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2,446,336

MAGNETIC REFRIGERATOR DOOR CLOSURE AND SEAL

Filed July 27, 1944

2 Sheets-Sheet 1

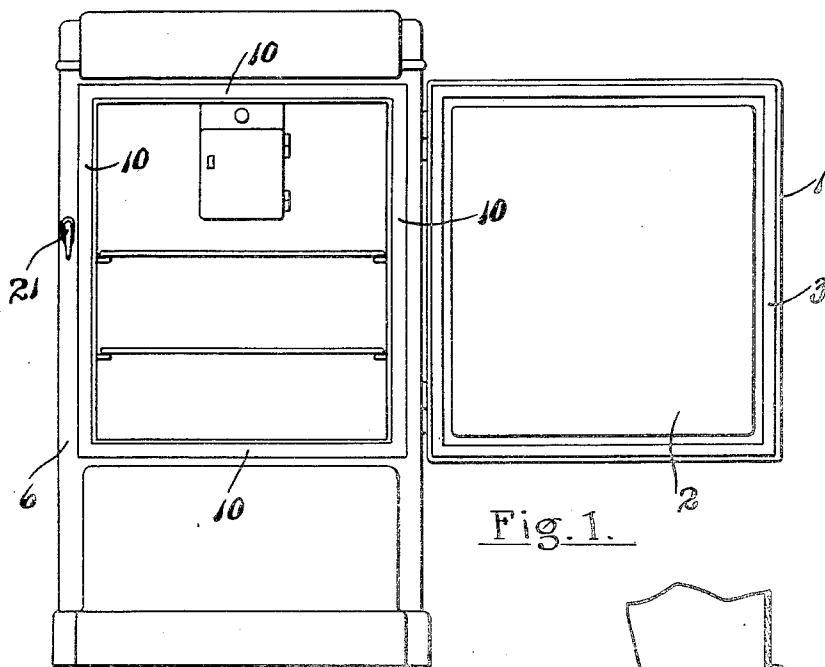


Fig. 1.

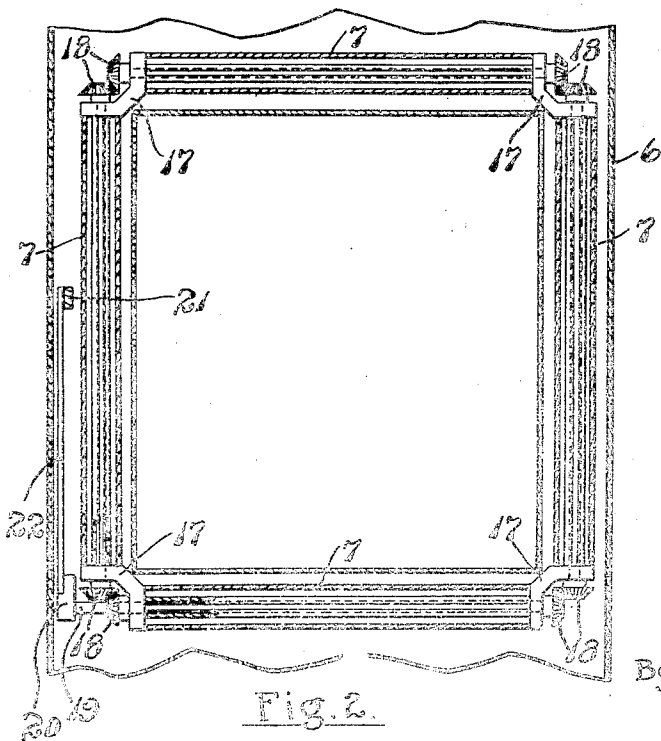


Fig. 2.

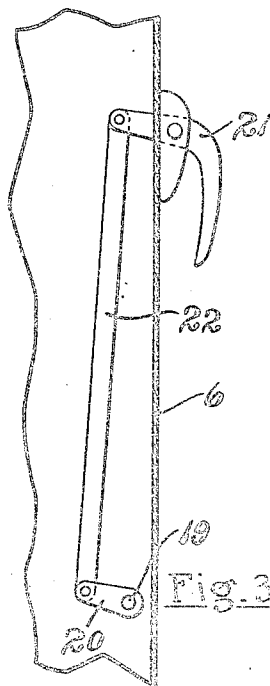


Fig. 3.

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2 Sheets-Sheet 2

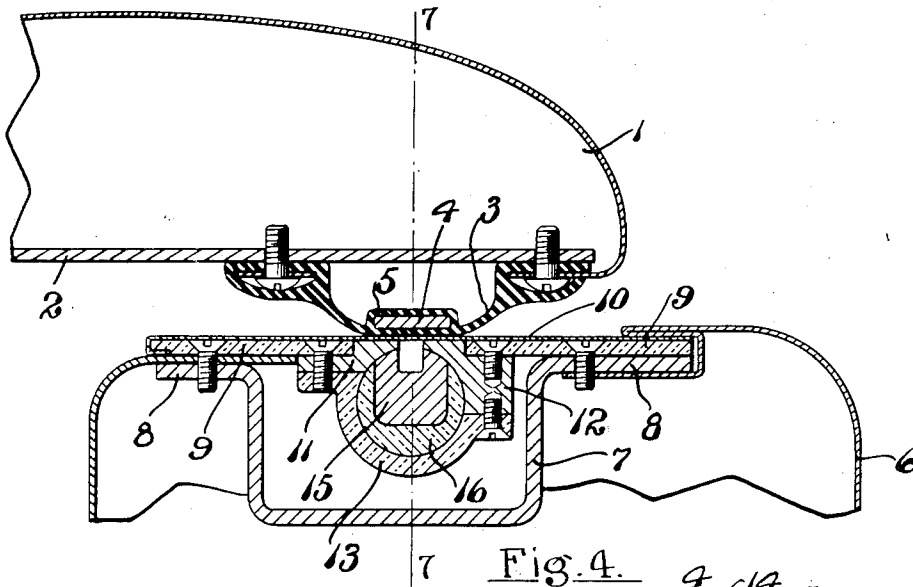


Fig. 4.

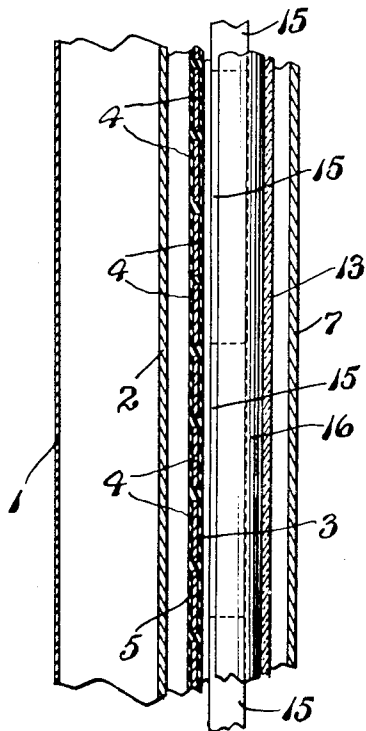


Fig. 7.

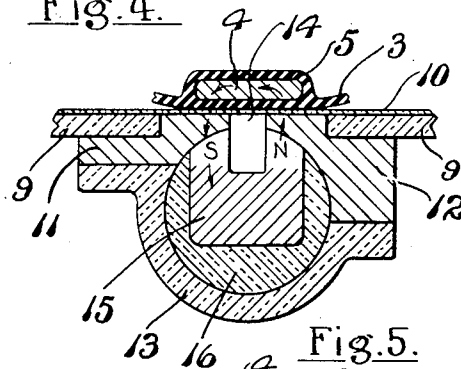


Fig. 5.

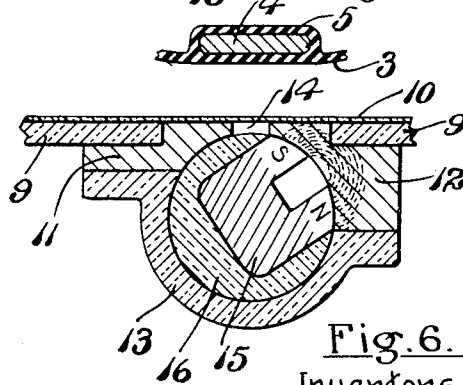


Fig. 6.

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UNITED STATES PATENT OFFICE

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MAGNETIC REFRIGERATOR DOOR
CLOSURE AND SEAL

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6 Claims. (Cl. 20—69)

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This invention relates to door closures and seals therefor, particularly useful in conjunction with refrigerators though not necessarily limited solely to refrigerator constructions.

In refrigerators an opening or openings must be provided in order that food materials or the like may be placed within the refrigerator, also for access for removal therefrom. The opening is closed by a door, and between the inner side of the door and the outer surfaces of the refrigerator surrounding the opening it is necessary to provide a suitable seal which is usually continuous entirely around the door opening and which may be compressed when the door is closed to exclude as completely as possible the entrance of heat, thereby maintaining the desired degree of refrigeration within the refrigerator without undue operation of the refrigeration machinery with which the refrigerator is equipped.

In the present invention, a novel means for securely holding the door closed by means of magnetic attraction is provided, together with a means for causing such magnetic attraction to become ineffective when the door is to be opened. Preferably the magnetic attraction will be exerted by means of magnets carried by the refrigerator casing, with members attracted by the magnets mounted upon and enclosed within the compressible sealing gasket mounted on the door, and in such manner that the ready flexibility of the gasket may be taken advantage of to cause it to conform to the surfaces on the refrigerator casing against which it bears, shaping itself to any irregularities such as concavities or convexities in the surfaces against which the gasket engages and thereby effect a practical and secure seal without the exertion of a considerable force which has previously been needed in holding doors of refrigerators closed through the power of springs in the door carried latches engaging with keepers mounted upon the refrigerator casing. It is a primary object and purpose of the present invention to provide a construction as outlined which will effectively hold a door in closed sealing position through magnetic attraction, which may be released whenever desired, and which is relatively simple in construction and durable, practical and effective in use.

An understanding of the invention may be had from the following description taken in connection with the accompanying drawings, in which,

Fig. 1 is a front elevation of a refrigerator to which my invention is applied, the door being shown open.

Fig. 2 is a fragmentary vertical section taken

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in a plane a short distance back of the open side of the refrigerator illustrating one form of mechanism for rendering the attraction of the magnets used ineffective.

Fig. 3 is a fragmentary vertical section at right angles to that shown in Fig. 2 showing a manually operated handle means for operating the mechanism illustrated in Fig. 2.

Fig. 4 is a fragmentary enlarged horizontal section through a portion of the door and of the adjacent door jamb of the casing against which the sealing gasket carried thereby engages, the door being in closed position.

Fig. 5 is a section like that shown in Fig. 4 showing in enlarged form the relation of a magnet to the member carried by the gasket which it attracts in holding the door closed.

Fig. 6 is a section similar to that shown in Fig. 5 showing a different position of the magnet in which the door is released for opening, and

Fig. 7 is a fragmentary vertical section substantially on the plane of line 7—7 of Fig. 4.

Like reference characters refer to like parts in the different figures of the drawings.

The door at 1 is of a conventional structure and may be provided with a plate 2 at its inner side to which the sealing gasket 3 is applied continuously around and adjacent the peripheral edges of the door, as in Fig. 1. The gasket is of rubber or other equivalent material and has a longitudinal intermediate portion which is thin in section with edge portions, as best shown in Fig. 4, through which screws or like fastenings may be applied to secure the gasket to the door. This provides a thin intermediate portion of the gasket in the form of an arch, enclosing a chamber between said arch and the inner face of the door. Longitudinally of and within the thin wall section of the gasket 3 a plurality of members 4 are housed within the gasket, being surrounded at its inner sides and edges by an envelope 5 molded integral with the gasket and of the same material. The members 4 may be short lengths of soft iron or may be in the form of small iron particles bonded together in a flexible form either by rubber or plastic material so that said intermediate section of the gasket is adapted to flex freely and readily conform to a surface against which pressed, readily shaping itself to any irregularities in its surface.

The refrigerator casing 6 has a front opening which the door is to close and the portions of the refrigerator case surrounding said opening have inserted therein, preferably, channels 7 (Fig. 4) the sides of which are provided with

outturned flanges 8 which parallel the adjacent front outer surfaces of the refrigerator casing. Plates 9 of non-magnetic material lie over said flanges and extend inwardly toward each other partly over the open sides of the channels 7. Over said plates and across the space between them a thin plate 10 also of non-magnetic material is located and secured as best shown in Fig. 4. Soft iron members 11 and 12 are disposed one under the inner edge portion of each of the plates 9 and approach each other but are spaced apart at their adjacent edges. A housing member 13 of non-magnetic material is secured at the inner sides of the soft iron members 11 and 12 by the screw connections shown in Fig. 4, said members 11 and 12 and the housing member 13 being interiorly shaped to provide a cylindrical housing, the purpose of which will hereafter appear. The cylindrical housing may be open at its outer side at the space or slot 14 between the adjacent inner edges of the members 11 and 12; or said space 14 may be filled with a non-magnetic material.

Within the housing thus provided a plurality of permanent magnets 15, U-shaped in cross section are mounted within cylindrical members 16 of non-magnetic material located end to end which are grooved at one side for the reception of the magnets. The poles of the magnets (Fig. 5) are curved at their outer ends to conform to the inner cylindrical walls of the housing and together with the mounting member 16 in which held form a body which may be turned about its central longitudinal axis within the housing.

The plurality of magnets and their mountings 16 are located in end to end alinement at each side of and above and below the front door opening in the refrigerator, with the thin plates 10 presented at the outer front surfaces of the refrigerator casing around said opening. It is against said jamb surfaces 10 that the gasket 3 engages when the door is closed.

In the position of the magnets as shown at Fig. 5, that is, with the poles thereof located one at each side of the slot 14, magnetic attraction is exerted upon the soft iron members 4 carried within the gasket when the gasket is moved to a position bringing the members 4 within the range of attraction of said magnets. This draws the flexible gasket against the outer surface of the plates 10 and, because of the ready flexibility of the gasket, there is a snug engagement of the outer surface of the gasket and a conforming thereof to the outer surfaces of the plates 10.

As shown in Fig. 2, the housing channels 7 at the sides of the door opening and those above and below it at their adjacent ends are provided with angle brackets 17 which may close the ends of said channels 7. The magnet mountings 16 may be connected together end to end and at the ends thereof coming to the bracket 17 may be suitably extended or have short shafts extending therefrom on which beveled gears 18 are secured. The gears at each of the corners are in mesh with each other as shown in Fig. 2. One of the shafts as at 19 is shown extended beyond its gear 18 and equipped with an arm 20. Such extension of the shaft will preferably be at the lower side of the door opening and at the side of the refrigerator casing opposite that at which the door is hingedly mounted. A handle lever 21 is pivotally mounted upon the refrigerator casing at its front and above the arm 20 passing through the front of the casing with its rear

end connected by a link 22 to the arm 20 (Fig. 3). On lifting the handle lever 21, shaft 19 will be rocked about its axis a short distance with a consequent turning of all of the gears 18, and of the magnet holders 16 and the magnets 15 carried thereby.

When this occurs, as shown in Fig. 6, the magnets 15 are turned through an arc of approximately 45°, or until one of the poles of the magnet has moved a considerable distance away from the slot 14 and the other has moved entirely across said slot so that said poles, as in Fig. 6, are covered wholly by the soft iron member 12; or if moved in the opposite direction by the member 11. This shorts the magnetic flux from the permanent magnet across the poles thereof because said poles are bridged by the soft iron member 12, releasing the members 4 whereupon the door may be readily opened. In practice the hinges of the door 3 may be equipped with a torsion spring of light strength and just strong enough to carry the door open when the magnetic attraction is disrupted.

It is of course to be understood that many ways of rotating the shaft 19 than the one shown and described may be devised, for example, a solenoid armature secured to the end of the arm 20 may be pulled upon by energizing a solenoid winding on closing an electric circuit having a push button switch therein; also spring means may be used to restore the parts to their initial position. All of these details are subject to a wide variation and the invention is not to be limited thereto.

The invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within their scope.

We claim:

1. A door member, a door jamb member, means for movably mounting the door member whereby it may be brought into closing position with the door jamb member or moved away therefrom, a flexible compressible sealing gasket mounted on one of said members, the other of said members having a surface against which the gasket is adapted to bear, flexible magnetically attractable material carried by said gasket, a permanent magnet located upon the member to which the gasket is not attached having poles presentable to said magnetically attractable material to draw the gasket into sealing engagement against said surface, and means for moving said magnet between said position and a second position in which its attraction upon said gasket carried magnetically attractable means is released.

2. A door jamb, a door movably mounted for movement toward or away from the door jamb, a plate of non-magnetic material secured to said door jamb and presenting an outer surface to the adjacent inner surface of the door, a flexible gasket secured to the door having a longitudinal central portion of arch form, a flexible member of a soft iron magnetic material housed within the outer wall of said gasket substantially centrally and longitudinally thereof, a permanent magnet mounted longitudinally of and within the door jamb having an axis substantially paralleling the length of the gasket, means for rotatably mounting said magnet to turn about its longitudinal axis, said magnet in one position having its poles directly opposite a central portion of the gasket and one at each side of the longitudinal center line thereof, a housing in which said magnet is rotatably mounted, said housing to one side thereof including a longi-

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tudinal section of soft iron which extends across the poles of said magnet when rotated about its axis in one direction.

3. In a structure of the class described, a door jamb and a door, a longitudinal channel support extending lengthwise of the door jamb at the outer portions thereof, a longitudinal cylindrical housing having two spaced apart longitudinal sections of soft iron at the front portion and a longitudinal section of non-magnetic material between the soft iron sections, a cylinder of non-magnetic material rotatably mounted within said housing longitudinally thereof, a permanent magnet carried by said cylinder and extending thereinto having spaced pole surfaces normally presented toward the outer side of said door jamb and normally lying one against each of the spaced soft iron cylindrical sections, a thin plate of non-magnetic material located at the outer side of said door jamb across said housing, and a flexible sealing gasket attached to the door having longitudinally thereof between its side edges, magnetically attractable flexible members enclosed within and covered by the material of the gasket adapted to extend across the poles of said magnet when in normal position, said magnet adapted to be turned to a second position where both of the poles are bridged by one of said soft iron sections of the housing.

4. A construction having the elements defined in claim 3, combined with manually operable means for turning said magnet and the non-magnetic holder therefor about the central longitudinal axis of said cylindrical housing.

5. A refrigerator having a front opening surrounded at its vertical sides and at its top and bottom by door jamb members each having substantially flat outer surfaces, a door hingedly mounted on the refrigerator to close said opening, a flexible compressible gasket carried by the door and adapted to be brought against said surfaces of the door jamb members to provide a seal, magnetically attractable members molded

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within said gasket longitudinally thereof between its side edges, permanent magnets carried back of the outer surfaces of said door jamb members, means for rotatably mounting said magnets to turn about vertical axes at the vertical sides of said opening and about horizontal axes at the top and bottom of said opening, said magnets having spaced poles adapted to be moved to a position to attract the magnetically attractable means carried by said gasket, and to be moved to another position in which said magnetic attraction is rendered ineffective, and a single manually operable means for moving all of said magnets simultaneously between the first and second mentioned positions.

6. In a construction of the class described, a casing having an opening at its front, a door hingedly mounted on said casing adapted to be moved to position to close said opening, a flexible compressible gasket carried by the door to engage against the casing around said opening to seal the opening, movably mounted permanent magnets carried by the casing at the top, bottom and at each vertical side of said opening and located back of the surfaces of the casing against which the gasket engages, means carried by said gasket longitudinally thereof and adjacent its outer portion which when the door is closed is attracted by said magnets, and means for moving said magnets simultaneously to a position to release such magnetic attraction.

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