Nov. 17, 1953 L. L. ANDERSON ET AL 2,659,118

MAGNETIC DOOR SEAL

Original Filed March 20, 1950

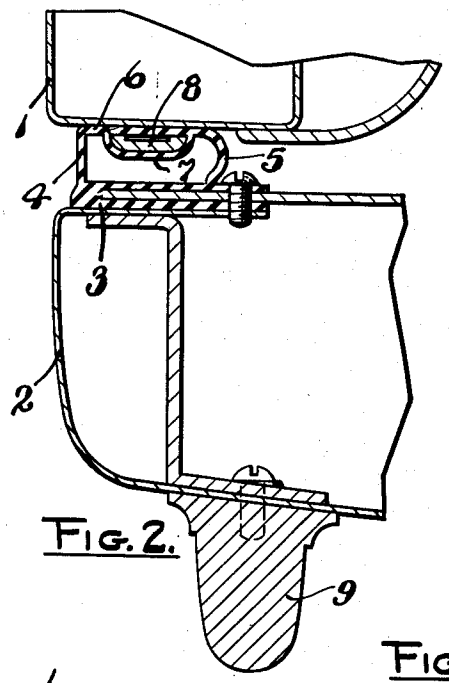
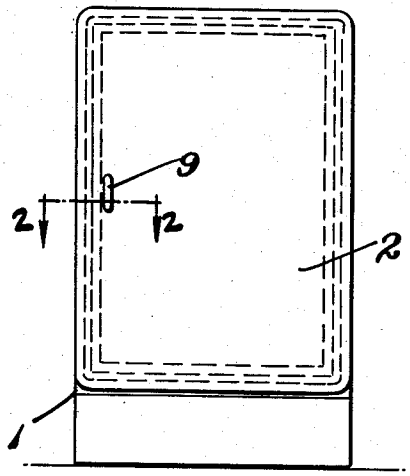


FIG. 2.

FIG. 1.



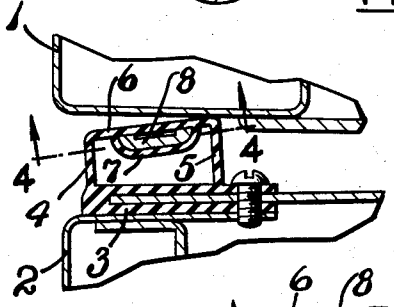
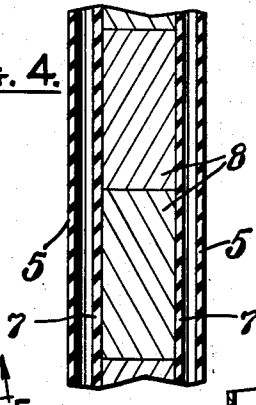


FIG. 3.

FIG. 4.



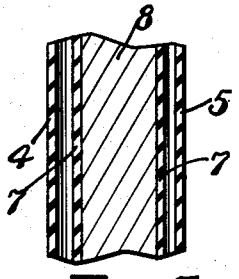


FIG. 5.

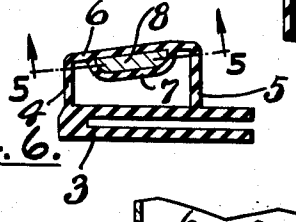


FIG. 6.

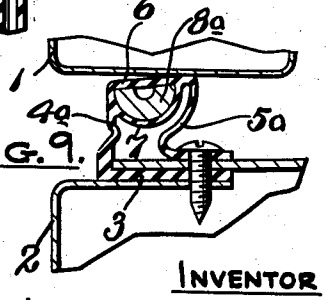


FIG. 9.

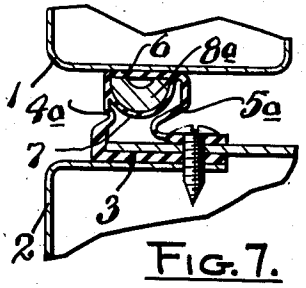


FIG. 7.

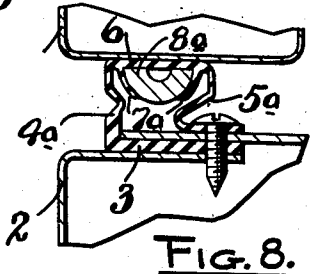


FIG. 8.

INVENTOR
LLOYD L. ANDERSON
NATHAN S. WARING
ANTON W. KORB
By Livernance and Van Antwerp
ATTORNEYS

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MAGNETIC DOOR SEAL

Lloyd L. Anderson and Nathan S. Waring, Grand Rapids, and Anton W. Korb, Grandville, Mich., assignors to Jervis Corporation, a corporation of Michigan

Continuation of application Serial No. 150,748, March 20, 1950. This application June 26, 1952, Serial No. 295,608

9 Claims. (Cl. 20—69)

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This invention relates to a magnetic door closure and seal, of a simple, novel, practical and effective construction. The invention has a special utility in connection with doors which should be maintained, when closed, in a tightly sealed relation against a casing, the entrance opening to which is closed by the door.

This application is a continuation of application Serial No. 150,748, filed March 20, 1950, now abandoned.

In refrigerators, such close sealing is desirable to prevent entrance of heat or the loss of refrigeration which, if it occurs, requires additional expense to maintain the space within the refrigerator as its pre-selected low degree of temperature.

In the present invention, holding and sealing the door closed is by means of magnetic attraction. The modern household electric refrigerator uses a metal, usually steel, which is attracted by magnetic attraction; and in our invention, the conventional sealing gasket, which is between the outer edge portions of the door and a refrigerator casing, the entrance opening to which the door closes, is preferably supplied with permanent magnets which, when the door is closed, are in close proximity to the outer steel faces at the front of the refrigerator casing, and exert their magnetic forces thereupon to maintain the door closed and the gasket pressed snugly, in a substantially perfect sealing condition, against the refrigerator casing.

The door is opened by an outward pull applied to a handle permanently secured to the door. With our invention, the amount or quantity of force which must be applied to such handle to open the door is materially reduced, by reason of the novel structure of the gasket which is constructed, so that it is drawn and pulled loose from the refrigerator casing first at one side edge of the gasket and thereafter progressively separated from the refrigerator casing, so that the initial force required is only that needed to break the magnetic attraction over a fraction of the area of the magnetic poles, being analogous to a peeling off of the gasket rather than a direct outward, entire breaking loose of the gasket from the refrigerator casing. The force required in the latter instance is much more than in the former. Therefore, with our invention a greater magnetic force may be used to maintain the door closed and sealed, without undue or excessive force being required to open the door. Our invention is directed to novel and practical structures for obtaining the desirable results enumerated and for producing the invention in a practical, economical form.

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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 of the type to which our invention is applied;

Fig. 2 is a fragmentary enlarged horizontal section, substantially on the plane of line 2—2 of Fig. 1, the door being shown closed;

Fig. 3 is a fragmentary section, like that in Fig. 2, of the door as it is initially being opened;

Fig. 4 is a vertical section, substantially on the plane of line 4—4 of Fig. 3;

Fig. 5 is a similar section, substantially on the plane of line 5—5 of Fig. 6;

Fig. 6 is a transverse section through the gasket used with a slight modification in the form of the magnets used;

Fig. 7 is a fragmentary horizontal section, similar to Fig. 3, showing a modification of structure in connection with the gasket and magnets carried thereby, with the door shown closed;

Fig. 8 is a slightly different modified form of structure from that shown in Fig. 7, in a like sectional view; and

Fig. 9 is a section, like Fig. 7, the door being slightly opened.

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

The refrigerator casing 1, and the hinged door 2 thereon at its front, for closing its front entrance opening, are of any usual structure. The gasket which is between the door at its outer edge portions and at its inner side, and the front face of the refrigerator casing surrounding the entrance opening thereto, is shown secured to the door though in practice the invention will not be departed from should the gasket be reversed in position and secured to the refrigerator casing.

The gasket which extends entirely around the door at its inner side, adjacent its edges, has a relatively heavy base 3 and an outer leg or side 4 integral with and extending inwardly from the base, an inner leg or side 5 normally longer than the side 4, and an inner connecting side 6 between the outer edge portions of the sides or legs 4 and 5. Integrally formed within the hollow gasket thus made is a channel retainer 7, the edges of the flanges of which are integral with the inner side 6 as shown. Within such retainer a plurality of permanent magnets 8 are located and held. The magnets are located end to end, and are shown in Fig. 4 as of shallow U-shape and in Fig. 6 as flat; in either case their opposite poles

are so located that they are effective to attract the gasket to the metal refrigerator casing. At the outer (opposite the hinges) side of the door, substantially between its upper and lower edges, a manually engageable handle is fixedly secured.

When the door is closed, as in Fig. 2, the base 3 and the inner side 6 of the gasket are parallel to each other, as the inner side of the door parallels the front face of the refrigerator. Thus, the longer leg or side 5 is bent or bowed into the convex form shown in Fig. 2. The magnets exert their magnetic force upon the steel material of the refrigerator casing. The gasket being of a resilient material, such as rubber, will be drawn into conformity at its engaging side with the outer faces of the front vertical sides and upper and lower ends of the refrigerator casing around its entrance opening. When the door is opened by a pull upon the handle 9, there is a direct pull upon the shorter leg 4 of the gasket, which is at the outside at the free vertical edge of the door, which will start the gasket separation from the refrigerator casing, first at such outer side, being thereafter followed progressively inward until the longer convex side 5 has straightened out as in Fig. 3. Thereafter, the gasket and the magnets carried thereby are moved bodily with the door as the latter is further opened. When the door is closed, the longer inner side 5 is bent into its convex form and the magnets 8 are positioned with reference to the casing so as to exert their full attracting force thereon.

After the gasket at the outer free edge of the door is pulled from the casing, the magnets at the upper and lower edge of the door are progressively pulled outwardly and separated; and finally those at the inner side of the door adjacent its vertical hinged edge. It is at the beginning that the greatest force is required to break the magnetic pull which holds the door closed.

In Fig. 6 the magnet 8 is of a solid cross section and not of the shallow U-shape shown in Figs. 2 and 3, the poles of such several magnets 8 being at opposite ends. The door may be opened however in the same manner by substantially peeling the gasket from the front outer face of the refrigerator casing with a less manual force exerted than would be required if both of the sides or legs 4 and 5 of the gasket were of the same length.

In Figs. 7, 8 and 9 the gasket cross section is slightly modified by making the sides 4*a* and 5*a* of accordion form, the inner side 5*a* at the vertical free edge of the door having a greater length when in a normal free position than the outer side 4*a* (see Fig. 9). The magnets 8*a* also are modified in structure, being generally semicircular in cross section, and the retainers at 7 and 7*a* therefore are made to correspond and embrace the magnets at their curved sides; note that the inner side of the channel 7*a* is open which structure while providing sufficient channel embrace to retain the magnets in position with respect to the gasket, nevertheless is sometimes of value in assembly and replacement. The opening and closing of the door is the same and the reduction in the pull required to open the door is likewise attained. It is of course to be understood that the magnets may be of other forms and of different cross sections without affecting the invention or departing from it. While the magnets are shown in end to end relation, the invention may also be embodied by using magnets spaced from each other in the length of the gasket so as to reduce the number of magnets needed, with a consequent reduction in expense.

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 gasket adapted to be used for sealing a hinged door adjacent its edges against a casing surrounding an entrance opening closed by the door, said gasket comprising an elongated member having an attaching side, spaced generally parallel sides extending therefrom substantially at right angles, one of the last-recited sides being definitely wider than the other, and an additional side integral with and connecting said narrower and wider spaced sides, magnets within the gasket at the inner side of said additional side of the gasket, and means to hold said magnets against change of position with respect to the gasket, said gasket structure and said specified mounting thereof providing a seal which is pulled loose—first at one side edge of the gasket—from the surface against which said gasket sealingly abuts and which seal is thereafter progressively separated from said surface so that the initial force required is only that needed to break the magnetic attraction over a fraction of the effective area of the magnets, the gasket being peeled off of said surface, wherefrom a relatively large magnetic force may be used to maintain the seal without excessive force being necessary to break said seal.

2. A hollow elongated gasket adapted to be used for sealing between a door and casing, having four sides in pairs spaced from each other, one of said sides being adapted to be attached at the inner side of the door with the opposed side of the gasket spaced therefrom and normally occupying a position in a plane at an acute angle to said attaching side, the remaining sides of the gasket being, one definitely narrower than the other, and magnets located lengthwise of the gasket within it away from said attaching side and against the side spaced therefrom, and means integral with the gasket for retaining the magnets in place, said gasket structure and said specified mounting thereof providing a seal which is pulled loose—first at one side edge of the gasket—from the surface against which said gasket sealingly abuts and which seal is thereafter progressively separated from said surface so that the initial force required is only that needed to break the magnetic attraction over a fraction of the effective area of the magnets, the gasket being peeled off of said surface, wherefrom a relatively large magnetic force may be used to maintain the seal without excessive force being necessary to break said seal.

3. An elongated refrigeration sealing gasket having two generally parallel, spaced-apart sides one definitely wider than the other, and two additional sides extending between the said first-mentioned sides and integral therewith, said gasket being compressible substantially perpendicularly to one of said last-mentioned sides for sealing purposes and said last-mentioned sides being disposed in planes at an acute angle to each other when the gasket is not in sealing compression, one of said additional sides being adapted to receive securing means, the other of said additional sides being resiliently and compressibly capable of effecting a seal against entrance of heat or escape of refrigeration, said two additional sides being parallel to each other

when in compressed sealing position; the wider of said first-mentioned sides being adapted to bulge convexly when the gasket is in said compressed sealing condition, and magnets disposed lengthwise within the gasket adjacent the sealing side, said gasket structure and said specified mounting thereof providing a seal which is pulled loose—first at one side edge of the gasket—from the surface against which said gasket sealingly abuts and which seal is thereafter progressively separated from said surface so that the initial force required is only that needed to break the magnetic attraction over a fraction of the effective area of the magnets, the gasket being peeled off of said surface, wherefrom a relatively large magnetic force may be used to maintain the seal without excessive force being necessary to break said seal.

4. A structure as defined in claim 3, and retaining means for said magnets integrally connected with the sealing additional side of the gasket comprising a generally channel cross-sectional shape between which and the sealing side of the gasket the magnets are held.

5. A structure as defined in claim 3, and retaining means for said magnets comprising magnet-embracing portions connected to the inner face of said gasket sealing side.

6. A sealing gasket adapted to be used between a door member and a casing member—the latter having an opening which is closed by said door, and adapted to be secured to one of said members and to be compressed between said members to abut against the other member when the door is closed, said gasket having longitudinally extending sides, two of the latter being generally parallel when said gasket is in uncompressed condition and one of the latter sides being definitely narrower than the other of said two sides, the wider of said sides being strained to a greater degree than the narrower of said sides when the gasket is compressed, and magnetic means carried by one of the other of said longitudinally extending sides, said gasket structure and said specified mounting thereof providing a seal which is pulled loose—first at one side edge of the gasket—from the surface against which said gasket sealingly abuts and which seal is thereafter progressively separated from said surface so that the initial force required is only that needed to break the magnetic attraction over a fraction of the effective area of the magnets, the gasket being peeled off of said surface, wherefrom a relatively large magnetic force may be used to maintain the seal without excessive force being necessary to break said seal.

7. A casing member having an entrance opening, a door member for closing the casing, a sealing gasket positioned on one of said members and adapted to abut the other member to seal said opening when said door is closed, said

gasket having two face portions and two side edge portions, one of said latter portions being definitely wider than the other, one of said face portions normally lying parallel and close to the member on which the gasket is positioned, said gasket being secured to said last-recited member at least along one edge of one of said side edge portions, the other of said face portions being adapted to abut against the other member when the door is closed and said gasket being releasable initially at one edge of the last-recited face portion and thereafter progressively releasable across the width of the face from said edge toward the other edge thereof.

8. A casing member having an entrance opening, a door member for closing the casing, a sealing gasket positioned on one of said members and adapted to abut the other member to seal said opening when said door is closed, said gasket having two face portions and two side portions, one of said latter protions being definitely wider than the other, one of said face portions normally lying parallel and close to the member on which the gasket is positioned, said gasket being secured to said last-recited member at least along one edge of the wider of said side edge portions, the other of said face portions being adapted to abut against the other member when the door is closed and said gasket being releasable initially at that edge of the last-recited face portion (which is furthest from the hinged edge of the door) and thereafter progressively releasable from said edge toward the other edge of said face portion.

9. A gasket adapted to be used for sealing a hinged door member adjacent its edges against a casing member surrounding an entrance opening closable by said door, said gasket being mounted on one of said members and comprising two face portions and two side portions, one of said face portions normally lying closely adjacent said one member on which said gasket is mounted and the other face portion being adapted to abut against the other member when said door member is closed, a plurality of magnets within said gasket having attraction for said other member, one edge of said other face portion of said gasket being movable further than the other edge thereof from said one member whereby when said door is drawn open said other member is separated from said other edge before it is separated from said one edge.

LLOYD L. ANDERSON.
NATHAN S. WARING.
ANTON W. KORB.

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