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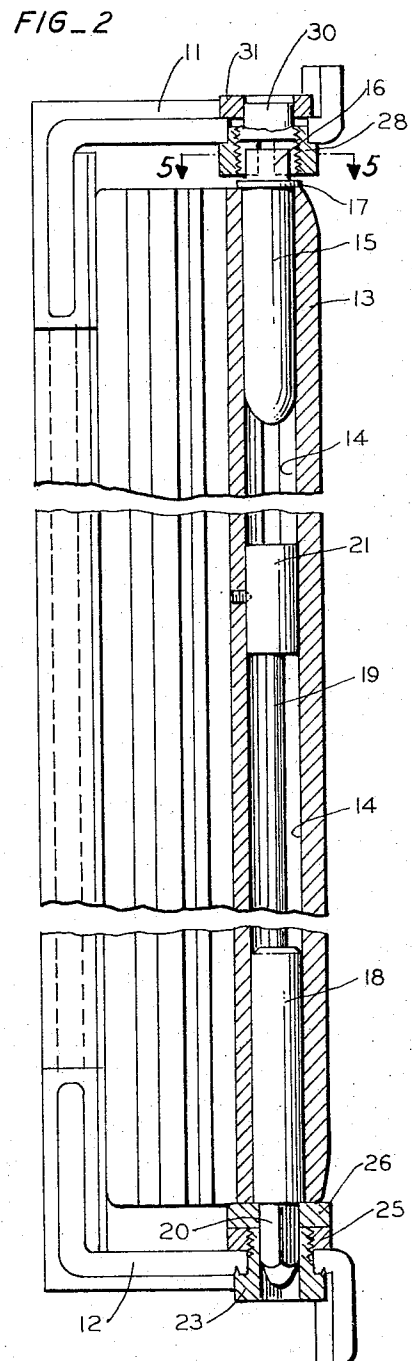
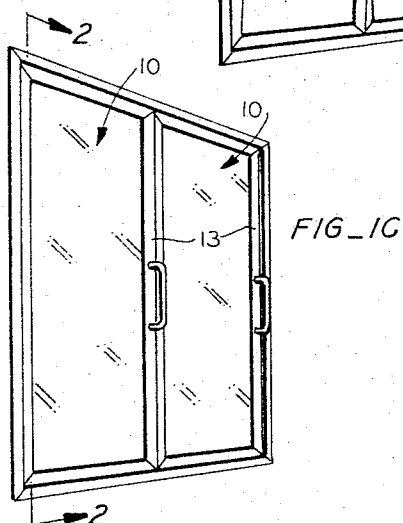
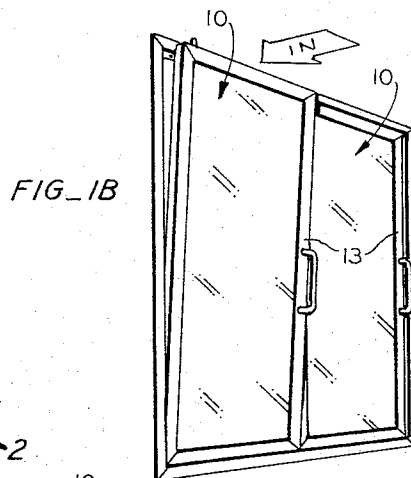
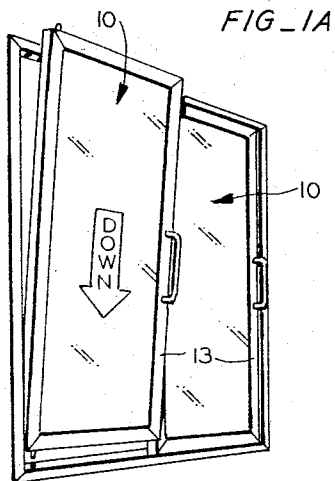
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3,365,747

DOOR HINGE MOUNTING

Filed March 25, 1965

2 Sheets-Sheet 1



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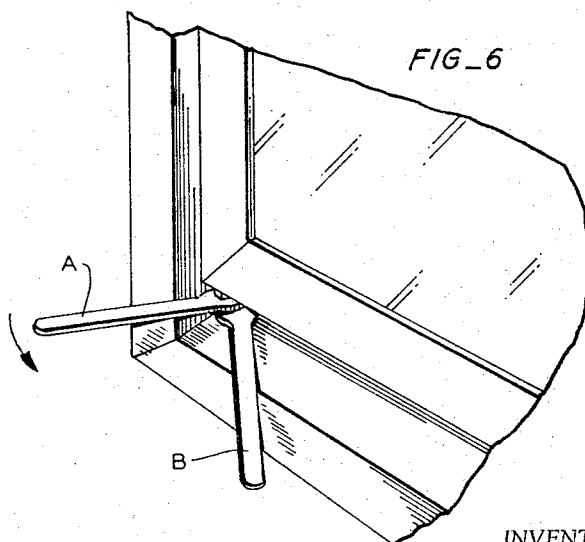
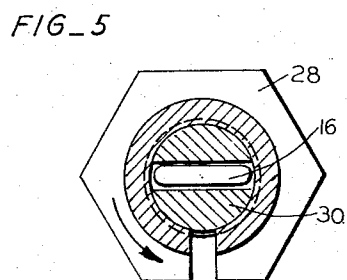
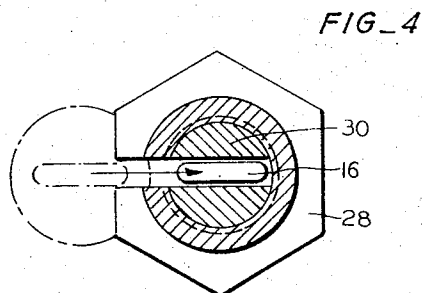
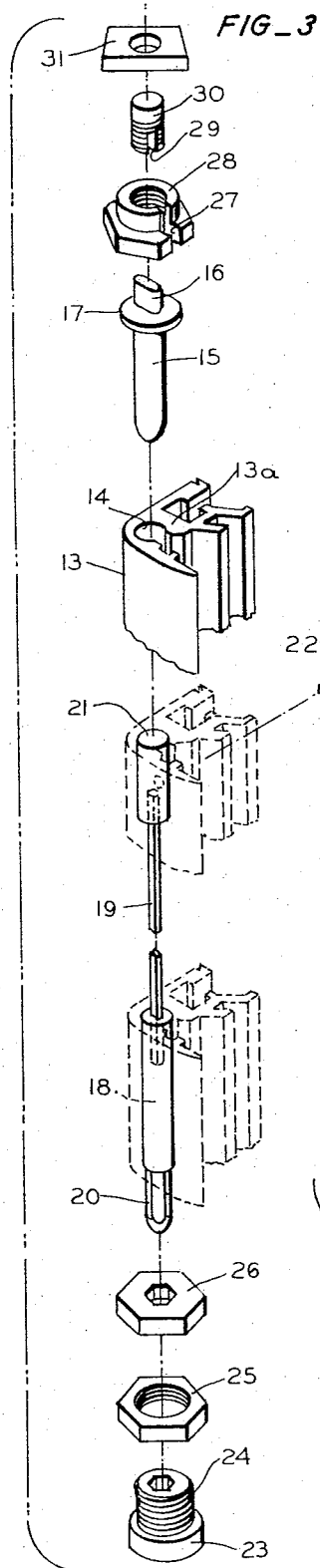
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2 Sheets-Sheet 2



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DOOR HINGE MOUNTING
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ABSTRACT OF THE DISCLOSURE

An assembly for pivotally mounting a panel within a support frame which includes a lower pivot assembly which is disengageable by means of vertical movement of the panel, and which includes an upper pivot assembly which is disengageable by means of lateral movement of the panel, selective means being included to selectively allow and disallow the disengagement of the upper pivot.

This invention relates to door hinge mountings and is particularly related to mountings for doors of the self-closing type. The invention is particularly adapted for use with door mountings having a torsion bar that applies a force for closing the door and maintaining the door in a closed position.

It is recognized that various types of door mountings have been devised for pivotally mounting a door in a manner similar to the present invention. Certain of these door constructions have upper and lower pivot assemblies comprised of interfitting parts that are disengaged and mated together by vertical movement either of the door or one of the pivot elements that mounts the door. Door mountings of this kind have also been constructed with a torsion bar or rod disposed within the framework of a door for applying a closing force to the door. In such cases, one end of the torsion bar is secured to the door while the other end is secured to a mounting stud that may be axially connected with a bracket secured in the door frame. The disengageable mounting stud and bracket are formed with surfaces that prevent relative rotation. An exemplary teaching of this kind is that shown and described in United States Patent No. 2,908,050.

In brief, the present invention contemplates a new door mounting comprising a first mounting assembly that is disconnectably joined by vertical movement of the door (in a manner similar to prior art structures) but further including a second mounting assembly that is connected by a lateral mating of parts which cannot be inadvertently disconnected by accidental lifting of the door. The second mounting assembly more particularly comprises a threaded pin having a transverse slot formed in the end thereof, a nut threadedly mounted on the pin, said nut having a radial slot positionable in alignment with the slot of the pin, and a pivot pin that is engageable with the pivot bearing on the door but also having a stud formed thereon that may be laterally engaged with the aligned slots of the pin and nut.

This invention also teaches a simplified arrangement of parts that facilitates the manufacture and assembly of a door mounting of the kind described. In this regard the door is made from a framework of extruded sections, at least one section having a circular bore that may be used as pivot elements for upper and lower pivot assemblies. In addition, a thrust bearing mounted on the torsion rod

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supports the door from a mounting bushing on the frame, and the cooperation between the parts allows the spring torque on the rod to be adjusted while the door is fully supported by the frame.

One object of this invention is to provide a novel door closer and mounting, particularly for glass doors of a refrigerator display cabinet, which will allow a door to be rapidly mounted or removed from a door frame.

Another object is to provide door mounting apparatus having a torque spring arranged coaxially relative to the axis of pivotal support and including pivot means that allows each door to be set flush with the front opening of a door frame without using exposed hinge fittings either above or below the door.

Another object is to provide door mounting apparatus including a torque spring for biasing the door to a closed position and having fittings that allow the door to be removed without the need for special tools, but which is securely held in place by a captivating element that is rotatable on the axis of pivot mounting.

A still further object of this invention is to provide a novel door mounting of the kind described which utilizes a torque spring and where the tension of the torque rod is easily adjusted or set by using conventional wrenches after the door is fully mounted.

Still another object is to provide a door frame formed of extruded sections, at least one section having a circular bore that may be used as pivot elements for upper and lower pivot assemblies.

Other objects of this invention will become apparent in view of the following detailed description and the accompanying drawings.

In the drawings forming a part of this application and in which like parts are identified by like reference numerals throughout the same,

FIGS. 1A, 1B and 1C are perspective views illustrating the sequence of steps employed in mounting a door that embodies a preferred form of the invention;

FIG. 2 is a vertical section taken on line 2—2 of FIG. 1C and through the pivot axis of the door, details of the pivot mounting being shown in their cooperative relationships;

FIG. 3 is an exploded perspective view showing a preferred form of fittings for mounting a door at its upper and lower corners in the preferred manner contemplated by this invention;

FIGS. 4 and 5 are sections of the upper door pivot taken on line 5—5 of FIG. 2, FIG. 4 showing the orientation of parts when the door is being mounted or removed from the door frame and FIG. 5 showing the relationship of parts during normal use of the door; and

FIG. 6 is a detail and perspective view of the manner in which the tension of the torque rod is adjusted.

Referring to FIG. 2 in particular, door panels 10 are pivotally mounted within door frames that are defined by vertically spaced horizontal upper and lower angle bars 11 and 12. Each door 10 is supported upon a vertical pivot axis that extends through the framework 13 of the door. For this purpose each framework is made of extruded sections, and at least the section used for hinging the doors is formed with a circular bore 14, best shown in FIGS. 2 and 3. The upper and lower ends of bore 14 are used as pivot bearings, the upper end receiving a pivot pin 15 having a stud 16 formed on its upper end above

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a collar 17. The lower end of bore 14 receives a pivot element 18 mounted to the end of a torsion rod or spring 19 and having a free end 20 extending through the bottom edge of the door. A plug 21 is provided on the upper end of torsion rod 19 for anchoring that end to the extruded section. Plug 21 is secured within bore 14 of the extruded channel member by a set screw 22 that is received in a threaded opening formed through the center flange 13a of the extrusion.

As illustrated, pivot pin 15 and pivot element 18 have circular cylindrical surfaces that complement bore 14 and permit relative rotation therebetween when the doors are pivoted open or closed. With the doors in place, pivot pin 15 and element 18 serves as relatively fixed bearings about which the door pivots, and bore 14 provides a pair of vertically aligned first and second pivot bearings formed as an integral part of the door's framework.

It will be noted that the free end 20 of pivot element 18 is shaped with a cylindrical (hexagonal) surface that complements and is axially mateable with a cylindrical opening formed in a mounting bushing. This bushing has a collar head 23 at one end of a threaded stem 24, and it is releasably secured to the lower angle bar 12 by means of a retainer nut 25. Importantly, the interfitting and complementary surfaces of the pivot element and the mounting bushing prevent relative rotation therebetween, and securing the mounting bushing to flange 12 will also fixedly position the pivot element on the pivot axis of the door.

Referring to FIG. 2, a thrust bearing 26 is mounted to end 20 of element 18 for supporting the door upon retainer nut 25. The inner opening of bearing 26 conforms to the cylindrical (hexagonal) surface of end 20 and is mated therewith in a tight fit. It will be evident, therefore, that bearing 26 is keyed upon the end of element 18 and is fixed relative to the mounting bushing when end 20 is received within the hexagonal opening of the mounting bushing.

As indicated above, the upper end of each door 10 is pivoted from angle bar 11 by means of the pin 15, collar 17 resting upon the end of the door extrusion and supporting the pin as shown in FIG. 2. Stud 16 is particularly formed with a thickness which allows it to be moved laterally through a slot 27 formed in an upper locking nut 28 and positioned within a slot 29 of a threaded pin 30. Nut 28 is internally threaded and mounted on pin 30, and slots 27 and 29 are formed with a width dimension sufficient for receiving stud 16. Pin 30, as shown, is press-fitted or welded in the opening of a mounting plate 31, and together the pin and mounting plate are held to bar 11 with the locking nut 28 in the manner which is to be described.

Before mounting door panel 10 to supporting framework, slots 27 and 29 of locking nut 28 and pin 30, respectively, are placed in radial alignment, as shown in FIG. 4, and both the pin and nut are oriented as to direct the open end of their slots toward the front side of the door frame. Moreover, where, as shown, nut 28 is used both for captivating stud 16 and simultaneously securing pin 30 to flange 11, pin 30 is first rotationally oriented and nut 28 is threadedly tightened thereon as to secure the pin to flange 11. Then, nut 28 is backed off the necessary amount to bring its slot 27 into radial alignment with slot 29 of pin 30. With this relationship of parts, door 10 may be rapidly mounted between the supporting bars 11 and 12.

In view of the above description of parts and their assembly, and with particular reference to FIGS. 1A, 1B and 1C, it will be apparent that door 10 is mounted within the door frame by initially positioning the door with end 20 of pivot element 18 generally aligned above the opening of the lower mounting bushing. The upper end of the door is at this time canted slightly forward and outward of the door frame as shown in FIG. 1A. A down-

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ward movement of the door brings end 20 into engagement with the recess of stem 24 until bearing 26 rest upon the upper surface of retainer nut 25, this position being shown in FIG. 1B.

With the lower pivot established, the upper end of the door is moved into the plane of the door frame, causing stud 16 to pass through slot 27 and into slot 29, which slots have been previously aligned, as shown in FIG. 4. Using a conventional wrench, nut 28 is threadedly rotated to a position as shown in FIG. 5 where slots 27 and 29 are no longer aligned, thereby captivating stud 16 within the slot of pin 30. The rotation of nut 28 also moves the nut upward on the pin, as to secure the pin and its mounting plate 31 to upper angle bar 11.

Since the lower end of torque rod 19 is held fixed upon mating end 20 of pivot element 18 with the recess of bushing stem 24, any pivotal movement of the door will now set up a torsional strain in the rod that biases the door to its original closed position. Inasmuch as a certain amount of residual spring force is desirable after the door is returned into the plane of the door frame, torque rod 19 is initially spring-loaded using a pair of conventional wrenches in the manner shown in FIG. 6.

The procedure by which residual spring force is applied involves, first, backing off locking nut 25 a sufficient amount to release the mounting bushing and permit its rotation relative to angle bar 12. Bearing 26 is then engaged with a wrench A, shown in FIG. 6, and a suitable tensioning force is applied in the direction indicated. While wrench A is held, thereby tensioning rod 19, locking nut 25 is re-engaged with a wrench B and turned to secure the bushing in its newly oriented position.

Although a preferred embodiment of this invention has been illustrated and described, it will be apparent that various modifications and changes may be made without departing from the spirit of the invention or the scope of the attached claims, and each of such changes is contemplated.

What I claim is:

1. An assembly for pivotally mounting a self closing door within the opening of a support frame having vertically spaced horizontal frame members, comprising: a door having a torque rod mounted therein and secured at one end thereto; said torque rod having a free end extending through the bottom edge of said door; a pair of vertically aligned first and second pivot bearings mounted to said door and disposed coaxially relative to said torque rod, the free end of said torque rod extending through the first of said pivot bearings and being pivotally supported therein; means mounted to one of said frame members for engaging the free end of said torque rod; and means mounted to the other of said frame members for pivotally engaging the second pivot bearing, said means comprising a threaded pin having a transverse slot formed in the end thereof, a nut threadedly mounted on said pin and having a radial slot positionable in alignment with the slot of said pin, and a pivot pin engageable with said second pivot bearing and having a stud formed thereon that may be laterally engaged with the aligned slots of said pin and nut.

2. The assembly of claim 1 wherein said door comprises a framework formed of sections, at least one section of said framework being formed as an extrusion having a generally circular bore that defines said first and second pivot bearings.

3. The assembly of claim 1 and further comprising a thrust bearing mounted on the free end of said torque rod, said thrust bearing having an opening for receiving the free end of said torque rod therethrough and being formed with a tool engaging surface for rotating the end of said rod and placing it under spring tension.

4. An assembly for pivotally mounting a panel within the opening of a support frame having vertically spaced horizontal frame members, comprising: upper and lower pivot assemblies for mounting a panel within the opening

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of said frame members; one of said pivot assemblies being comprised of interfitting parts that are disengageable by vertical movements of the panel, one part being mounted to the panel and the other part being mounted to a frame member; the other pivot assembly being comprised of a threaded pin mounted on one of said panel or said frame member and having a transverse slot formed in the end thereof, a nut threadedly mounted on said pin and having a radial slot positionable in alignment with the slot of the pin, and a pivot pin mounted on the other of said panel and said frame member and having a stud formed thereon that may be laterally engaged with the aligned slots of said pin and nut.

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