Feb. 19, 1952 R. E. SLOPA 2,586,573

DOOR HINGE

Filed March 26, 1948

Fig. 1.

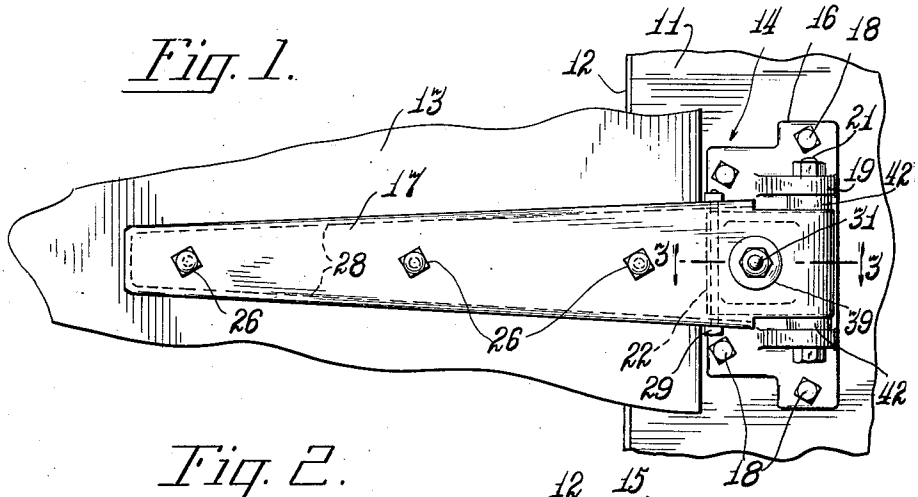
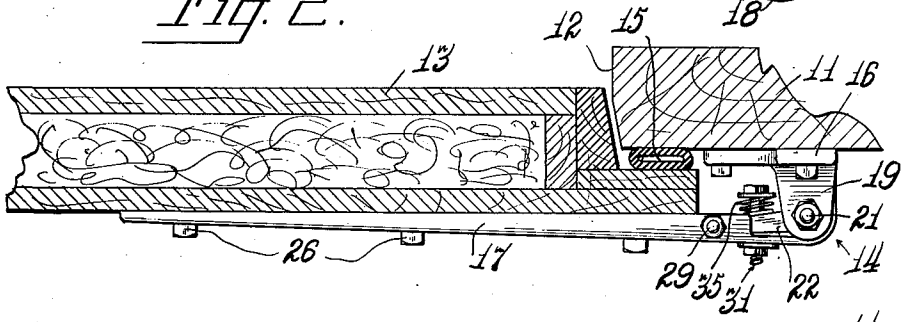


Fig. 2.



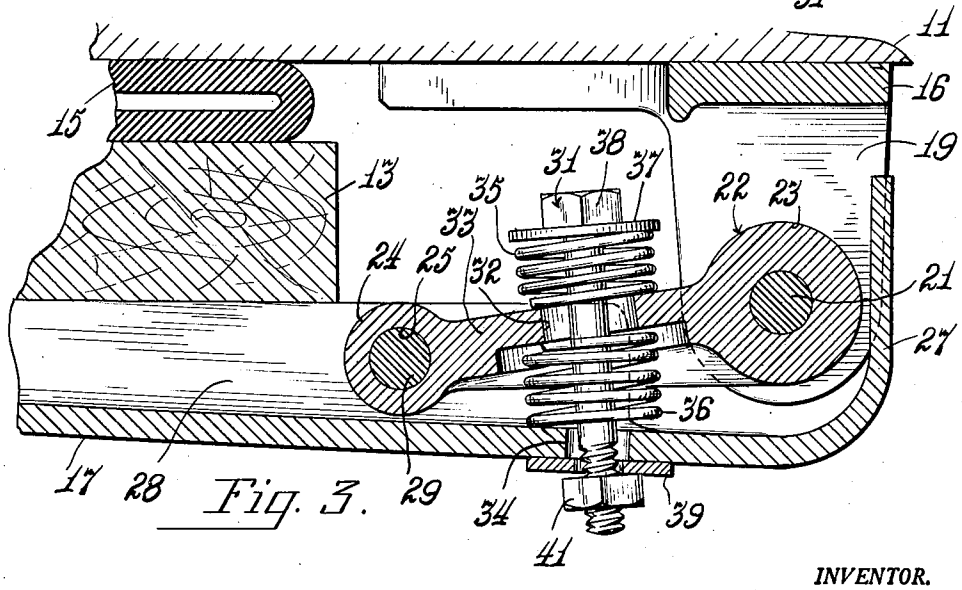


Fig. 3.

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DOOR HINGE

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4 Claims. (Cl. 16—131)

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The invention relates to improvements in hinge structures and more particularly to the rugged construction and association of operating parts of a novel resilient floating type hinge of a kind that insures tight sealing contact between a door and its related door frame.

Known types of hinges or door mountings of the kind adapted to urge a door into tight sealing contact with its related door frame embody various, and sometimes unsightly, complicated structures which in some instances are not entirely satisfactory in use either because of the looseness in the hinge mounting or the difficulties involved in adjustment or part replacement.

The hinge structure embodying the features of the present invention is particularly adapted for use on doors mounted to hermetically seal a chamber such as, for example, a cold storage chamber or refrigerator. The door may be of conventional construction and it may be provided with suitable sealing strips or gaskets which abut the face of the door frame surrounding the wall opening for establishing a tight seal. In order to maintain a tight seal around the entire opening, the hinge elements must necessarily be of a compensating type so that the edge of the door along which said hinge elements are mounted may be adjusted towards or away from the door frame progressively to compensate for any wear in the sealing strips or for any strain imposed upon the sealing strips because of icing or other conditions which may retard uniform sealing.

The hinge structure disclosed is somewhat similar to the type of overlap hinge structure disclosed in the copending application of George W. Slopa, Ser. No. 8,939, filed February 17, 1948, now Patent Number 2,535,324 of December 26, 1950, except that in the present instance the link means connecting the member secured to the door with the mounting bracket is movable with and supports the door. In the present disclosure force is exerted directly on the member attached to the door and in the direction of the plane of the door to insure sealing contact between the door and the door frame at all times when the door is in closed position.

It is an object of the present invention to provide a novel free-swinging, yieldable hinge structure adapted to compensate for any strain upon a closure supported thereby owing to icing or other conditions which may prevent uniform sealing.

Another object is to provide, in a hinge structure, novel features of construction and assembly which will facilitate part replacement without complete dismantling of the installation.

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Another object is to provide a compensating hinge structure with resilient means arranged to exert pressure in a direction at right angles to the plane of the door so as to urge the door, when in closed position, into tight sealing engagement with the door frame.

Another object of the invention is to provide, in an adjustable hinge structure, means to prevent the development of looseness between related parts irrespective of whether the door carried thereby is in open or closed position.

Other and further objects of the present invention will be apparent from the following description and claims, and are illustrated in the accompanying drawing which, by way of illustration, shows exemplary embodiments and the principles thereof. Other embodiments of the invention embodying the same principle may be used, and structural changes may be made as desired by those skilled in the art, without departing from the present invention and the purview of the appended claims.

In the drawing:

Fig. 1 is a front elevational view of a hinge embodying the features of the present invention.

Fig. 2 is a horizontal plan view of the hinge showing portions of an enclosure wall and door in section.

Fig. 3 is an enlarged fragmentary sectional detail view taken substantially on line 3—3 of Fig. 1.

Referring to the accompanying drawing, which is illustrative of an exemplary form of refrigerator wall door opening and closure door therefor, it will be observed that the wall 11 is provided with a door opening, as at 12, having a door 13 in abutment with the marginal area or door frame surrounding the opening 12. The relationship between the door 13 and the door frame is such as to provide a hermetic seal therebetween so as to prevent rapid heat transfer when the door is closed and latched. It should be understood that all references herein to a door frame include the marginal area of any door opening adapted to be closed by a door in the manner discussed in detail hereinafter.

As illustrated, the door 13 is mounted to swing about an axis into open and closed positions. Such pivotal mounting of the door is obtained by the use of a plurality of hinges one of which is generally indicated at 14. It should be obvi-

ous that although but a single hinge is illustrated, a door mounting will include two or more such hinges depending upon the size and weight of the door. The hinge elements are secured firmly to the outside face and along one edge of the door 13 and to the related face of the door frame. The other or free edge of the door 13 (not shown) may be suitably secured in closed position by manually operable latch mechanism of any conventional construction.

In the present disclosure, when the door is swung into a closed position and latched, a sealing strip or gasket 15 provided all around the inside face of the door margin is brought into tight sealing contact with the face of the door frame so as to hermetically seal the opening. Owing to icing conditions or to the presence of other obstacles which may prevent uniform or tight sealing of the gasket 15 around the door frame, the hinge elements 14 embody a yieldable construction so as to automatically compensate for any variation in the ultimate or sealing position of the gasket 15.

Referring now specifically to the accompanying drawing, the hinge element 14 consists of a mounting bracket 16 and a member 17. The mounting bracket 16 may be substantially rectangular in shape and is secured to the outside face of the enclosure wall 11 adjacent one edge of the door opening 12 as by means of lag screws 18. A pair of ears 19 are formed integral with the bracket 16 and extend forwardly therefrom in spaced apart relation. These ears are suitably apertured adjacent their free ends to receive therethrough a pintle pin or bolt 21.

A wide link 22, best shown in Fig. 3, is provided on one end with a substantially cylindrical bearing portion 23 of a length corresponding substantially to the distance between spaced apart ears 19. This link end is adapted to be fitted between the ears 19 and receive the bolt 21 therethrough, thereby affording a loose hinge connection between the link end and the mounting bracket 16. The other end of the link 22 also is provided with a tubular bearing portion 24 having an aperture 25 therein for purposes to be described hereinafter.

The associated hinge member 17 consists of an elongated strap-like member, preferably U-shaped in transverse section and tapered longitudinally. It is suitably apertured at spaced intervals throughout its length to receive mounting screws 26 by means of which the member 17 is firmly secured to the outside face of the door 13 adjacent one edge thereof. Upon referring to Fig. 2 it will be observed that the member 17 projects outwardly beyond the edge of the door 11 and that its projecting end portion overlies and embraces the link 22 so as to substantially conceal the same from view. The extreme end or tail portion 27 of the member 17 extends rearwardly substantially at right angles to the main body portion to overlie the hinge connection between the link 22 and mounting bracket 16.

The longitudinal side walls or flanges 28 of the hinge member 17 terminate short of the hinge connection at the bracket 16 and are provided with aligned apertures registering with the aperture 25 in the link end 24. A bolt or pin 29 is passed through the registering apertures in the side walls 28 and link end 24 to pivotally connect said link end to the member 17 inwardly of the free end of the projecting end portion. The link which affords a free swinging connection between the member 17 and bracket 16 is sufficiently rugged to afford adequate support for the door 13, the weight of which is carried thereby.

Free movement between the link 22 and hinge member 17 is prevented in the present construction by the provision of suitable yieldable means connecting said members. As best shown in Fig. 3, such means includes a tie bolt 31 which extends freely through a hole 32 in the link web 33 and through a corresponding hole 34 in the overlying free end portion of the member 17. A pair of compression springs 35 and 36 are suitably mounted on the tie bolt 31, one on either side of the link web 33. As illustrated, the spring 35 is located on the inwardly disposed face of the web 33 and is retained in place as by means of a washer 37 carried beneath the bolt head 38. The other spring 36 is interposed between the opposed recessed face of the link web 33 and the inside face of the hinge member 17. A washer 39 and nut 41 mounted on the projecting threaded end of the tie bolt 31 afford means whereby the tension of the springs 35 and 36 (which are normally tensioned) may be increased or decreased to suit various requirements of use.

Increase or decrease in the tension of the springs 35 and 36 is required in instances of icing or when abnormal wear has occurred in the gasket 15. For example, when the gaskets 15 become worn to such an extent that hermetic sealing of the opening 12 is no longer effected, the nut 41 on the tie bolt 31 is turned onto the tie bolt so as to compress the springs 35 and 36 and thereby draw the hinge member 17 inwardly towards the door frame. Such inward movement of the member 17 carries the door 13 inwardly towards the door opening to thereby reduce the gap normally requiring sealing by the gasket. In such manner any loss of sealing resulting from excessive wear from the gaskets 15 may be progressively corrected.

Refrigerators and cold storage compartments frequently are difficult to seal owing to icing conditions. The existence of such conditions, if not compensated for, may, under certain circumstances, result in warpage of the door 13 or breakage in the hinges or other hardwear mounted on the door. In the present structure any resistance to closing the door is automatically accounted for by the yieldable floating hinge construction disclosed. Should icing or some other obstruction prevent proper closure of a door mounted by means of the present hinges, the ultimate position of the door will be such as to locate the hinge connection 24—29 outwardly of the position best illustrated in Fig. 3. In other words, the link 22 will swing outwardly about its pivot 21. In such event the spring 35 is compressed to compensate for the relocation of the link 22 and the spring 36 expands sufficiently to take up any slack and prevent free play in the assembly.

When the door is moved into an open position, the link 22 moves in substantial unison therewith, the entire mounting pivoting on the pintle pin or bolt 21. If desired, anti-friction bearings 42 may be arranged at opposite ends of the bearing portion 23 of the link 22 to minimize wear. Should spring breakage occur, it is a relatively simple matter to remove the tie bolt 31, while the door is in an open position, replace the broken spring and, after replacing the bolt 31, adjust the springs to the required tension.

Although a preferred embodiment of the invention has been disclosed in the accompanying drawings and described in detail in the foregoing

description, it should be understood that the invention is capable of embodying a wide variety of modifications in detail construction and manner of use without departing from the spirit of the invention and the scope of the appended claims.

I claim:

1. A hinge for a door for closing and sealing an opening through a door frame including a mounting bracket adapted to be attached to a door frame, a member adapted to be attached to one face of the door, said member having an end portion extending beyond an edge of the door and overlying the mounting bracket, a link connected at one end to the bracket and at its other end to the end portion inwardly of the free end of said portion, said link having an aperture in its medial portion and the extending end portion having an aperture aligned with the link aperture, a tie-bolt extending loosely through said apertures, and a pair of springs surrounding the tie bolt, one located between the link and the extending end portion and the other located on the other side of said link, said tie bolt being effective to increase or decrease the tension of said springs.

2. In a hinge including a mounting bracket and a member, a link hingedly connected at one end to said bracket and at its other end to said member, and yieldable means disposed on opposite sides of the link midway between its ends connecting the member and said link whereby said member and link move in substantial unison about the hinge mounting bracket.

3. A hinge for a door for closing and sealing an opening through a door frame including a mounting bracket adapted to be attached to the door

frame, a member adapted to be attached to the door, a link pivotally connected at one end to the member inwardly of one end of the member and at its other end to the bracket, and yieldable means connecting the said member and the medial portion of the link whereby the member and link move in substantial unison during opening and closing movement of the door, said yieldable means including a pair of compression springs one disposed on each side of the link.

4. A hinge for a door for closing and sealing an opening through a door frame including a mounting bracket adapted to be attached to the door frame, a member adapted to be attached to the door, a link pivotally connected at one end to the member inwardly of one end of the member and at its other end to the bracket, and yieldable means connecting the said member and the medial portion of the link whereby the member and link move in substantial unison during opening and closing movement of the door, said yieldable means including a pair of compression springs one on each side of said link and adjustable means to tension said springs.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,987,512	Leonard	Jan. 8, 1935
2,171,921	Duval et al.	Sept. 5, 1939