

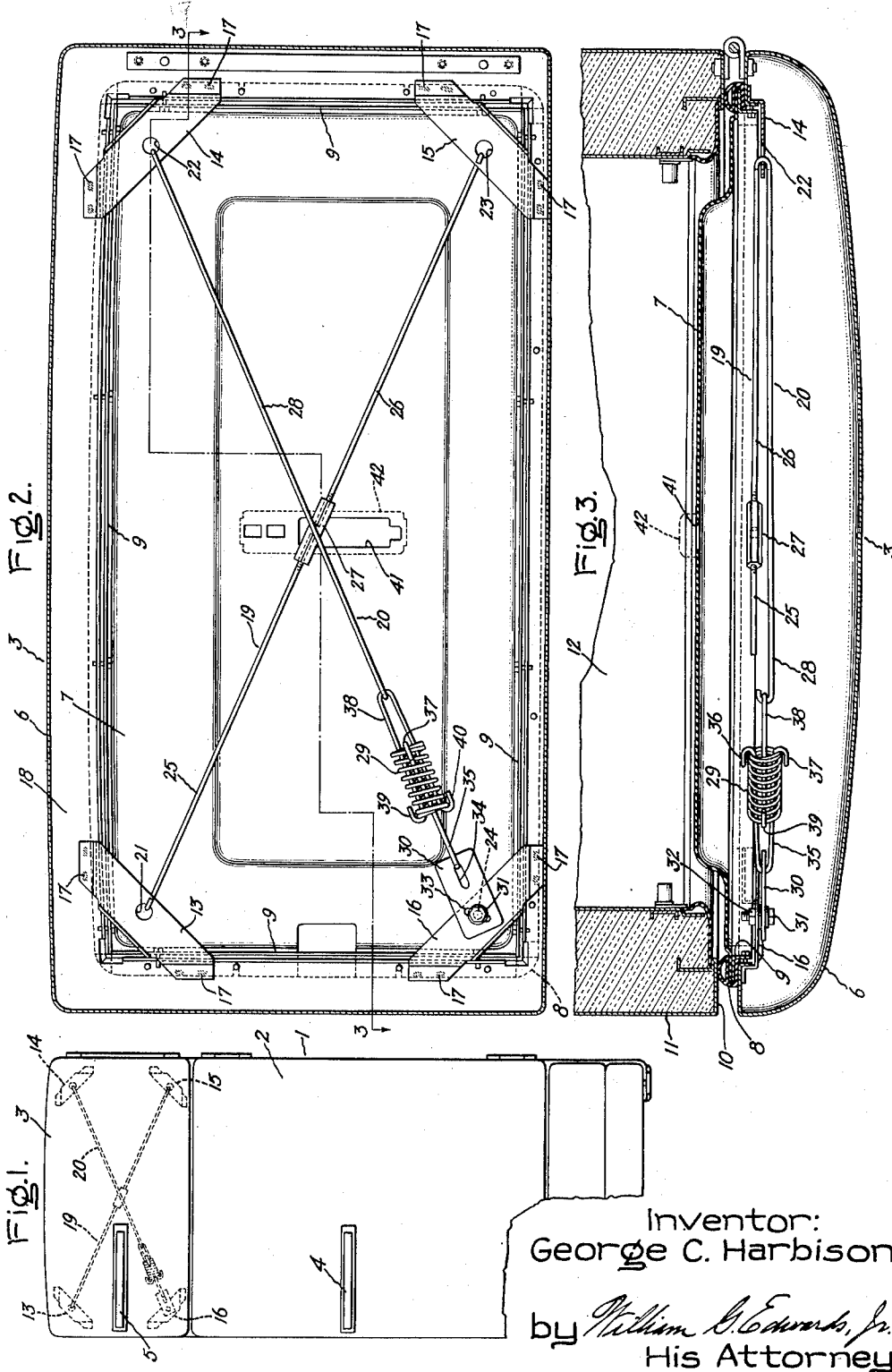
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ADJUSTABLE DOOR BRACE CONSTRUCTION

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ADJUSTABLE DOOR BRACE CONSTRUCTION

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My invention relates to door braces and more particularly to an adjustable door brace construction for permitting adjustment to alter the shape of the door.

In the building of refrigerator cabinets and the like on a mass production basis the plane of the door in the completed cabinet is sometimes not entirely parallel to the plane of the face of the cabinet. Such a condition may prevent the proper sealing of the door. Provision may be made by the use of adjustable diagonal door braces for varying the plane of the door to bring it into coincidence with the plane of the face of the cabinet. However, when this adjustment is accomplished by merely utilizing adjustable door braces, there is no assurance that tension will be present on either of the braces after adjustment and hence the door may tend to lack rigidity and may not retain its adjusted shape under operating conditions.

It is an object of my invention to provide an adjustable door brace construction in which tension on each brace is insured.

It is a further object of my invention to provide a door brace construction including provision for adjusting the door into sealing relationship with the face of the cabinet and including provision for insuring rigidity of the door and maintenance of its adjusted position.

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

For a better understanding of my invention reference may be had to the accompanying drawing in which Fig. 1 is a front elevation view of a refrigerator incorporating my invention; Fig. 2 is a sectional elevation view of a door illustrating the door brace construction, and Fig. 3 is a sectional plan view taken along the line 3—3 of Fig. 2.

Referring now to Fig. 1, there is shown a refrigerator 1 having two doors 2 and 3. The door 2 is provided for closing the access opening of a fresh food compartment and the door 3 closes the access opening of a frozen food compartment. Handles 4 and 5 are provided for opening the doors 2 and 3 respectively. The door 3 is provided with an adjustable door brace construction illustrated in dotted lines; this door brace arrangement is shown in detail in Figs. 2 and 3. While the bracing structure has been shown and applied only to the upper door 3, it

will be apparent that it could be applied equally well to the lower door 2.

Referring now to Figs. 2 and 3, the door 3 includes an outer shell 6 of dished or pan-like shape. The outer door is usually formed of relatively thin sheet metal. A spaced inner panel 7 of a relatively poor heat-conducting material, such as a suitable plastic composition, is provided. The space between the outer shell 6 and the inner panel 7 is filled with a suitable heat-insulating material (not shown.) A gasket 8 is secured to the outer shell by a retaining strip 9, and the gasket is adapted to engage the face 10 of the refrigerator cabinet 11 to seal the access opening of the frozen food compartment 12. A portion of the gasket overlies the edge of the inner panel.

A plurality of corner braces, or gusset elements 13, 14, 15 and 16, are secured diagonally across the corners of the outer shell. The ends of each of the corner braces are welded, as indicated at 17, to a flanged portion 18 of the outer shell.

During manufacture of the refrigerator there may be some variation in the shape of the cabinet or the shape of the door so that the plane of the door, and particularly the plane of the sealing surface of the gasket 8, and the plane of the face 10 of the cabinet are not parallel. This introduces the possibility of a gap between the sealing surface of the gasket and the face 10 of the cabinet at some point. In order to provide for adjustment to bring the plane of the door and the plane of the face of the cabinet into coincidence, cross braces 19 and 20 are employed. Openings 21, 22, 23, and 24 are provided in the corner braces 13, 14, 15, and 16 respectively for receiving the ends of the cross braces.

The cross brace 19 includes two rods 25 and 26, one end of the rod 25 being bent to hook into the opening 21 and one end of the rod 26 being bent to hook within the opening 23. The adjacent ends of the rods 25 and 26 are connected by a turnbuckle 27, which is utilized for adjusting the tension on the cross braces and varying the shape of the door.

The cross brace 20 includes a rod 28, a compression spring 29 and an adjustable element 30. The adjustable element 30 is secured to the corner brace 16 by a bolt 31 and a nut 32 or any other suitable fastening device. The bolt 31 passes through an elongated opening on slot 33 in the adjustable element 30, the slot 33 being inclined at an angle to the direction of the cross

brace 20. This slot permits adjustment of the end of the cross brace 20 to vary the initial compression of the spring 29. While an elongated slot has been provided in the adjustable element 30, and a circular opening 24 in the corner brace 16, it will be apparent that the elongated slot could alternatively be formed in the corner brace 16. The adjustable element 30 includes a second elongated opening or slot 34 which extends in the line of the cross brace 20. A generally U-shaped hook 35 is received within the slot 34 and is adapted to hook over one end of the spring 29. The hook 35 includes two return bent portions 36 and 37 for engaging one end of the spring. A similar U-shaped hook 38 including return bent portions 39 and 40 extends internally through the spring in a plane at right angles to that of the hook 35 and engages the opposite end of the spring 29. One end of the rod 28 engages the opening 22 in the corner brace 14 and the opposite end engages the U-shaped hook 38 to complete the cross brace. Although it is preferred to use the corner braces 13, 14, 15, and 16 because a relatively thin metal is usually employed for the outer shell, the cross braces may, if desired, be connected directly to the flanged portion 18 of the door near the corners of the door.

In assembling the door the adjustable element 30 is adjusted by the use of the inclined slot 33 to place a predetermined compression on the spring 29. The compression of the spring 29 results in a tension of a predetermined amount on the cross brace 20 tending to pull the corner braces 14 and 16 toward each other, and this may bow the door to some extent. By way of example, the adjustable element 30 may be shifted so as to place a tension of 100 pounds on the cross brace 20, and the compression spring may be compressed to within $\frac{1}{8}$ " of its minimum length. After the assembly of the door has been completed and the door has also been assembled on the cabinet, it may be found that, because of variations in either the cabinet or the door, the plane of the door does not correspond exactly to the plane of the face of the cabinet. This condition can be corrected by the turnbuckle 27. An opening 41 is provided near the center of the inner door to permit access to the turnbuckle after the door has been completely assembled. The turnbuckle may be turned in either direction to obtain the necessary adjustment. Thus, if the turnbuckle is moved to shorten the length of the cross brace 19 there will be a tendency to bow inwardly the corners of the door in line with this cross brace. Conversely, the turnbuckle may be moved in the opposite direction to allow the corners of the door in line with the cross brace 19 to move farther apart, the corners in line with the cross brace 20 being moved inwardly by the spring 29 in the cross brace 20. After the adjustment has been completed the opening 41 may be covered by a removable thermometer 42, removable plug, or other suitable covering element.

It can be seen that the use of the spring 29 to apply an initial tension on the cross brace 20 insures a tension on the cross braces 19 and 20 after the completion of the adjustment. This tension on the cross braces contributes to the rigidity of the adjusted door and also minimizes any tendency to drift from the adjusted position. In the absence of the spring such a door may lack rigidity and may fail to remain in its adjusted position during usage.

A tension spring may be employed, if desired, in lieu of the compression spring 29 illustrated in the drawing. However, the compression spring is preferred since it has the advantage of limiting the amount which the door can be twisted out of its plane. Thus, as mentioned earlier in this specification, the compression spring may be initially adjusted to within about $\frac{1}{8}$ " of its minimum length or, expressed differently, its solid height when the turnbuckle is turned in a direction which tends to lengthen the cross brace 20 by compressing the spring 29, and the solid height of the spring prevents excessive twisting of the door which might otherwise damage some other part of the assembly.

While I have shown and described a specific embodiment of my invention, I do not desire my invention to be limited to the particular construction shown and I intend, by the appended claims, to cover all modifications within the spirit and scope of my invention.

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

1. In a door for refrigerators or the like which comprises an outer shell of pan-like shape and diagonal braces connected to said shell adjacent the corners thereof, the improvement which comprises providing in one of said braces a stressed spring for applying at all times a tension on said one of said braces, and providing means for adjusting the other of said braces to vary the shape of said door.

2. In a door for refrigerators or the like comprising an outer shell of pan-like shape, a corner brace secured to said outer shell at each corner thereof, and two diagonal cross braces, one of said cross braces having its ends in engagement with two diagonally opposite corner braces, and the other of said cross braces having its ends in engagement with the remaining two diagonally opposite corner braces, the improvement which comprises providing a stressed spring in one of said cross braces for applying at all times a tension on said one of said cross braces, said one of said cross braces including in one end thereof a slot for affording adjustment relative to the corresponding engaged corner brace, said one end of said one of said cross braces being adjustable along said slot for varying the stress on said spring to vary the tension applied to said one of said cross braces, and means for adjusting said other of said cross braces to vary the shape of said door.

3. In a door for refrigerators or the like comprising an outer shell of pan-like shape and diagonal braces connected to said shell adjacent the corners thereof, the improvement which comprises providing a compression spring in one of said braces, said spring being compressed for applying a tension at all times on said one of said braces, and means for adjusting the other of said braces to vary the shape of said door, the fully compressed position of said spring limiting the amount of possible variation in the shape of said door by said adjusting means.

4. In a door for refrigerators or the like comprising an outer shell of pan-like shape, a corner brace secured to said outer shell at each corner thereof and diagonal braces extending between said corner braces, the improvement which comprises forming one of said diagonal braces to include a compression spring, a rod engaging one of said corner braces and one end of said spring, and an element engaging the corner brace diagonally opposite said one of said corner braces

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and connected to the opposite end of said spring, said spring being compressed for applying at all times a tension on said rod, providing a second rod engaging a third corner brace and a third rod engaging a corner brace diagonally opposite said third corner brace, and providing a turn-buckle connected to adjacent ends of said second and third rods for adjusting the tension on said rods to vary the shape of said door.

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