Oct. 17, 1961 P. C. KORODI 3,004,309

MAGNETIC CLOSURE SEAL

Filed April 30, 1959

FIG. 1.

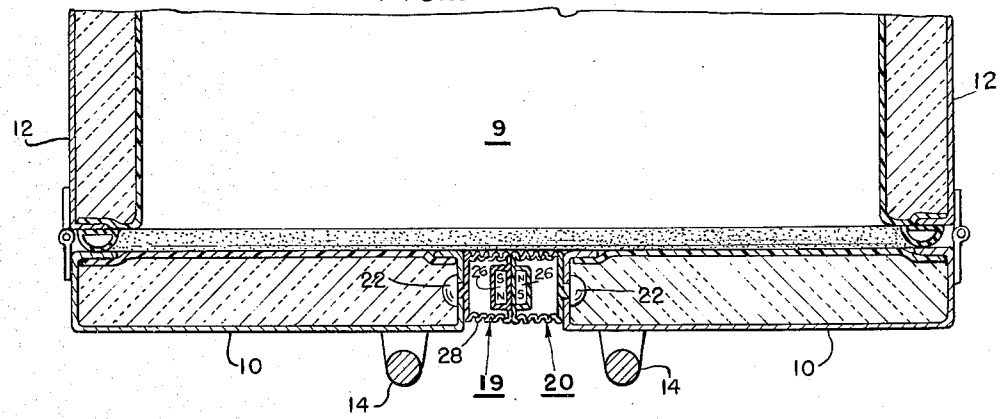
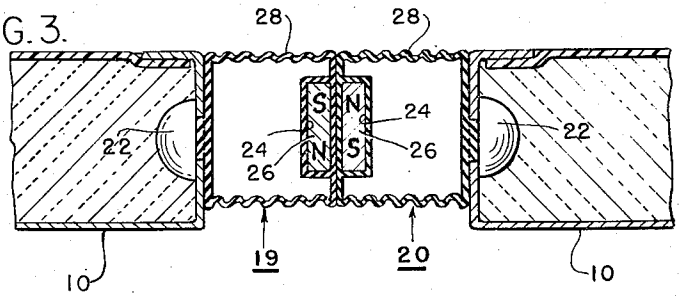


FIG. 3.



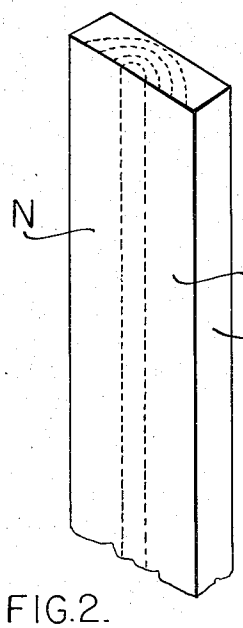


FIG. 2.

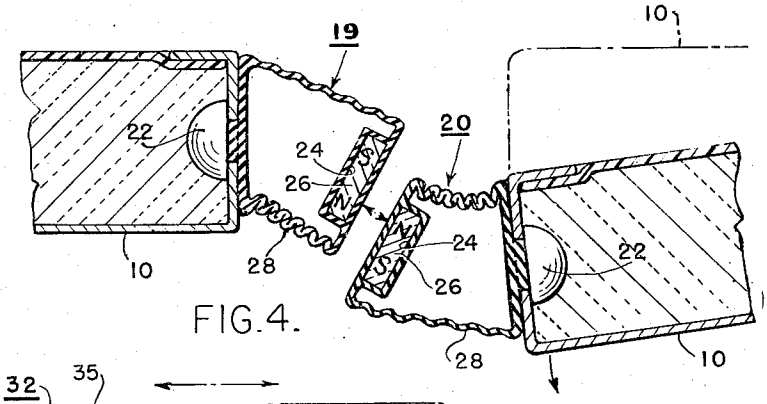


FIG. 4.

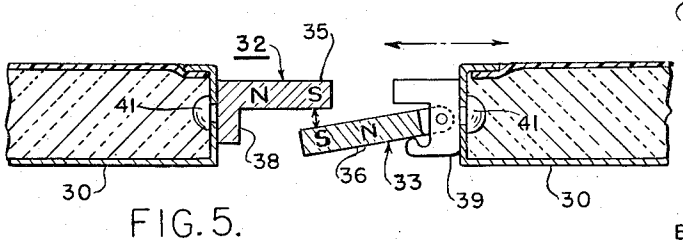


FIG. 5.

INVENTOR
PAUL C. KORODI
BY William J. Foley
ATTORNEY

United States Patent Office 3,004,309 Patented Oct. 17, 1961

3,004,309

MAGNETIC CLOSURE SEAL

Paul C. Korodi, Columbus, Ohio, assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

Filed Apr. 30, 1959, Ser. No. 810,008
2 Claims. (Cl. 20—69)

This invention relates to closure seals and more particularly to means for effecting a seal between inner, adjacent edges of a pair of side-by-side doors closing an access opening in a cabinet.

Many prior art cabinets having an access opening closed by a pair of side-by-side door members are provided with a vertical mullion or center post spanning the access opening. The door members are hinged for swinging, relative movement about their outer vertical edges and their inner, vertical edges are provided with gaskets which firmly seat against the mullion to provide a good seal. Since a mullion obstructs the access opening, it is desirable to eliminate it and provide means for effectively sealing the space between the inner, vertical edges of the door members.

The effectiveness of a seal of the type set forth depends, not only on its ability to prevent heat from entering the food storage compartment, but also on the ease with which it breaks and reestablishes a tight seal when one door member is opened and closed, and this is the principal concern of the present invention.

In carrying out the present invention, therefore, a magnetic closure seal for the adjacent edge surfaces is provided which breaks and reestablishes a seal more easily than prior art closure seals of this kind. The seal includes a magnet body mounted on the inner edge of each individually movable door member so as to extend along the length thereof; and the means employed for mounting one of the magnet bodies includes a portion which, in the closed position of the door members, renders that magnet body movable toward the other magnet body. Each magnet body has a longitudinally extending pole surface which is generally parallel to the direction of relative movement of the door edge surfaces. Additionally, each pole surface is provided with a pair of longitudinally extending, opposite magnetic poles arranged side-by-side and in such a manner as to be in proximity with respective opposite poles of the other magnet body when the members close the opening.

The initial opening movement of one door is accompanied by relative sliding movement of the gaskets along their contact surfaces until like poles of the respective magnet bodies are in close, mutually facing relationship, in which position the magnet bodies repel each other, thereby moving the gaskets apart, breaking the seal between them, and permitting the door movement to be continued without further sliding contact between the gaskets. When the door is closed a seal is reestablished with virtually no sliding friction between the gaskets.

The various objects, features, and advantages of the invention will appear more fully from the detailed description which follows, taken in connection with the accompanying drawing, forming a part of this application, in which:

FIG. 1 is a horizontal sectional view of a cabinet incorporating a preferred embodiment of the invention;

FIG. 2 is an enlarged fragmentary perspective view of a magnet body showing the opposite magnetic poles on one pole surface thereof;

FIG. 3 is an enlarged fragmentary view of the gaskets of FIG. 1 as they are arranged in closed position of the doors;

FIG. 4 is a view similar to FIG. 3 showing one door ajar, in which position the magnets repel each other; and

FIG. 5 is a horizontal sectional view of a cabinet incorporating another embodiment of the invention.

The insulated cabinet illustrated fragmentarily in the drawing is of the domestic refrigerator type and has an unobstructed front access opening to a refrigerated storage chamber **9**. The access opening is of generally rectangular configuration and is closed by a pair of side-by-side doors or door members **10**, each door being hingeably mounted on cabinet side walls **12** for swinging movement about an outer, vertical edge thereof. The doors **10** are individually movable to an opened position by pulling on one or the other of two handles **14**. In the closed position, the doors **10** have inner, vertical edges which are adjacent each other and sealed against each other by means of gaskets **19** and **20** respectively mounted thereon. The doors **10** are sealed at their other edges against the cabinet by conventional gaskets; and each door may be equipped with a suitable latch mechanism, which is not shown.

The gaskets **19** and **20** are of hollow tubular construction and made from rubber or rubber-like material, as may be suitable for extrusion in great lengths. In order to mount the gaskets **19** and **20** they are provided with mounting buttons **22**, generally of dovetail configuration, which are received in suitable openings in the inner edge of each door. Other suitable mounting means may be used, in addition to that shown. Each gasket has an external contact surface and wall structure **24** interiorly thereof defining an elongated chamber in which is received a continuous magnet body or strip **26** of magnet material. As will be explained, the strips **26** are attractable to each other and the gaskets **19** and **80** are movable with the strips **26** until they contact each other and establish a tight seal. To this end, the gaskets **19** and **20** each have flexible, pleated wall portions **28** in order that the gaskets will be rendered extendable toward each other from their associated inner edges of the doors **10**.

As best seen in FIG. 2, the continuous strip or magnet body **26** is of generally rectangular cross section and has two, elongated, opposite magnetic poles N and S arranged side-by-side on one broad, longitudinally extending pole surface thereof. Stated another way, the magnetic poles N and S are arranged one after the other in the direction in which the door carrying them is movable. The pole surface is generally parallel to the direction of relative movement of the inner door edges. (See FIGS. 2 and 3.) Materials such as barium-ferrite are suitable for being magnetized in the manner described. Preferably the magnet material is originally in powdered or granulated form, and together with a rubber or rubber-like bonding substance, is molded to shape and then magnetized. The bonding of the magnet material in rubber-like material gives the magnet body **26** a measure of flexibility which minimizes the chances of breakage in service and renders the strip **26** and its gasket conformable to irregularly shaped contact surfaces.

The opposite poles N and S of each magnet body **26** are so arranged that, in the closed position of the doors **10**, the poles of one magnet body **26** are in proximity and mutually facing relationship with respective opposite poles of the other magnet body. As is well understood, opposite magnetic poles attract and like poles repel. Accordingly, in the closed position of the doors **10** the strips **26** attract each other and move their respective gaskets **19** and **20** into engagement, at the same time unfolding the pleated wall portions **28** of the gaskets.

As one of the doors **10** is moved to an ajar position (see FIG. 4) the gasket contact surfaces remain in sliding engagement until like magnetic poles are approximately

opposite each other, in consequence of which the gasket contact surfaces part and the seal between them is broken. This construction has many advantages. Since the gasket contact surfaces of the present invention require less sliding contact until the seal is broken, there is a reduction in both frictional wear and the work required to effect separation, as compared with prior art magnetic gaskets which make no provision for the pole faces to repel each other in any ajar position of the door 10. During closing of a door, sliding friction is almost completely eliminated because the like poles of the two magnetic strips 26 repel each other and maintain the gaskets 19 and 20 out of contact until the door reaches its fully closed position.

Referring now to FIG. 5, the invention is shown applied to a pair of door members 30 which are movable in a direction normal to their adjacent edge surfaces. This type of closure is commonly referred to as a sliding door or panel construction, since the door members are slidable in a common track or parallel tracks (not shown). Similar to the previously described embodiment, however, the doors 30 have inner, vertical edges which are adjacent each other and sealed against each other by means of gaskets 32 and 33 respectively mounted thereon. The gaskets 32 and 33 have magnet bodies 35 and 36, respectively, and mounting members 38 and 39, respectively. Each of the latter is provided with mounting buttons 41 which are received in suitable openings in the inner door edges.

The gasket 32 is preferably molded of rubber-bonded barium-ferrite with its component parts formed integrally. The magnet body 35 is immovable with respect to its mounting member 38 and it is magnetized in the same manner as the continuous strip 26 (see FIG. 2). That is, the magnet body 35 has a longitudinally extending pole surface lying generally parallel to the direction in which the door edge surfaces are movable; and it has a pair of longitudinally extending magnetic poles, N and S, arranged side-by-side.

The magnet body 36 of the other gasket 33 is made of the same magnet material as the magnet body 35; and it is similarly magnetized. However, the magnet body 36 is hingeably mounted on its mounting member 39 so that its pole surface is movable toward and away from the pole surface of the magnet body 35. The poles of the magnet body 36 are arranged so as to be in proximity with respective opposite poles of the magnet body 35 when the door members 30 are closed, and in this position the pole surfaces attract each other and form a tight seal. When the doors 30 are moved apart the gaskets slide on each other until like poles, S in the illustration, are opposite each other and the repelling force moves the magnet bodies apart, thereby breaking the seal by magnetic forces rather than manual effort.

From the foregoing it will be apparent that a closure seal has been provided for the adjacent edge surfaces of relatively movable door members which close an opening not having a million. The seal not only serves as a heat barrier, but also breaks and reestablishes a tight seal with very little effort required of the user compared to prior art constructions.

The invention is especially well suited for use on double door cabinets having no mullion or center posts, but it should be understood that the invention is equally applicable to cabinets having a single door where the plane of contact between the seal surfaces is generally parallel to the direction in which the seal surfaces are relatively movable.

While the invention has been shown in several forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof.

What is claimed is:

1. Means for effecting a seal between the inner edge surfaces of a pair of relatively movable doors adapted to close an unobstructed access opening in a wall of a cabinet, said means including gaskets respectively mounted on said inner edge surfaces and each including an elongated magnetic portion, at least one of said magnetic portions being movable relative its door into contact with the magnetic portion of the other of said gaskets as the doors are closed, the plane of contact being generally parallel to the direction of relative movement of said edge surfaces, each magnetic portion including an elongated pair of opposite magnetic poles arranged one after the other in the direction in which the door carrying them is movable, said poles of one magnetic portion being positioned in close, mutually facing relationship with respective opposite poles of the other of said magnetic portions in the closed position of the doors, whereby said magnetic portions are attracted to each other in the closed position of the doors and repelled from each other to reduce sliding friction therebetween as like poles approach each other during the opening or closing movement of one door relative to the other.

2. The combination with wall structure having an opening therein, and a pair of doors arranged side-by-side and adapted to close said opening, said doors having respective elongated edge surfaces disposed adjacent each other when said doors close said opening, of an improved closure seal between said edge surfaces, said seal including a magnet body for each of said edge surfaces extending therealong, and means for mounting said magnet bodies on their respective doors, the mounting means for one of said magnet bodies including a flexible connection between said one magnet body and the edge surface of the door with which the said one magnet body is associated, said connection rendering said one magnet body movable toward the other magnet body as the doors close the opening, each magnet body having a longitudinally extending pole surface generally parallel to the direction of relative movement of said edge surfaces, each pole surface being provided with a pair of opposite magnetic poles which are arranged one after the other in the direction in which the door carrying them is movable, each magnetic pole extending along the length of said seal and being arranged so as to be in proximity with the opposite pole of the other magnet body when the doors close the opening; whereby said magnet bodies are attracted to each other in the closed position of the doors and are repelled from each other to reduce sliding friction therebetween as like poles approach each other during the opening or closing movement of one door relative to the other.

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