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REFRIGERATOR DOOR CONSTRUCTION

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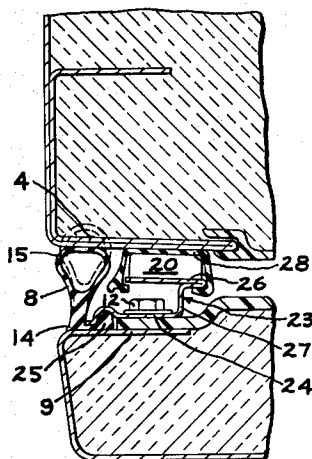


FIG. 2

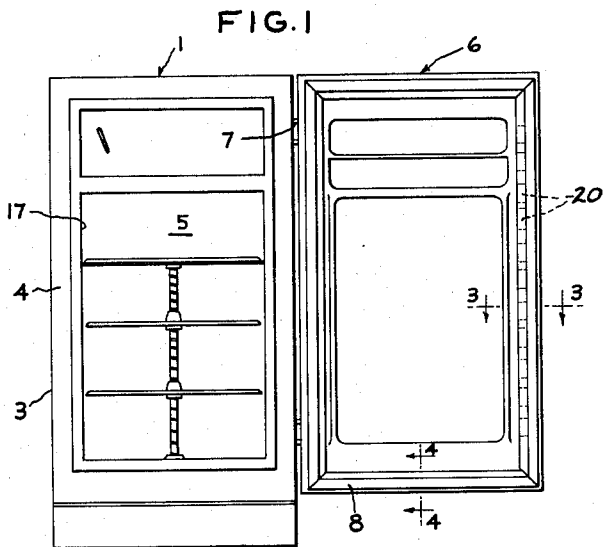


FIG. 1

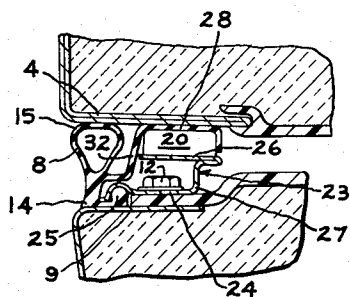


FIG. 3

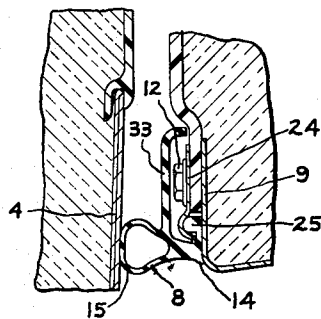


FIG. 4

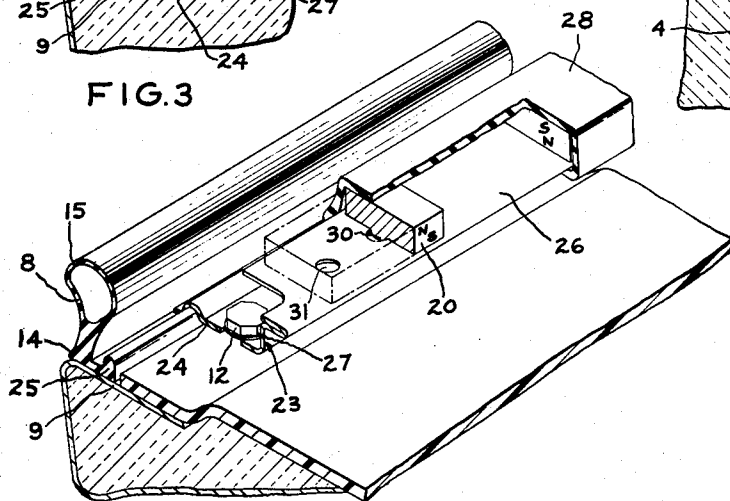


FIG. 5

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REFRIGERATOR DOOR CONSTRUCTION

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4 Claims. (Cl. 20—69)

The present invention relates to a door construction for refrigerator cabinets and is more particularly concerned with improved door construction including a magnetic latch means for holding the door in a closed position relative to the cabinet.

Refrigerator doors normally comprise spaced inner and outer panels containing heat insulation therebetween, a gasket for sealing the space between the door and the cabinet about the access opening to the cabinet, and latching means for holding the door in a closed and gasket sealing position relative to the cabinet. The present invention is particularly directed to a door construction in which the magnetic elements employed to hold the door in a closed position comprise a sintered mixture of selected metallic oxides known as magnetic ferrite. Because of the nature of the magnetic ferrite magnets, it is desirable to employ a plurality of magnets arranged for example along the free edge of the door, that is the side opposite the hinge side, and the invention has as one of its objects the provision of a new and improved arrangement of parts for supporting both the magnetic elements and the gasket on the door.

Another object of the invention is to provide a new and improved door construction in which the sealing gasket comprises a flange or lip portion extending about the entire periphery of the door and forming a trim strip designed to cover and hide from view the magnetic elements employed for holding the door in a closed position.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming part of this specification.

In carrying out the objects of the present invention there is provided a door construction including spaced inner and outer panels and a sealing gasket secured to the inner side of the door structure for engaging the face of the cabinet about the access opening thereto in order to seal the gap between the door and the cabinet when the door is in the closed position. A plurality of ferrite magnets are arranged linearly along the free edge of the door in a line parallel to the gasket with adjacent magnets arranged in reverse polarity. These magnets are in spaced relation with one another and are supported on the door by means of a strip of magnetic material having a first portion secured to the door and a second portion spaced from the first portion and extending substantially parallel thereto. The magnets are suitably secured to the second portion which also functions as a shunt for providing a magnetic path between adjacent reversed polarity magnets so that when the door is in the closed position a suitable armature provided on the cabinet face, or the cabinet face itself in the event it is composed of steel or other magnetic material, will in cooperation with the magnetic strip form a closed magnetic path including adjacent magnets.

In order to facilitate the opening of the door against the attractive forces of the magnets for the cabinet arma-

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ture and also to conceal the magnet elements from view when the door is open, a non-magnetic cover is provided for the magnetic elements and in a preferred form of the invention this cover comprises a flange integrally connected to or forming part of the sealing gasket. The strip also includes means for engaging and retaining a base portion of the gasket so that the strip serves not only to support the magnets but also to anchor the gasket to the door structure. In the preferred form of the invention the retainer strip and the inner door panel are secured to the outer door panel by the same fastening means such as screws or the like.

For a better understanding of the invention reference may be had to the accompanying drawing in which:

Fig. 1 illustrates a refrigerator embodying the present invention;

Fig. 2 is a sectional view illustrating details of the gasket and magnet arrangement of one embodiment of the present invention;

Fig. 3 is a sectional view similar to Fig. 2 illustrating a modification of the present invention taken generally along lines 3—3 of Fig. 1 with the door in the closed position;

Fig. 4 is a view similar to Fig. 3 taken along the line 4—4 of Fig. 1 and illustrating the gasket construction in those areas of the door in which no magnets are employed; and

Fig. 5 is a perspective view partially in section illustrating further details of construction of the embodiment of the invention illustrated in Fig. 2.

Referring now to the drawing, there is shown a refrigerator including a cabinet 1 comprising a metal outer wall 3 which is shaped to provide a flange portion or face 4 framing the access opening to a storage compartment 5. A door 6 for closing the access opening to the cabinet is hinged to the cabinet along one vertical edge by means of the hinges 7. In order to seal the space between the door and cabinet in the region of the access opening a gasket 8 of rubber or other suitable resilient and flexible material is provided.

With reference to Fig. 2, it will be seen that the door includes an outer wall or panel including an inwardly extending flange 9 to which an inner door panel is secured by means of screws 12. The gasket 8, which extends around the entire periphery of the door, has a base portion 14 positioned adjacent the peripheral edge of the inner door panel in contact with the flange 9 and a tubular face or sealing portion 15 for sealing contact with the inwardly extending flange 4.

In order to hold the door in a closed position relative to the cabinet and provide the desired sealing compression of the gasket sealing portion 15, there are employed a plurality of ferrite magnets extending in a line along the free or unhinged edge of the door 6. These magnets are arranged so that adjacent magnets are spaced from one another and are disposed inwardly from the gasket 8 in such position that upon closing of the door 6 the magnets will be in magnetic but not physical engagement with the flange 4 of the cabinet which in the illustrated modification is composed of steel or similar magnetic material.

For the purpose of supporting and securing the magnets 20 in spaced relationship and in a line running substantially parallel to the portion of the gasket 8 along the free edge of the door 6 and also for anchoring the gasket to the inner surface of the door 6, there is provided a retainer strip 23 composed of a sheet of magnetic material formed to provide a first or base portion 24 which is preferably secured to the door by the same fastening means 12 employed to join the inner and outer door panels. The outer edge of this base portion 24 overlaps and partly encompasses longitudinally extending bead 25 on the base 14 of the gasket in such a man-

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ner that when the strip 23 is fastened in place on the door, the edge thereof anchors the gasket securely along the edge of the door 6. The strip 23 also includes a platform or magnet supporting portion 26 which extends generally parallel to the base portion 24 and is connected thereto by a transverse portion 27.

The spaced magnets 20 are suitably secured to the upper or platform portion 25 of the retainer strip so that adjacent magnets have their poles in opposite directions. In other words, one magnet will have its north pole facing the cabinet and its south pole in contact with the platform 26 while the adjacent magnets on each side of this magnet will have their south poles facing the cabinet and their north poles in contact with the platform 26. By this arrangement, the platform 25 forms part of a magnetic circuit including adjacent magnets which are completed by the magnetic face 16 of the cabinet when the door is in the closed position so that the magnets magnetically retain the door in gasket sealing engagement with the cabinet.

An added function of the platform 25 is to support the line of magnets 20 in spaced relationship with the door flange 9 in a position such that the magnetic latching means will contact the cabinet face 16 when as shown in Fig. 2 the desired distortion or compression of the gasket bead 15 necessary for sealing engagement is obtained.

In the modification of the invention shown in Fig. 2 of the drawing, a non-magnetic cover member 28 is employed for providing an air gap between the magnets and the cabinet face when the door is closed and for enclosing the magnets 20 and hiding them from view when the door is in the open position. This cover 28 composed for example of a resinous material is generally channel-shaped and is provided with inwardly extending flanges on the open side of the channel which are designed to engage the platform 26 and secure the cover 28 to the retainer strip.

As more clearly shown in Fig. 5, the various magnets 20 may be provided with protuberances 30 which are received in holes or apertures 31 in the platform 26 in order to position and space the various magnets on the platform. The cover member 28 is sufficiently rigid and strong can then be employed to hold the magnets in their desired positions by its clamping action relative to the platform 26.

For cost and other reasons including the magnetic characteristics of the material, the magnets are preferably composed of resin bonded magnetic ferrite particles or powder. The powdered magnetic ferrite material may be any of the magnetic oxide materials now on the market comprising the heat reaction product of iron oxide and one or more metal oxides and having the empirical formula MFe_2O_4 wherein M represents a bivalent metal such as cobalt, copper, barium, or a mixture of these metals. These ferrites have a crystalline structure and are generally formed by sintering the metal oxide with iron oxide at a relatively high temperature. The powdered ferrite material is mixed with a resinous or plastic binder such as polystyrene and is then extruded or molded into any desired shape or dimensions, as for example, in the shape of bars from which the rectangular magnet elements 20 are cut. The resultant pieces may be magnetized in any well known manner to provide the desired pole surfaces on opposite faces thereof. The product is particularly characterized by an extremely high coercive force so that it is desirable that means such as the cover 28 be employed to provide gaps in the magnetic circuits when the door is closed and thereby limit the force necessary to break the circuit during door opening.

In the modification of the invention shown in Figs. 3 and 4 of the drawing, the separate cover member 28 is replaced by a flange or flap 32 forming an integral part of the gasket 8. This inwardly extending flange is designed to extend entirely around the periphery of the

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door and is so shaped that part of it covers or conceals the magnets 20 arranged along the free edge of the door as shown in Fig. 3 of the drawing while the remaining portions of this flange 32 as indicated by the numeral 33 in Fig. 4 of the drawing extend over the fastening means 12 in order to conceal this part of the assembly along the remaining door edges. By this arrangement, the flange 32 provides the desired air gap in the same manner as the cover 28. The magnets can be fastened to the platform 25 by any suitable means such as rivets, various adhesives and cements, etc.

While there has been shown and described specific embodiments of the invention it is to be understood that the invention is not restricted thereto and it is intended by the appended claims to cover all modifications within the spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A door for a refrigerator cabinet comprising an outer panel having a flange extending inwardly from the edges thereof, a sealing gasket having its base contacting said flange, a plurality of spacedly arranged magnets supported along one edge of said door for magnetically holding said door in a closed position relative to said cabinet, and a retainer strip for securing said gasket and said magnets to said door and for forming a magnetic path between adjacent spaced magnets, said retainer strip being composed of a sheet of magnetic material shaped to provide a first portion secured to said door and including an edge overlapping and engaging the base of said gasket and a second portion spaced from and extending substantially parallel to said first portion, said magnets being secured to said second portion.

2. A door for a refrigerator cabinet comprising an outer panel having a flange extending inwardly from the edges thereof, a plurality of spacedly arranged magnets supported along one edge of said door for magnetically holding said door in a closed position relative to said cabinet, a retainer strip for securing said magnets to said door and for forming a magnetic path between adjacent spaced magnets, said retainer strip being composed of a sheet of magnetic material formed to provide a first portion secured to said door and a second portion spaced from and extending substantially parallel to said first portion, said magnets being secured to said second portion, and a non-magnetic cover for said magnets forming an air gap between said magnets and said cabinet when the door is in the closed position.

3. A door for a refrigerator cabinet comprising an outer panel having a flange extending inwardly from the edges thereof and an inner panel having its peripheral edges overlapping the inner portions of said flange, a sealing gasket having its base contacting said flange between the edges of said outer panel and said inner panel, a plurality of spacedly arranged magnets supported along one edge of said door for magnetically holding said door in a closed position relative to said cabinet, a retainer strip for securing said gasket and said magnets to said door and for forming a magnetic path between adjacent spaced magnets, said retainer strip being composed of a sheet of magnetic material formed to provide a first portion secured to said door and including an edge overlapping and engaging the base of said gasket and a second portion spaced from and extending substantially parallel to said first portion, said magnets being secured to said second portion, and fastening means securing said retainer strip and inner panel to said outer panel.

4. A door for a refrigerator cabinet comprising an outer panel having a flange extending inwardly from the edges thereof, a sealing gasket having its base contacting said flange, a plurality of spacedly arranged magnets supported in a line extending along one edge of said door parallel to said gasket for magnetically engaging an armature on said cabinet to magnetically hold

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said door in a closed position relative to said cabinet, a retainer strip for securing said gasket and said magnets to said door and for forming a magnetic path between adjacent spaced magnets, said retainer strip being composed of a sheet of magnetic material formed to provide a first portion secured to said door and including an edge overlapping and engaging the base of said gasket and a second portion spaced from extending substantially parallel to said first portion, said magnets being secured to said second portion, said gasket including a

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non-magnetic flange portion overlying said magnets to form an air gap between said magnets and said cabinet when said door is in its closed position.

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