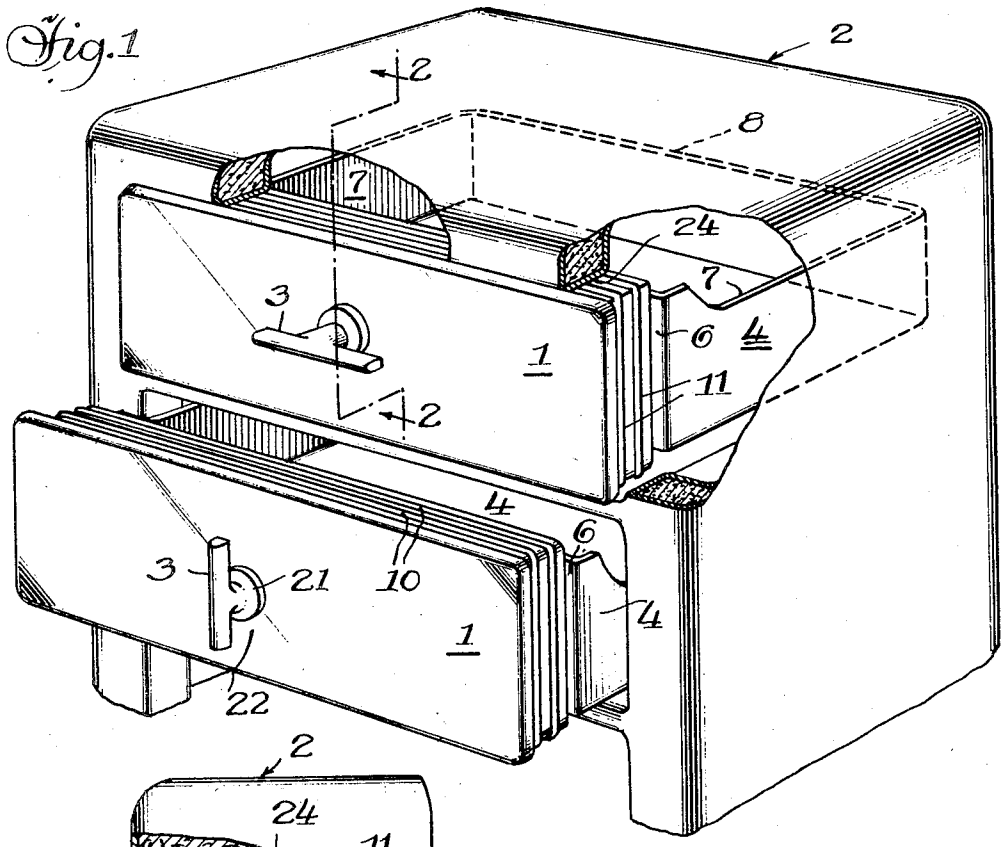
Oct. 24, 1950 T. R. SMITH 2,527,084

REFRIGERATOR CLOSURE WITH HYDRAULIC SEAL

Filed Nov. 1, 1946

Fig. 1



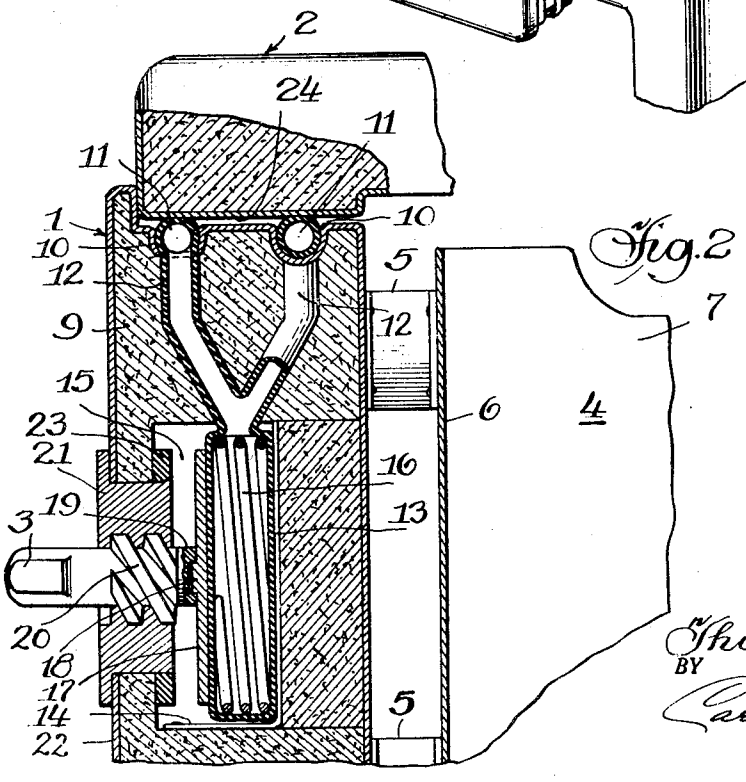
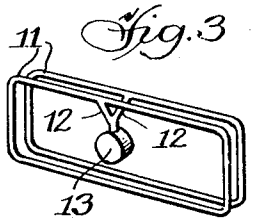


Fig. 2

Fig. 3



INVENTOR.
Thomas R. Smith,
BY
Carl F. Jeffers
Atty.

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REFRIGERATOR CLOSURE WITH HYDRAULIC SEAL

Thomas R. Smith, Newton, Iowa, assignor to The Maytag Company, Newton, Iowa, a corporation of Delaware

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6 Claims. (Cl. 220—46)

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The present invention relates to seal means and especially to a novel hydraulic seal means for a closure member, and it has for an object to provide improved apparatus of the character set forth.

In doors or closures of the type now employed in, for example, refrigerators, a single or double resilient gasket is provided upon a shoulder on the door or closure disposed in a plane substantially at right angles to the motion or path of movement of the door, and a mating portion is provided on the refrigerator cabinet surrounding the opening for the shoulder on the door. By reason of such construction and arrangement, it is necessary that the door be considerably larger than the opening in order to provide for the complementary or mating shoulders and especially is this true where a double gasketing arrangement is employed.

In the present construction of refrigerator or deep freezing unit, there is provided a plurality of drawers mounted in relatively close spaced relation in one or more vertical banks or tiers. In such a unit the use of the ordinary type of gasketing referred to above would result in the loss of an excessive amount of storage space. It is, therefore, an object of the present invention to provide a novel assembly and sealing means allowing for maximum storage space and permitting the closure to be approximately the dimensions of the drawer at the rear of the closure.

The present invention further comprehends the provision of a novel hydraulic seal requiring a minimum of space and which is actuated by a handle which is also utilized to move the closure and drawer into and out of the refrigerator cabinet.

Another object of the invention is to provide a cabinet having an opening therein for a closure member and wherein hydraulic seal means is operated to simultaneously seal the interior from the exterior of the cabinet and to retain the closure in its closed position.

Another object of the present invention is to provide a novel seal assembly carried by the closure and so constructed and arranged as to engage and positively seal under hydraulic pressure against a smooth mating surface provided in an opening in a refrigerator cabinet.

Another important advantage of the present novel invention is the provision of a door or closure which requires no latching means for retaining it in closed position.

Further objects are to provide a construction

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of maximum simplicity, efficiency, economy and ease of assembly and operation, and such further objects, advantages and capabilities as will later more fully appear and are inherently possessed thereby.

The invention further resides in the construction, combination and arrangement of parts illustrated in the accompanying drawing, and while there is shown therein a preferred embodiment, it is to be understood that the same is susceptible of modification and change, and comprehends other details, arrangements of parts, features and constructions without departing from the spirit of the invention.

In the drawing:

Figure 1 is a fragmentary view in perspective of a refrigerator or deep freezing unit having a plurality of slidable drawers equipped with the novel sealing means of assembly.

Fig. 2 is a fragmentary enlarged view in vertical cross-section taken in a plane represented by the line 2—2 of Fig. 1.

Fig. 3 is a perspective view of the hydraulic system for effecting sealing between the door or closure and the encompassing cabinet.

In the embodiment selected to illustrate the invention in the several views in the drawing, the novel seal assembly is shown embodied in the door or closure 1 for a refrigerator or deep freezing unit or cabinet 2. The door 1 is provided with a handle 3 for moving the door or closure and a slidable drawer 4 for containing food products such as meat, fish, vegetables or other perishables.

The drawer 4 is suitably and rigidly connected to the closure as by means of a plurality of spacer brackets 5, whereby the front 6 of the drawer is separated from the closure an amount sufficient to permit the circulation of air therebetween. For the same reason, the sides 7 and the back 8 of the drawer are preferably spaced from the interior of the refrigerator case or lining of the insulated cabinet an amount sufficient to permit air to circulate about the drawer, either by convection or forced draft. Any number of such closures and drawers may be provided in vertical and/or horizontal alignment depending upon the size of the cabinet or unit, and each drawer is carried by suitable hangers and guides (not shown) in the refrigerator case to permit each assembly of closure and drawer to slide inwardly or outwardly into closed or open position.

Each closure is shown of relatively thick construction and suitably filled with insulation 9 to prevent heat losses. Around the periphery

or edge, each closure is provided with one or more continuous grooves or recesses 10 for the reception of a continuous length of flexible or expansible hollow tubing 11 adapted to receive hydraulic fluid. Each tube 11 is connected to one end of a section of hollow tubing 12. The other end of the sections of tubing 12 opens into and connects with a fluid supply and source of hydraulic pressure, such as, for example, a flexible and hollow bellows 13 mounted within a support 14 in a recess 15 preferably provided in the interior of the door or closure 1. Within the bellows is provided a confined quantity of any suitable hydraulic fluid and a coil spring 16 for returning and normally maintaining the bellows expanded.

To actuate the flexible bellows and to thereby apply hydraulic pressure for forcing the hydraulic fluid into the flexible tubing 11, the bellows 13 is associated with a pressure plate 17 having a projection 18 mounted in a recess in the end 19 of a rotatable cam follower 20. This cam follower is threaded into a cam 21, anchored in an opening in the face 22 of the closure, and may be locked thereon by an internal collar 23. The shank of the follower is formed on or connected to the handle 3. Thus, by turning the handle in a clockwise direction, the pressure plate 17 compresses the bellows against the action of the spring 16 and forces the hydraulic fluid into the section 12 and flexible tubing 11. This action expands and forces the tubing against the smooth mating surface 24 in the opening in the interior of the refrigerator cabinet, thereby forming a positive seal between the refrigerator door or closure and the cabinet. It is to be understood that the grooves 10 may be provided in the adjacent surface of the cabinet and that the hydraulic operating mechanism may not necessarily be operated by the handle 3 of the closure member.

When the handle 3 is rotated in a counterclockwise direction to relieve pressure on the bellows and permit outward movement of the pressure plate 17 under expansion force of the spring 16, pressure on the fluid in the hydraulic system is relieved and the tubing 11 collapses. This breaks the seal and the door or closure 1 and drawer 4 may be readily pulled outwardly to secure access to the contents or interior of the drawer. The pressure remains relieved and the tubing is in a collapsed condition until after the closure is moved to closed position. At this point, turning of the handle in a clockwise direction compresses the bellows and applies hydraulic pressure to the fluid through the cam mechanism and pressure plate to expand the tubing. Expanding or distending the tubing 11 with the hydraulic fluid provides a continuous hydraulic seal about the periphery of the door or closure and simultaneously locks the door in closed position due to the friction built up by the tubing 11 against the surface 4 about the opening in the refrigerator cabinet. By sealing the door in this manner no additional latching or locking means is required.

Although but a single groove and a single continuous length of hydraulic tubing will give good sealing action in order to provide a dead air space about the closure and to give maximum sealing action, I prefer to employ the spaced tubing 11 in the manner shown in the drawing. This tubing and bellows may be formed of any suitable flexible or rubber-like expansible material. In order that the tubing provide a continuous seal and may be bent about the periphery of the door or closure without kinking, the corners of the door or closure and the adjacent or encompassing surfaces in the opening in the cabinet are preferably rounded.

From the above description and the disclosure in the drawing, it will be apparent that the invention comprehends a novel hydraulic seal for a door or closure and in which the closure may be made of substantially smaller dimensions than prior structures. This allows for maximum storage space and permits the closure to be approximately the size of the drawer at the rear thereof.

Having thus disclosed my invention, I claim:

1. In a hydraulic seal assembly for refrigerator doors or closures, comprising a closure for an opening in the refrigerator, one or more grooves provided in the periphery of the closure, one or more sections of flexible tubing provided in the grooves, a handle on the closure, and mechanism in the closure actuated by the handle for inflating said tubing and forcing it into sealing contact with the adjacent surfaces in the cabinet when the closure is moved to closed position and for deflating said tubing to release the sealing contact when the closure is to be opened.

2. In a hydraulic seal assembly for refrigerator doors or closures, comprising a closure for an opening in the refrigerator, one or more grooves provided in the periphery of the closure, one or more sections of flexible tubing provided in the grooves and encompassing the periphery of the closure, a flexible bellows connected to the tubing and a source of fluid supply in the bellows, a handle for operating the closure, and means for compressing the bellows when the handle is moved in one direction to thereby apply pressure to the bellows and force the fluid under pressure into the tubing and expanding the latter for sealing contact with the encompassing surfaces on the cabinet, and relieving the pressure on the bellows when the handle is moved in another direction whereby the pressure in the tubing is relieved and sealing contact is broken.

3. In a refrigerator or frozen food cabinet provided with a closure for securing access to the interior of the cabinet, a hollow flexible sealing tube carried in the periphery of the closure, a handle on the closure for moving it into open or closed position in an opening in the cabinet, and hydraulic means actuated by the handle for supplying hydraulic fluid under pressure to the sealing tube when the closure is moved to closed position to seal the space between the closure and cabinet.

4. In a cabinet having an access opening, a spaced closure member for said opening, a handle on said closure for moving it into open or closed position with respect to said cabinet, sealing means disposed between the opening in said cabinet and said closure, and hydraulic means actuated by said handle to cause said sealing means to seal said spaced closure member and said cabinet.

5. In combination, a cabinet having an access opening, a closure for the opening, a resilient tubular sealing member for sealing the space between the cabinet and closure, a contractible and expansible imperforate bellows in said closure and in communication with said tubular sealing member to define a closed chamber, a quantity of liquid confined in said bellows and tubular sealing member, and means for contracting said bellows to displace a portion of the liquid to

thereby expand the tubular sealing member and seal the space between the closure and cabinet and expanding said bellows to contract said tubular sealing member to break the seal between the closure and cabinet.

6. In a cabinet having an access opening, a closure for said opening, a resilient hollow sealing means carried at the periphery of said closure, a contractible and expansible bellows mounted in said closure and communicating with said hollow sealing means, a fluid confined in said bellows and hollow sealing means, and means for contracting the bellows to thereby expand the resilient sealing means into contact with the cabinet about the opening and for expanding said bellows to contract said sealing means out of contact with the cabinet.

THOMAS R. SMITH.

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