June 21, 1966 B. STERNER 3,256,552

HINGE

Filed Jan. 23, 1963 2 Sheets-Sheet 1

Fig.1

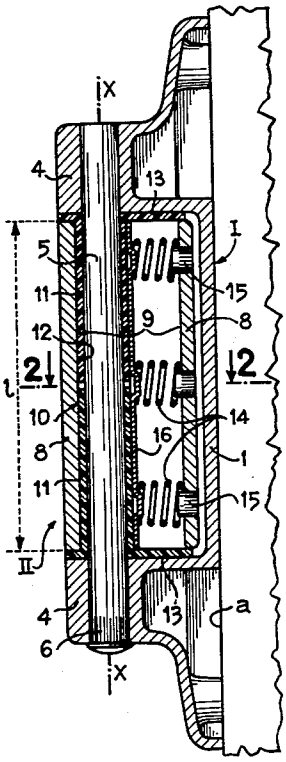



Fig.3

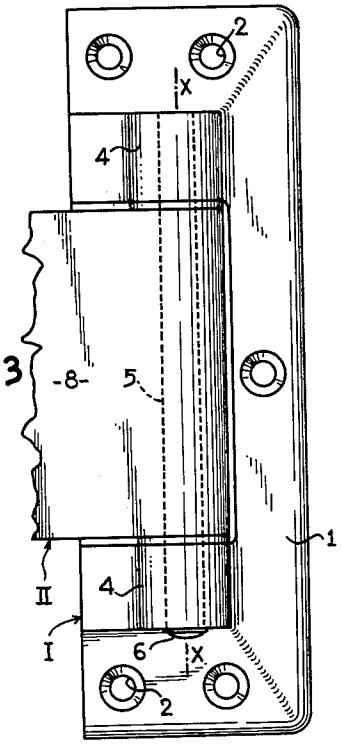
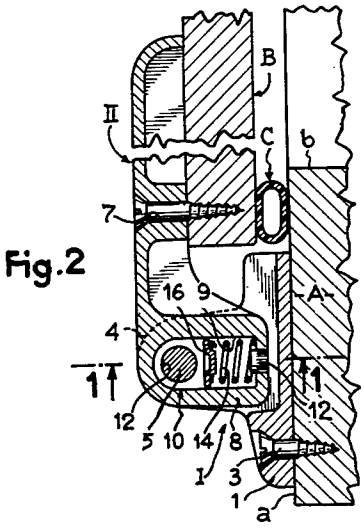



Fig.2



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Fig.4

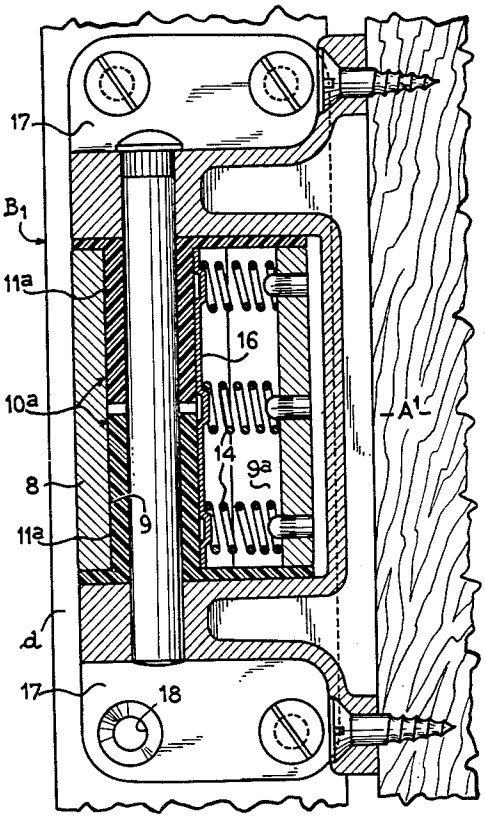
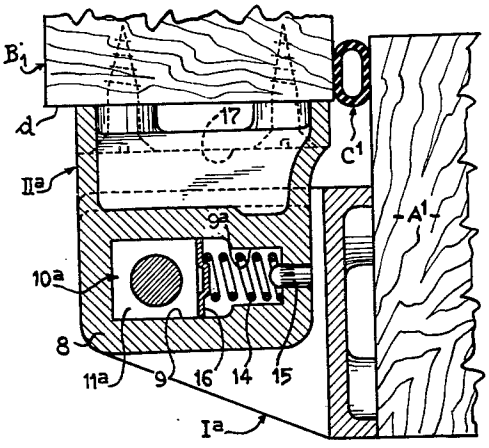



Fig.5



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3,256,552

# HINGE

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Claims priority, application France, Feb. 6, 1962, 887,101
7 Claims. (Cl. 16—128)

The present invention relates to hinges for refrigerator doors and other apparatus or installations, this door being adapted to apply against the fixed support face formed on the body of the refrigerator or on any other frame with interposition between the door and this face of a sealing element that the closed door must compress against said face.

The required compression for providing a seal is easy to obtain on the side corresponding to the closing lock or latch, which comprises for this purpose elastically-yieldable means biasing the door against the support face. On the other hand, on the side relating to the hinges, this result has heretofore been obtained in an imperfect manner as most of the known hinges comprise no elastically-yieldable biasing means and those that do are more complicated in construction and costly.

The object of the present invention is to remedy these drawbacks.

The invention provides an improved hinge which permits elastically applying the door provided therewith against the fixed support face corresponding to the door and thus compressing a sealing element between the face and the door.

In this improved hinge, the moving part thereof adapted to be fixed to the door comprises a slideway whose plane of symmetry is perpendicular to the corresponding fixed support face of the door in the closed door position, and said moving part slides through the medium of the slideway and in opposition to an elastically-yieldable means, on a slide rotatively mounted on a fixed pin which constitutes a hinge hook or pin and is carried by the part of the hinge adapted to be fixed to said fixed support face.

Owing to this feature, the desired elastic biasing is obtained in a particularly strong hinge having massive parts which are capable of being disassembled and in particular permit the hinge to be taken apart.

Further features and advantages of the invention will be apparent from the ensuing description, with reference to the accompanying drawings to which the invention is in no way limited.

In the drawings:

FIG. 1 is a vertical longitudinal sectional view of a hinge according to the invention for a refrigerator door, the section being taken along line 1—1 of FIG. 2 intersecting the axis of the hinge pin;

FIG. 2 is a horizontal sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is a partial front elevational view corresponding to FIG. 1, and

FIGS. 4 and 5 are views similar to FIGS. 1 and 2 respectively in the case of an overlapping door pivoted to a door frame.

In the embodiment shown in FIGS. 1–3, the hinge is adapted for securing a door B to the forward face *a* of the body A of a refrigerator or like apparatus, this door being required to compress in its closed position a sealing element C along the entire periphery of the cavity *b* of the body A.

This hinge is composed of two parts or leaves I and II respectively secured to the body A and the door B.

The part I comprises a base 1 provided with holes 2 for securing the base 1 to the body A by means of screws 3. This base has a U-shaped form with two projections or ears 4 constituting a fork which carries the hook or pin 5 having an axis X—X and being parallel with the face *a*. This pivot pin 5 can be an interference fitted in the two ears 4 and maintained therein, for example by means of knurling 6.



The moving part II of the hinge is attached to the door B by screws 7 (FIG. 2) and has the general shape of a strip preferably stiffened by ribs and/or flanges and terminating in a head 8 whose dimension *l* (FIG. 1) is slightly less than that of the entrance of the fork constituted by the ears 4 of the fixed part I so that this head can be engaged in this fork.

The head 8 is provided with a throughway aperture 9 extending in a direction parallel with the axis X—X and having a rectangular cross-sectional shape but a semi-cylindrical end portion which is adapted to form a slideway which is symmetrical relative to a plane which coincides with the plane of the section 1—1, perpendicular to the face *a* of the door frame, when the door B is in its closed position resting against this frame. This slideway is adapted to slide relative to a slide generally indicated by the reference character 10 and rotatively mounted on the hook or pin 5.

This slide 10 is in fact composed of two independent parts disposed in end-to-end relation and each consisting of, on the one hand, a longitudinally extending portion 11 provided with a cylindrical aperture 12 through the medium of which it is rotatively mounted on the pin, whereas its outer face fits in the semi-cylindrical end portion of the slideway 9 and the adjacent portions of the parallel faces of this slideway, and, on the other hand, a flange or lateral cheek portion 13 interposed between the head 8 of the part II of the hinge and the adjacent faces of the ears 4 of the part I, so as to reduce wear and friction due to the weight of the door.

It will be observed that the two semi-slides are advantageously composed of plastic, for example superpolyamide, polytetrafluoroethylene or any other material which is wear resistant and has great strength. These elements can be obtained by pressure moulding.

Interposed between the half-slides and the end of the slideway 9 adjacent the base 1 are a number of springs 14 centered by pins 15 and bearing, on the one hand, against said end of the slideway 9 adjacent the base 1 and, on the other hand, against a support plate 16 interposed between these springs and the two parts 11 of the slide 10.

During sealing hinge operation the slide 10 does not participate in the rotational movements about the axis X—X of the pin 5 and the part II of the hinge slides, through the medium of its slideway 9, on this slide 10.

In the open position of the door, the slide and slideway occupy the relative position shown in FIGS. 1 and 2, and the same is true in the closed position if the force exerted by the springs 14 exceeds the elastic reaction of the sealing element C.

On the other hand, if the sealing element C offers a resistance when the door is being closed which exceeds the force exerted by the springs 14 which are extended to the maximum extent (illustrated position), these springs are compressed and the part II of the hinge moves toward the left (when viewed as in FIGS. 1 and 2) away from the part I, the slideway 9 sliding relative to the slide 10 and compressing the springs 14.

In this way, one is certain that in the closed position there is always equilibrium between the elastic reaction of the sealing element C and the elastic action of the springs 14 which, in bearing against the fixed pin 5, bias the door B toward the support face *a* in the direction for compressing the sealing element C.

Owing to the elasticity-yieldable hinge obtained, in the closed position of the door the sealing element C is perfectly compressed throughout the periphery of the door.

As can be seen, the hinge is composed of two massive parts. It can be taken apart since it is sufficient to extract the pin 5.

FIGS. 4 and 5 show a variant of a hinge adapted to pivot the leaf $B_1$ of an overlapping door, to a door frame $A_1$, a sealing element $C_1$ being compressed therebetween.

The part $I^a$ of the hinge is more or less identical to the part I of the first embodiment.

The part $II^a$ is shorter than the part II of the first embodiment and secured directly through the medium of lateral lugs 17, to the lateral edge *d* of the leaf $B_1$ by means of screws extending through countersunk holes 18.

The rest of the arrangement is identical to the first embodiment, the head 8 of the part $II^a$ comprising a slideway 9 which is, however, narrowed at $9^a$ so as to guide the springs 14 which are centered by the pins 15 and bear through the medium of the bearing plate 16 against the two parts of the slide generally indicated by the reference character $10^a$. The longitudinal portions $11^a$ of the two parts of the slide have a rectangular cross-sectional shape corresponding to that of the larger part of the slideway 9.

Although specific embodiments of the invention have been described, many modifications and changes may be made therein without departing from the scope of the invention as defined in the appended claims.

It is obvious that the number of springs can be different from that shown and that any other type of spring could be employed, such as a stack of Belleville washers or a stack of spring blades bent in opposite directions and disposed in the longitudinal direction in the slideway 9.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a structure comprising a door and a door support, a hinge mounting the door on the support so that the door is pivotable about a pivot axis, the hinge having a fixed hinge part secured to the support and a moving hinge part secured to the door, a hinge pin fixed in the fixed hinge part and embodying said pivot axis and means for pivotally mounting the moving hinge part on the hinge pin, said means comprising a slideway provided on the moving hinge part and extending in a direction substantially perpendicular to the general plane of the door, a slide pivotally mounted on the hinge pin and engaged with and co-operating with the slideway so that the slideway is prevented from rotating relative to the slide but is slidable relative to the slide in a direction substantially perpendicular to the general plane of the door toward and away from the fixed hinge part in the closed position of the door, and resiliently yieldable means interposed between the slide and the moving hinge part and biasing the moving hinge part away from the hinge pin and toward the fixed hinge part in said closed position of door, whereby the door is resiliently biased toward the support in the closed position of the door and has no tendency to tilt in said general plane relative to said pivot axis.

2. In a hinge for pivotally mounting a door on a support, the hinge having a fixed hinge part adapted to be secured to the support and a moving hinge part secured to the door, two ears on the fixed hinge part, a hinge pin fixed in the two ears, and means for pivotally mounting the moving hinge part on the hinge pin, said means comprising a slideway formed in the moving hinge part, slide means pivotally mounted on the hinge pin and slidably mounted in the slideway so that the slideway is slidable in directions toward and away from the fixed hinge in the closed position of the moving hinge part corresponding to the closed position of the door, and resiliently yieldable means interposed between the slide means and the moving hinge part and biasing the moving hinge part away from the hinge pin and toward the fixed hinge part in said closed position of the moving hinge part, whereby the door is resiliently biased toward the support in the closed position of the door and has no tendency to tilt in the general plane of the door relative to the axis of said hinge pin, said slide means being composed of a bearing material and having at one end a flange portion, the flange portions of the slide means being respectively interposed between and acting as thrust bearings between the ears and the moving hinge part.

3. In a structure comprising a door and a door support, a hinge mounting the door on the support so that the door is pivotable about a pivot axis, the hinge having a fixed hinge secured to the support and a moving hinge secured to the door, a hinge pin fixed in the fixed hinge and embodying said pivot axis, and means for pivotally mounting the moving hinge on the hinge pin, said means comprising a slideway provided on the moving hinge and having two plane faces parallel with a plane which contains the hinge pin and is substantially perpendicular to the general plane of the door, an abutment face provided on the moving hinge and located between the hinge pin and the fixed hinge in the closed position of the door, a slide pivotally mounted on the hinge pin and having two parallel plane faces slidably engaged between the plane faces of the slideway so that the slide is slidable toward and away from the abutment face in said plane, and compression spring means interposed between the slide and the abutment face and biasing the moving hinge toward the fixed hinge in said closed position of the door, whereby the moving hinge is resiliently biased toward the fixed hinge in said closed position of the door and the door has no tendency to tilt in said general plane of the door relative to said pivot axis.

4. In a hinge for pivotally mounting a door on a support, the hinge having a fixed hinge leaf adapted to be secured to the support and a moving hinge leaf secured to the door, two ears on the fixed hinge leaf, a hinge pin fixed in the two ears, and means for pivotally mounting the moving hinge leaf on the hinge pin, said means comprising a throughway aperture formed in the moving hinge leaf and through which the hinge pin extends, the aperture having an end face remote from the hinge pin and two plane faces parallel with a plane which contains the hinge pin and extends in a direction toward the fixed hinge leaf in a closed position of the moving hinge leaf corresponding to the closed position of the door, two slides composed of a wear resistant bearing material pivotally mounted on the hinge pin and slidably engaged between the plane faces of the aperture, each slide having a flange portion, the flange portions of the slides being respectively interposed between the ears and the moving hinge leaf so as to act as thrust bearings, and a plurality of compression springs interposed between the end face of the aperture and the slides and biasing the moving hinge leaf away from the hinge pin in a direction parallel with said plane.

5. The structure as claimed in claim 4, further comprising centering means provided in the end face and engaging the adjacent ends of the springs, and a bearing plate interposed between the other ends of the springs and the slides.

6. The structure as claimed in claim 5, wherein the slides are composed of synthetic plastics material and the bearing plate includes centering projections engaging said other ends of the springs.

7. In a structure comprising a door and a door support, a hinge pivotably mounting the door on the support, the hinge having a fixed hinge part secured to the support and a moving hinge part secured to the door, a hinge pin mounted in the fixed hinge part and prevented from moving laterally in translation relative to the said fixed hinge part, means pivotally mounting the moving hinge part on the fixed hinge part, said means comprising a slideway provided on the moving hinge

part, the hinge pin being mounted in the slideway to slide laterally in a radial plane of the pin substantially perpendicular to the general plane of the door, the hinge pin being pivotable relative to one of said hinge parts, and resiliently yieldable means mounted on the moving hinge part and exerting a yieldable pressure on the hinge pin so as to bias the moving hinge part toward the fixed hinge part in said radial plane in the position of the moving hinge part corresponding to the closed position of the door whereby the door is resiliently biased toward the support in the closed position of the door and has no tendency to tilt in the general plane of the door relative to the pivot axis of the hinge pin.

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