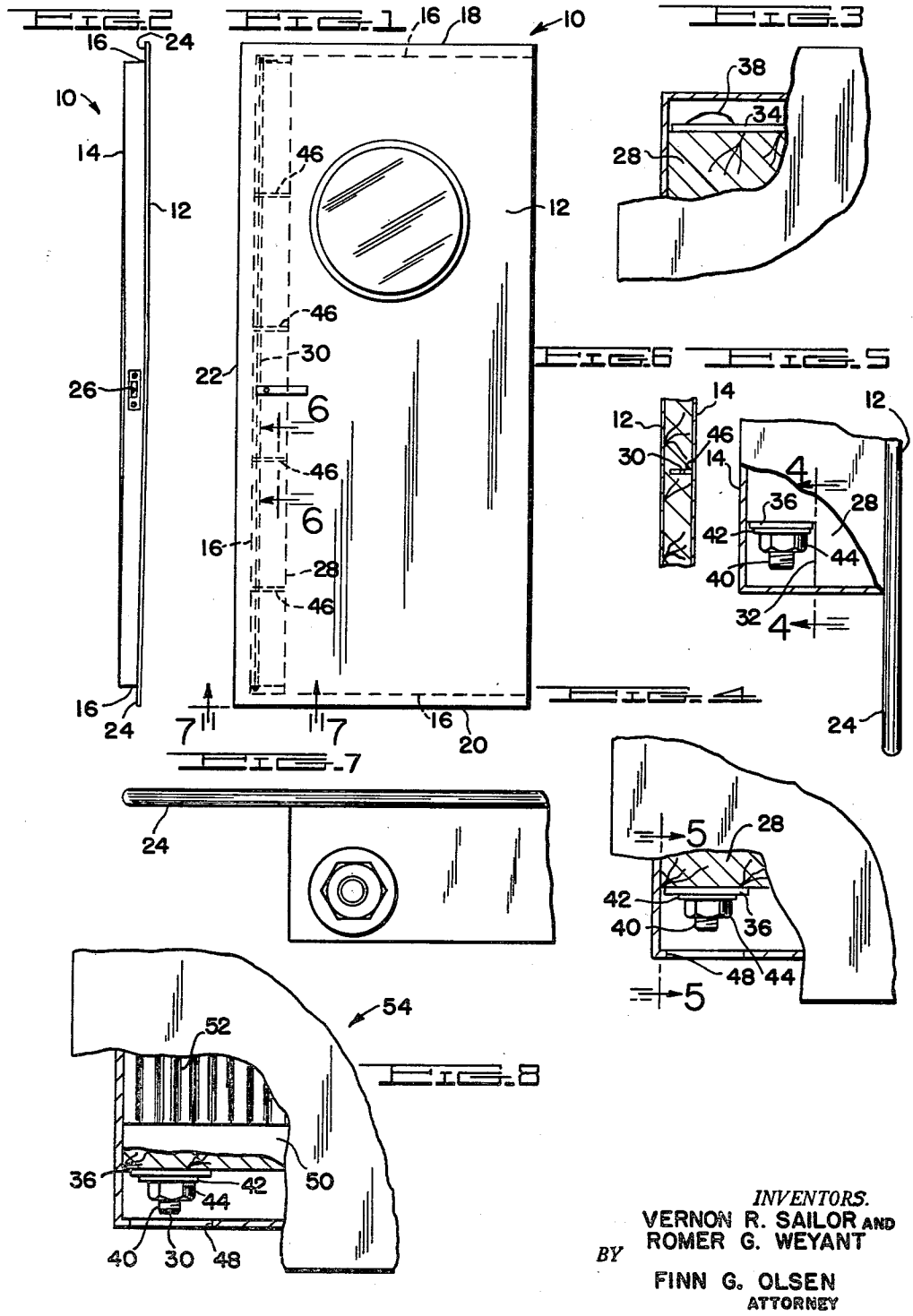
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DOOR CONSTRUCTION

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DOOR CONSTRUCTION

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The present invention relates to improvements in the construction of doors, and particularly those doors which are suitable for use in house trailers, cabin cruisers or the like.

Doors of the character described are generally of the type having front and rear sheet metal panels with the three unhinged edges having a recessed portion for fitting into a door frame and a lip portion overlying the outer side of the door frame. Doors of this character can be seen in United States Letters Patent 2,781,875 and 2,818,946.

One of the principal problems faced in the manufacture and use of such doors is that of providing and maintaining proper weather sealing around the periphery of the door. In efforts to accomplish this end, it is now common practice to contruct the door with a camber on at least its free side edge, which camber is concave on its rear or inner side. When the door is closed the top and bottom edges will then be urged tightly against the door frame by the spring properties of the door. The side edges are normally held in close contact with the door frame by the hinges and latch.

This construction and arrangement is effective so long as the door retains the required camber and the door frame retains its original shape. However, it is found that various conditions affect both the door and the door frame so that the camber in the door is no longer effective to provide the desired weather seal, particularly along the top and bottom edges of the door. Sometimes this occurs from warping or distortion of the door frame as may occur with house trailers, or it may occur from the door losing its camber. This latter condition may occur because the door permanently loses its preset shape, but it has now been discovered that one of the principal causes results from the temperature difference that exists on opposite sides of the door during cold winter weather. It is found that thermal expansion or contraction can cause the straightening of the door so that the lip portions at the top and bottom of the door will be pulled away from the door frame, thereby producing undesirable cracks. The greater the temperature differential between the opposite sides of the door, the greater will be the tendency to eliminate the camber in the door and to increase the sizes of cracks at the top and bottom of the door. Thus, when the sheet metal panel on the outside of the door is as much as fifty or sixty degrees colder than the inside sheet metal panel, the outside sheet metal will contract with respect to the inside panel thereby tending to eliminate the camber.

It is the principal object of the present invention to provide an improved door construction of the type embodying a camber for maintaining a tight weather seal particularly on top and bottom edges, said door construction being constructed and arranged to include means for selectively varying the amount of such camber so as to realize the most effective weather seal around the periphery of the door.

It is still another object of the present invention to provide an improved door construction of the foregoing character which has an adjustable tension means contained therein for setting the amount of camber in said door construction.

It is still another object of the present invention to provide an improved door construction of the foregoing character wherein access to said adjustable tension means for adjusting the same can be gained through the bottom edge of the door, and wherein the adjustable tension means is characterized by the simplicity of its operation.

It is still another object of the present invention to provide a door construction of the foregoing character which contains a frame member tending to maintain the door construction straight and an adjustable tension means associated therewith for causing a camber to be formed in said frame member and thereby in said door construction, whereby increasing or decreasing the tension in said tension means will increase or decrease the camber in said door construction.

It is still another object of the present invention to provide a door construction of the foregoing character wherein said frame member is constructed and arranged so that it may be cambered readily in one predetermined direction on application of pressure at opposite ends of said member so as to camber the door construction to the position providing optimum weather sealing characteristics.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

In the drawings:

FIGURE 1 is a front elevation of a door construction embodying the present invention;

FIGURE 2 is a side elevation of the door construction of FIGURE 1 as viewed from the left side;

FIGURE 3 is an enlarged fragmentary view of the upper left corner of the door construction illustrated in FIGURE 1 with a portion of the front panel removed;

FIGURE 4 is an enlarged fragmentary view of the lower left corner of the door construction illustrated in FIGURE 1 and including a fragmentary section taken on the line 4—4 of FIGURE 5;

FIGURE 5 is an enlarged end elevation of the corner illustrated in FIGURE 4 including a fragmentary section taken on the line 5—5 of FIGURE 4;

FIGURE 6 is a fragmentary section taken on the line 6—6 of FIGURE 1;

FIGURE 7 is an enlarged fragmentary bottom plan view looking in the direction of the arrows 7—7 of FIGURE 1; and

FIGURE 8 is a view similar to FIGURE 4 illustrating a modified form of the present invention with portions being broken away in two different planes.

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Referring now to the drawing, the illustrated embodiments of the invention will be described in greater detail. The door construction **10** has a front sheet metal panel **12** and a rear sheet metal panel **14** which are suitably joined at their corresponding four edges, for example in the manner taught in either of the aforesaid Patents 2,781,875 or 2,818,946, so as to provide a continuous marginal recess **16** extending across the top and bottom edges **18** and **20** and along the unhinged side edge **22**. This construction provides a lip portion **24** extending around the same three edges **18**, **20** and **22**. The recess **16** is adapted to fit into a door frame (not shown) and the lip portion **24** is adapted to fit over the door frame (not shown) to provide a weather seal. As taught in the aforesaid Patents 2,781,875 and 2,818,946, the most effective weather seal is provided when the door construction **10** is cambered along the side edge **22**, as shown in FIGURE 2, so that when the door latch **26** is closed in the keeper (not shown) of the door frame (not shown), the continuous lip portion **24** will be urged tightly against the door frame (not shown).

As previously explained, one of the problems confronting users of door constructions is that of keeping the proper camber in the door construction with respect to a particular door frame. Should the door construction lose its camber, cracks may occur between the top and bottom edges **18** and **20** of the door construction **10**, thereby permitting snow or rain to enter the trailer or to produce cold air drafts in the trailer. The present invention provides means for setting the camber and the embodiment of FIGURES 1 to 7, inclusive, will be described first.

As here shown, a wooden frame member **28** extends between the front and rear sheet metal panels **12** and **14** from the top to the bottom edges **18** and **20** and adjacent the side edge **22**. The frame member **28** is held in place by a suitable bonding agent, such as Chrysler Cycle-Weld, which bonds the frame member **28** to the inner surfaces of the front and rear sheet metal panels **12** and **14**.

Formed longitudinally through the frame member **28** is a passageway or bore through which extends a tension rod **30**. The frame member **28** has a corner removed, as at **32**, to form a notch on the lower edge adjacent the rear panel **14**, and a similar notch is formed at the upper end adjacent the rear panel **14**. Small metal plates **34** and **36** are located in the notches with the upper end **38** of the tension rod **30** being connected to the plate **34** so that it cannot rotate with respect thereto. In the disclosed embodiment this is accomplished by welding. The lower end of rod **30** is threaded, as at **40**, and this end extends through the plate **36** and washer **42** and has a nut **44** threadedly connected thereto.

The frame member **28** also has a plurality of grooves or saw cuts **46** across its rear face so that the frame member **28** can be cambered more readily to a position wherein the rear surface is concave. The rod **30** is located more closely to the rear face of the frame member **28** than to its front face so that when the nut **44** is screwed further into the tension rod **40**, the tensioning of the rod **40** will camber the frame member **28** in the desired direction and thereby increase the camber shown in FIGURE 2 of the door construction **10**. While the disclosed embodiment shows a rod as the tensioning element extending between opposite ends of the frame member **28**, a suitable cable or other means can also be used.

For the purposes of adjusting the tensioning means by turning of the nut **44**, a hole **48** is formed in the marginal recess at the bottom edge **20** through which a box wrench can be inserted for turning the nut **44**. Thus, if the camber in the door construction is reduced during winter weather by contraction of the metal in the front panel **12** relative to the rear panel **14**, the proper camber can be restored merely by opening the door, inserting a box wrench through hole **48** and onto nut **44** and screwing the latter further onto tension rod **30**. This will have the effect of increasing the camber in the frame member **28** and thereby in the door construction **10**.

A modified form of the invention is shown in FIGURE 8 and similar reference numbers are used to identify similar parts of the embodiment of FIGURES 1 to 7, inclusive. In the embodiment of FIGURE 8, the frame member **28** has been omitted, and in place thereof horizontal frame members are bonded in place between the front and rear panels at the top and bottom edges, with only the lower horizontal frame member **50** being shown. As there shown, the threaded end **40** of the rod **30** can be seen with the frame member **50** notched in the same manner as was done with respect to the previously described frame member **28**. Also shown is a corrugated pad **52** of the same type as is illustrated in the aforesaid Patents 2,781,875 and 2,818,946, and the rod **30** extends longitudinally therethrough. Increasing the tension in rod **30** acts to bow or camber the door construction **54** in generally the same manner as shown in FIGURE 2. In this embodiment there is no frame member tending to straighten the door when the tension rod or cable is loosened.

Having thus described our invention, we claim:

1. A door construction having front and rear sheet metal panels in spaced relation, three of the corresponding edges, including the top, bottom and one side edge, being shaped and fastened together to form a continuous marginal recess for fitting into a door frame, said one side edge being cambered to provide a concave face toward its rear panel, a relatively rigid resilient frame member mounted between said panels and extending vertically between said top and bottom edges and adjacent said side edge and operable to urge said side edge toward a straight position, and an adjustable tension element extending longitudinally through and operably connected to opposite ends of said frame member, said tension element being operable on being tensioned to camber said frame member and thereby said side edge, said frame member having a plurality of relatively deep horizontal grooves facing said rear panel so as to facilitate cambering said frame member on tensioning said tension element, said door construction having an access opening for adjusting the tension of said tension element.

2. A door construction having front and rear sheet metal panels in spaced relation, three of the corresponding edges, including the top, bottom and one side edge, being shaped and fastened together to form a continuous marginal recess for fitting into a door frame, said one side edge being cambered to provide a concave face toward said rear panel, a wooden frame member mounted between said panels and extending vertically between said top and bottom edges and adjacent said side edge and having a plurality of relatively deep horizontal grooves facing said rear panel so that when opposite longitudinal compressive forces of sufficient magnitude are applied to the ends of said frame member the latter will be cambered to effect an increase in the camber of said side edge, a tension rod extending longitudinally through said frame member and operably connected against rotation to one end of said frame member and having a threaded end projecting from the other end of said frame member, a nut threadedly connected to said threaded end and operable upon being turned in one direction to increase the tension of said rod and thereby the compressive forces acting upon opposite ends of said frame member, said sheet metal panels providing access means for fitting a wrench onto said nut for turning the latter.

3. A door construction as claimed in claim 2 wherein said access means comprises a hole formed in the bottom marginal recess in axial alignment with said rod.

4. A door construction having front and rear sheet metal panels in spaced relation, three of the corresponding edges, including the top, bottom and one side edge, being shaped and fastened together to form a continuous marginal recess for fitting into a door frame, said one

side edge being cambered to provide a concave face toward its rear panel, a pair of frame members secured between said panels and extending horizontally substantially the lengths of the top and bottom edges, a tension rod extending through each of said frame members adjacent said one side edge and having its upper end operably connected against rotation to the upper frame member, the lower end of said tension rod being threaded and projecting through the lower frame member, and a threaded member threadedly connected to the threaded end of said tension rod, said marginal recess in the lower edge providing an opening through which a tool can be inserted for turning said threaded member.

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