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J. J. DEVERY

2,904,853

CABINET STRUCTURE

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FIG. 2.

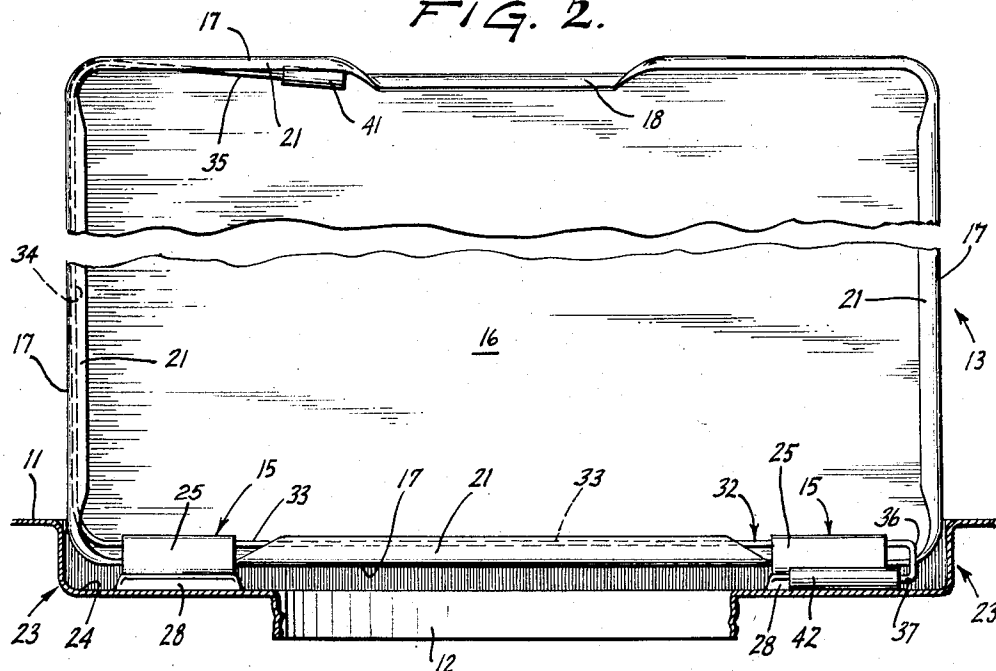


FIG. 1.

FIG. 4.

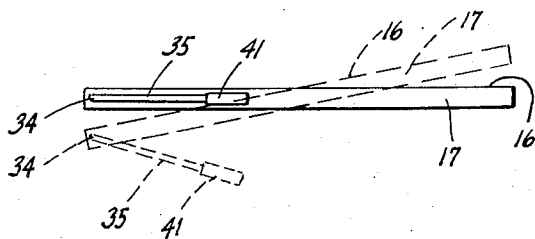
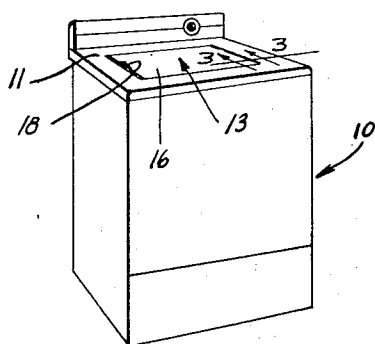


FIG. 5.

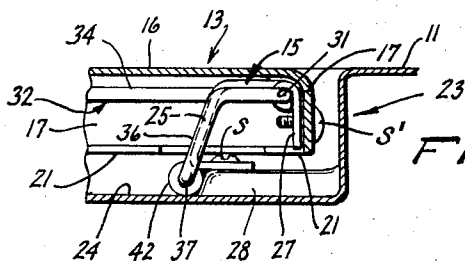
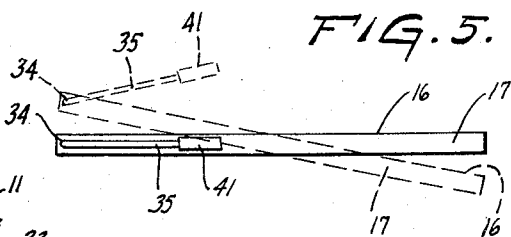


FIG. 3.

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CABINET STRUCTURE

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This invention relates to cabinet structure, and more particularly to means for mounting a closure member over an access opening provided in a cabinet. While of broader applicability, the present invention has particular utility in the field of household appliances such, for example, as laundry apparatus.

It is a practice in the field of domestic laundry apparatus to provide so-called vertical axis washing machines with access, or loading, openings disposed in horizontal upper wall portions of cabinet structure enclosing the machine. In one such structure the loading opening is closed by a hinged door made up, preferably, of a sheet metal panel having down-turned peripheral flanges which give the panel added strength and resist warpage. While these flange members satisfactorily prevent warpage encountered in normal usage of the door, difficulties have arisen due to warpage occurring during fabrication of doors of this type. For example, panels have become warped when subjected to heat, particularly such heat as is encountered in enamelling processes. While a door warped in this manner will remain substantially rigid during normal use, it presents an unsightly appearance when mounted on cabinet structure.

It is therefore a primary object of the present invention to provide novel means for preventing or eliminating such warpage distortion in a panel member.

It is a further object of the invention to provide panel warpage compensating means that is readily adjustable as the need for compensation may arise.

In achievement of the foregoing as well as other objectives, and first briefly stated, the present invention contemplates, in a preferred embodiment, the combination of a door panel which is susceptible to warpage with a torsion bar hinge pintle assembly shaped and disposed to function both as a counterbalance for the door panel and to exert on a warped panel forces compensating for such warpage, and maintaining substantially planar disposition of the panel.

The manner in which the foregoing objectives and advantages may best be achieved is illustrated in the accompanying drawing, in which:

Figure 1 is a perspective showing of laundry apparatus embodying the invention;

Figure 2 is an enlarged elevational showing, partly in section and with parts broken away, of the upper portion of apparatus seen in Figure 1 and showing the hinged closure member in its open position;

Figure 3 is an elevational showing, partly in section, and looking generally in the direction indicated by arrows 3—3 as applied to Figure 1; and

Figures 4, and 5 are somewhat diagrammatic elevational showings of the closure member looking toward the top edge of the latter, as viewed in Figure 2.

Making more particular reference to the drawing, and first to Figure 1, a cabinet 10 houses a vertical-axis laundry machine of conventional design wherein a rotatable tub or basket (not shown) has an upwardly presented open area which provides for both loading and

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unloading the same. With reference also to Figure 2, upper horizontal wall portion 11 of cabinet 10 has a tub access or loading aperture 12 disposed in registry with the aforementioned open area. A door 13 is hinged to the wall portion 11 by hinge means indicated generally by the numeral 15. Hinge means 15 will be hereinafter described in more detail.

Door or closure 13 comprises a panel portion 16 having down-turned flanges 17 extending along peripheral portions thereof. Flanges 17 have transversely extending portions 21 that are presented toward central regions of the door. Flanges 17 extending along free edges of the door are disposed for abutting engagement, when the door is closed, with suitable resilient bumpers or spacers (not shown) mounted on outwardly turned portion 24 of downturned flange 23 extending along the periphery of aperture 12. A recess 18 formed in the free edge of door 13 provides means for grasping the door to open the same.

Referring again to mounting of the door 13, and with reference also to Figure 3, hinge means 15 comprises a pair of hinge plates or brackets 25 mounted by screws S on embossed portions 28 of flange 23, said plates 25 having aligned hinge pin or pintle bores (not shown). The adjacent edge portion of door 13 has hinge plates or brackets 27 mounted by screws S' to flange 17 thereof. Brackets 27 have pintle bores 31 disposed in axial alignment with like bores provided in brackets 25.

Pintle means for hinge means 15 comprises leg portion 33 of a generally U-shaped, rod-like torsion member 32, the latter having a transversely extending portion 34 interconnecting leg or pintle portion 33 with a second reversely bent leg portion 35 extending, preferably, substantially parallel to the portion 33 and being disposed in the plane of the door, for example along the edge of the door opposite the hinged edge. Portions 34 and 35 of member 32 are retained frictionally within the flange 17 of the door. As seen to advantage in Figure 3, the free end of pintle portion 33 has a loop portion 36 presented toward portion 24 of flange 23, and a short reversely bent leg portion 37 extending from loop portion 36 engaging said flange portion 24 in the region of embossed portion 28. Loop portion 36 and interconnecting portion 34 are so angularly spaced from one another, about pintle portion 33 as an axis, as to introduce twisting of said pintle portion in an amount sufficient resiliently to urge said door toward its open position thereby counterbalancing the same.

Preferably, although not necessarily, extremities of the torsion member 32 are provided with suitable caps of flexible and resilient material, as seen at 41 and 42, which serve as bearing members and prevent marring of the cabinet and door finishes.

In particular accordance with the present invention, leg portions 33 and 35 are capable of being angularly displaced from one another about interconnecting torsional portion 34 as an axis. Keeping in mind this important latter feature, it is known that doors of the type disclosed frequently are warped in either of two directions, as indicated diagrammatically by the broken line showings of Figures 4 and 5. Warping of the present door is characterized in that the hinged edge portion is restrained from twisting, by the hinges whereas, the illustrated opposite edge of the door tends to twist substantially symmetrically about its mid-region. In order to compensate for twisting, an appropriate counter moment or force couple must be applied to the door panel, for example between such mid-region and a side or edge thereof. A convenient and effective region to which suitable forces may be applied comprises the free edge portion of the door opposite the hinged portion. The required forces advantageously are

imparted to this free edge portion, selectively, by the reversely bent portion 35 of torsion member 32.

In carrying out the teachings of the present invention, and having determined that a mounted door is warped in either of the directions indicated in Figures 4 and 5, a permanent angular displacement opposite to the warpage is imparted to leg portion 35 in accordance with a broken line showing thereof. Leg portion 35 is then inserted under the door flange 17. In so doing torsional, or twisting, deformation of the resilient interconnecting portion 34 is effected. Inasmuch as it is the tendency of portion 34 to untwist, and since leg or pintle portion 33 is secured by hinge brackets from any transverse movements, end portions of leg portion 35 will be urged in opposite directions, as against flange 17 and panel portion 16. The warpage compensating force coupled thus derived is of a value sufficient to twist or warp the door substantially about its mid-region and to the desired planar position as indicated in the full line showings of Figures 4 and 5.

From another point of view, it may be considered that the free end of leg portion 35 is disposed in a region of the door panel which is restrained by the symmetrically disposed hinges from substantial displacement due to warpage. In such event, the leg portion 35 will tend to rotate about its free end, under the urging of torsional portion 34, effecting panel-warpage compensating displacement of adjoining ends of portions 34 and 35. Accordingly, stressing of the panel is effected, thereby overcoming, as well as preventing, twisting distortion thereof.

The novel means of the invention, it will be appreciated, provide for correction of door warpage occurring either at the time of door installation or in the course of normal usage thereof.

While the invention has been disclosed as being embodied in laundry apparatus provided with a door having but a single panel, it is to be understood that the invention has utility in other types of door and jamb structure equipped with flexible doors or closure members. Also the invention contemplates torsion members having configurations other than the one illustrated.

It will be understood, however, that the foregoing as well as other modifications may be made in the illustrated embodiment without departure from the coverage of the appended claims.

I claim:

1. In combination, panel means susceptible of twisting distortion, hinge means including portions extending along an edge of said panel means and having aligned pintle bores carried by said panel means, said bores being disposed for alignment with like bores in hinge members providing for mounting said panel means on suitable support structure, and a rod-like torsion member having spaced leg portions and an interconnecting portion extending transverse said leg portions, one of said leg portions extending through said pintle bores pivotally to join said hinge members, the other of said leg portions being disposed in engagement with said panel means, the interconnecting portion of said torsion member being disposed and adapted for twisting to rotate said leg portions in opposite directions and transverse the plane of said panel means, stressing said panel means and thereby preventing such twisting distortion thereof.

2. In combination, panel means susceptible of twisting distortion, hinge means carried by said panel means and including a torsion spring and pintle member having a pintle portion shaped and disposed to provide for hinged connection of said panel means with fixed support structure, said member further including a leg portion spaced from said pintle portion and an interconnecting torsion section extending transverse said pintle and leg portions, said leg portion being disposed in engagement with said panel means, the interconnecting torsion section of said member being disposed and adapted for twisting to rotate said leg portion and said pintle portion in opposite directions and transverse the plane of said panel means, stress-

ing said panel means and thereby preventing such twisting distortion.

3. In combination, a panel susceptible of twisting distortion, hinge means including a pair of plates mounted on said panel, said plates having aligned pintle bores extending substantially along an edge of said panel, said bores being disposed for alignment with like bores in plates providing for mounting said panel on suitable support structure, and a rod-like torsion member having first and second leg portions spaced one from the other and a transverse portion interconnecting said leg portions, the said first leg portion extending through said pintle bores pivotally to join said plates, the said second leg portion being disposed in engagement with said panel, the interconnecting portion of said torsion member being disposed and adapted for twisting to rotatably urge said first and second leg portions in opposite directions and transverse the plane of said panel, stressing said panel and thereby preventing such twisting distortion thereof.

4. In combination, a panel susceptible of twisting distortion, hinge means providing for pivotal mounting of said panel on suitable support structure, and a rod-like torsion member having first and second leg portions spaced one from the other and a transverse portion interconnecting said leg portions, the first leg portion comprising the pintle of said hinge means, the said second leg portion being disposed in engagement with said panel, and the interconnecting portion of said torsion member being disposed and adapted for twisting to rotatably urge said first and second leg portions in opposite directions and transverse the plane of said panel, stressing said panel and thereby preventing such twisting distortion thereof.

5. In combination, a panel susceptible of twisting distortion, hinge apparatus including plate means mounted on said panel and having pintle bore means extending along an edge of said panel, said bore means being disposed for alignment with like bore means in plate means providing for mounting said panel on suitable support structure, and a rod-like torsion member extending through said pintle bore means pivotally to join said plate means, said torsion member having a first reversely bent end portion disposed for resilient torsional engagement with such panel supporting structure, and said torsion member having a second reversely bent offset opposite end portion being disposed for resilient torsional engagement with said panel to exert force in a direction overcoming twisting distortion of said panel.

6. In combination, a panel susceptible of twisting distortion, hinge apparatus including bracket means carried by said panel and having pintle bore means extending along an edge of said panel, said bore means being disposed for alignment with like bore means in bracket means providing for mounting said panel on suitable support structure, and a generally U-shaped rod-like torsion member having a first leg portion extending through said pintle bore means pivotally to join said bracket means, and a second leg portion spaced from said first leg portion and engaging said panel, the loop portion of said U-shaped torsion member being disposed and adapted for twisting rotatably to urge said first and second leg portions in opposite directions transverse the plane of said panel, stressing said panel and thereby preventing twisting distortion thereof.

7. Combined hinging and warpage compensating apparatus for a pivotally mounted closure panel member, comprising: first hinge bracket means carried by a relatively fixed support and having hinge-pin bores; second hinge bracket means carried by said panel member and having hinge-pin bores aligned with said bores formed in said first bracket means; and first and second rod-like member interconnected by a rod-like torsional member, said first member comprising the hinge-pin and

extending through said bores, said second member engaging said panel member in a region spaced from said hinge bracket means, and said torsional member being operative resiliently to urge said first and second rod-like members angularly apart about said torsional member as an axis thereby to exert a force compensating for warpage of said panel member.

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