differential is established between the cabinet air and that of the outside atmosphere; hence the subsequent breaking of the air seal provided by the gasket 21 is ordinarily accomplished only with great difficulty. With the present invention however, as the door handle 25 is grasped by the user and rotated around the pivot 43 to start the door opening operation the sealing button 46 is unseated by being raised off the opening 47 and, because the atmospheric air is at a higher pressure than that of the compartment 14, air from outside the cabinet will flow, in the path indicated generally by the broken arrow lines of Figure 4, through the aligned openings 47 and 48, through the interior of the housing 34 and the opening 49 in the opposite side thereof, and through the opening 29 in the inner door panel 18 to the reduced pressure areas within said cabinet. The inrush of air at atmospheric pressure into the cabinet tends to raise the pressure therein and thus equalizes the interior and exterior pressures. In this way the pressure differential between the compartment or cabinet air and the outside atmosphere is minimized and thus the vacuum like effect of the air seal is broken and the door may then be easily opened. By continuing the rotation of the handle 25 about its pivotal mounting pin 43 the heel 44 of said handle is made to engage and actuate the plunger 41 which then slides in its bearing member 42 to contact the first latch operating member 35 of the latch mechanism 26. The motion transmitted by said plunger to member 35, in turn, is transmitted successively through members 36 and 37 to the last member 38 which upon rotation releases the keeper of holding roller 50 from its interlocking relationship with the strike 27 thereby permitting the door to be opened. Since the latching mechanism is generally conventional in construction it is felt further detailed description of the components of its structure and operation is unnecessary for purposes of the present invention.

It should now be apparent that a novel pressure equalizing means has been shown and described, and it is to be understood that changes may be made in the construction without departing from the spirit of the invention or the scope thereof as defined in the appended claims.

What is claimed is:

In a combined refrigerator latch mechanism and air pressure release, the combination of a hook shaped strike to be carried by a refrigerator having a door with an outer panel adjacent a door opening, said strike having a transverse retaining shoulder and a beveled camming shoulder, with a latch and pressure release mechanism comprising a latch housing to be carried by the back of said outer door panel, and said housing having a sealing gasket to be positioned between the housing and the outer panel of the door, said gasket being clamped by threaded members securing said housing to said outer door panel, closing an opening in said outer door panel, a door handle having a grip pivotally mounted on said housing to be located outside the door, an elongated tubular bearing member carried by said housing and slidably supporting an actuating plunger for the latch, said plunger having a head located to be engaged by a heel of the door handle, said heel being located on the handle rear on that end of the handle which is beyond the pivot and opposite to the grip, a resilient bellows having its closed end secured to move with said plunger, and having its other end secured to the housing about said bearing, a latch pivoted on said housing to be retracted by engaging the beveled shoulder and to latch the door by engaging said transverse shoulder, a succession of pivoted levers acting on each other and pivoted on said housing and arranged to actuate said latch by means of said plunger, spring means for moving said latch toward latching position, spring means for urging the handle into a latched position with said heel out of engagement with said

plunger, and a sealing pad carried by the rear of the handle on the grip thereof and located to engage and seal an opening extending through the outer door panel and through said housing to relieve the pressure differential in the refrigerator by the initial movement of the handle, lifting said pad off said plunger before the heel of the handle engages said plunger or moves said latch, said pad automatically sealing said aperture upon release of the handle.

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