May 1, 1962 H. JORDAN 3,032,382

DISHWASHER FRAME

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FIG. 1.

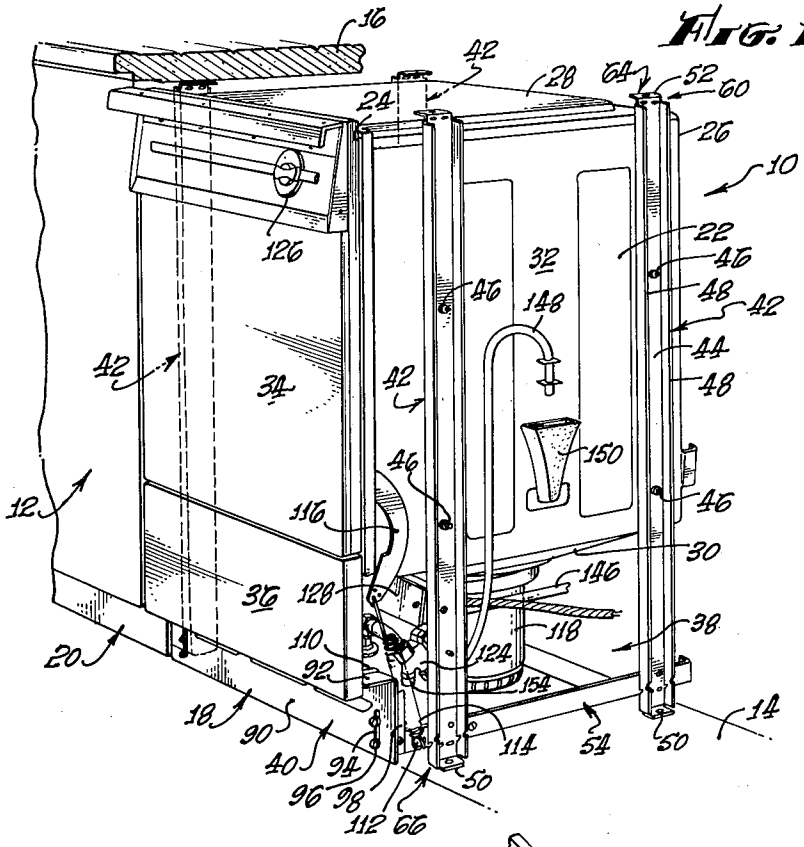


FIG. 4.

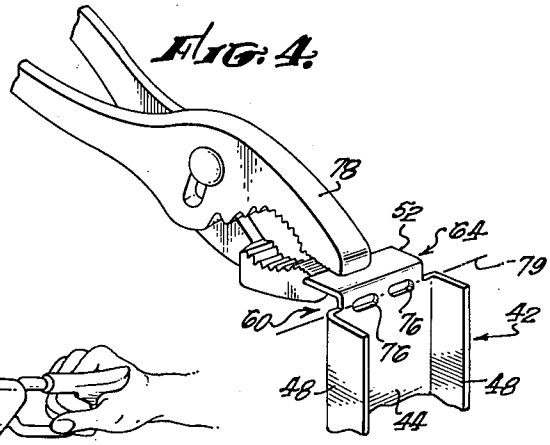
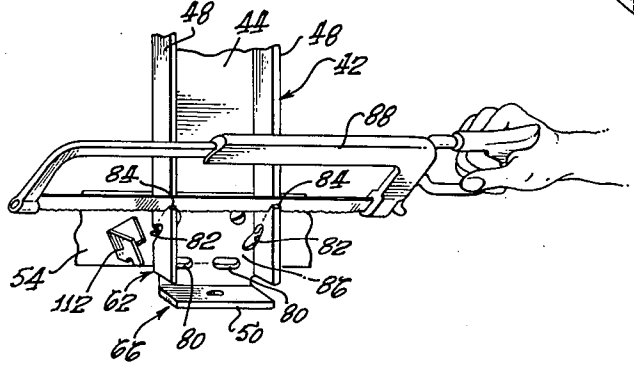


FIG. 5.



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FIG. 2.

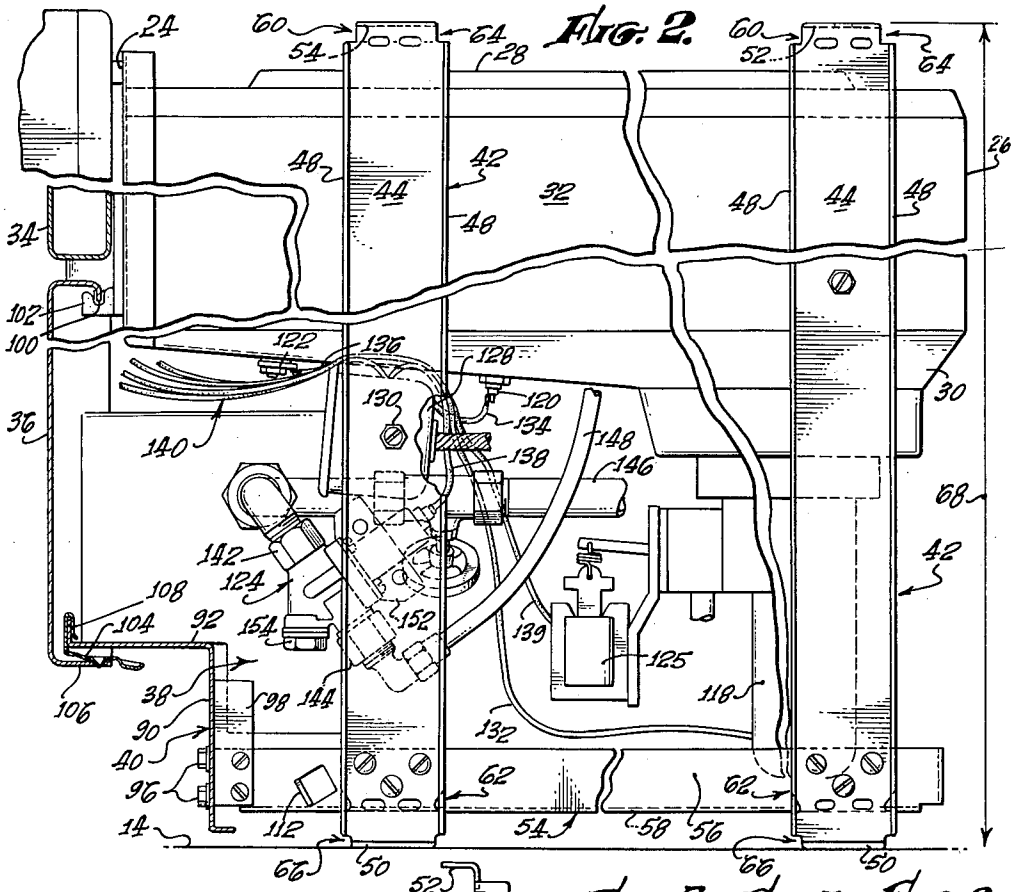


FIG. 3.

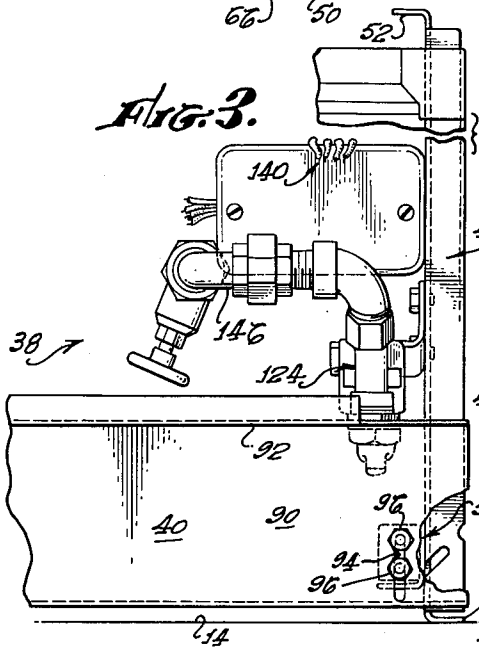
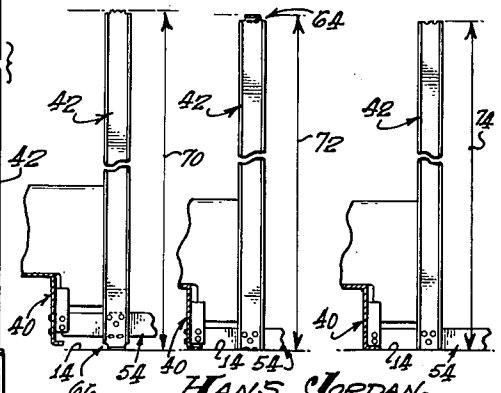


FIG. 6. FIG. 7. FIG. 8.



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DISHWASHER FRAME

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9 Claims. (Cl. 312—253)

The present invention relates in general to a frame and accessory arrangement for appliances such as dishwashers, and will be considered in connection with a dishwasher herein for purposes of illustration, although it will be understood that certain features of the invention may be utilized in connection with other structures.

Dishwashers are frequently installed in or built into kitchen cabinets so that they blend into the kitchen decor. Kitchen cabinets suitable for dishwasher installations are of relatively uniform height, but there are sufficient height variations that a dishwasher of fixed height will not fit all cabinets.

A primary object of the invention is to eliminate the problem posed by minor height variations in kitchen cabinets by providing a dishwasher having a frame which is adjustable as to height so that it may be installed in kitchen cabinets of various heights throughout a reasonably large range.

More particularly, an important object of the invention is to provide a dishwasher which includes a housing or tub supported by two pairs of spaced, upright frame members respectively secured to the side walls of the tub, the upright frame members extending above the top wall of and depending below the bottom wall of the tub and being provided adjacent their upper and lower ends with upper and lower weakened, breakable portions so that upper and lower sections of the upright frame members may be broken off in various combinations to permit installation of the dishwasher in kitchen cabinets of various sub-standard heights.

In other words, an important object of the invention is to provide a dishwasher which may be utilized without breaking off any of the breakable sections of the upright frame members, which may be utilized with the upper breakable sections removed, which may be utilized with the lower breakable sections removed, or which may be utilized with both the upper and lower breakable sections removed, the upper and lower breakable sections preferably having different heights so that four different dishwasher heights may be achieved with this arrangement to enable the dishwasher to be installed in cabinets of four different heights.

Another object is to provide two fore-and-aft frame members located below and respectively located on opposite sides of the housing inwardly of the upright frame members and connected to the upright frame members at such points that the lower surfaces of the fore-and-aft frame members are slightly below the lower breakable portions of the upright frame members. With this construction, when the lower breakable sections of the upright frame members are broken off, the lower surfaces of the fore-and-aft members engage the floor, or other supporting surface, thereby providing smooth floor-engaging surfaces when the lower breakable sections of the upright frame members are removed, which is an important feature.

Another object of the invention is to provide upright frame members having upright, i.e., longitudinal, flanges terminating at the upper breakable sections, the upper ends of these flanges forming counter-engaging surfaces when the upper sections of the upright frame members are broken off.

Another object is to provide upright frame members normally having horizontal floor-engaging flanges at their lower ends and horizontal counter-engaging flanges at their upper ends, the floor-engaging horizontal flanges being located below the lower breakable portions and the counter-engaging horizontal flanges being located above the upper breakable portions.

A further object of the invention is to provide a dishwasher wherein the upright frame members hereinbefore discussed are channels having webs connected to the side walls of the tub and having flanges which extend outwardly away from such side walls, the horizontal floor-engaging and counter-engaging flanges mentioned being formed by bending portions of the web at right angles to the main portion thereof.

Another object is to provide at the front of the dishwasher adjacent the bottom thereof a toe plate having a vertical flange and an upper, horizontal, forwardly extending flange, the vertical flange being adjustably connected to the fore-and-aft frame members for vertical movement relative thereto to accommodate breaking off of the lower breakable sections of the upright frame members. Another object in this connection is to provide the horizontal flange of the toe plate with panel attachment means for a front panel of the dishwasher, the toe plate being bendable in the vicinity of the junction between the vertical and horizontal flanges thereof to raise and lower the panel attachment means as the vertical flange of the toe plate is adjusted vertically relative to the fore-and-aft frame members.

Another object of the invention is to provide the fore-and-aft frame members with struck-out lugs serving as anchors for tension springs connected to a door which is hinged adjacent the lower edge of a doorway in the front wall of the tub for movement between a generally horizontal open position and a generally vertical closed position, the springs interconnecting the door and the lugs struck from the fore-and-aft frame members biasing the door toward its closed position.

Another and important object of the invention is to provide a dishwasher having an accessory section below the bottom wall of the tub containing electrical elements, and other accessories, so arranged that the accessory section is very clean and uncluttered.

More particularly, an object of the invention is to mount an electrical junction box on the inner surface of one of the upright frame members below and in close proximity to the bottom wall of the tub, electrical wires extending from this junction box to various electrical elements of the dishwasher. This high location of the junction box in the accessory compartment below the tub permits the junction box and the electrical elements to support the wires extending therebetween without the use of any wire supporting clips, or the like. In other words, the junction box holds the wiring up without the use of clips so that cluttering of the accessory compartment is minimized, which is an important feature.

Another object is to provide the dishwasher with a fill valve mounted on the same upright frame member which carries the junction box just below the junction box to make a cleanout plug on the front side of the fill valve readily accessible from the front of the dishwasher.

The foregoing objects, advantages, features and results of the present invention, together with various other objects, advantages, features and results thereof which will be evident to those skilled in the art in the light of this disclosure, may be achieved with the exemplary embodiment of the invention described in detail hereinafter and illustrated in the accompanying drawings in which:

FIG. 1 is a perspective view of a dishwasher which embodies the invention;

FIG. 2 is a fragmentary side elevation of the dishwasher;

FIG. 3 is a fragmentary front elevation of the dishwasher;

FIGS. 4 and 5 are fragmentary perspective views illustrating the manner in which the height of the dishwasher frame is adjusted; and

FIGS. 6, 7 and 8 are fragmentary side elevations on a reduced scale illustrating various adjusted heights of the dishwasher frame.

Referring particularily to FIG. 1 of the drawings, the numeral 10 designates a dishwasher of the invention which is installed in a kitchen cabinet shown fragmentarily at 12, the dishwasher resting on a floor 14 and being surmounted by a counter or counter top 16. The counter 16 and the structure of the cabinet 12 on either side of the dishwasher 10 conceal all of the dishwasher except the front thereof, which is substantially flush with the front of the cabinet. To complete the flush installation of the dishwasher 10, it is provided with a toe recess 18 in register with a toe recess 20 in the cabinet 12.

As will be apparent, the dishwasher 10 rests on the floor 14 and the over-all height thereof cannot exceed the vertical distance between the floor and the under side of the counter 16. This vertical distance is relatively constant in kitchen cabinets of conventional design, but there are some variations and, as will appear hereinafter, one aspect of the present invention relates to providing means for adjusting the over-all height of the dishwasher to accommodate such variations.

Considering the dishwasher 10 more specifically now, it comprises a housing or tub 22 in which dishes are washed, rinsed and dried and which includes a front wall 24, a rear wall 26, a top wall 28, a bottom wall 30 and side walls 32. The dishwasher 10 is of the front loading type and is provided at the front thereof with a door 34 which is adapted to close a doorway in the front wall 24, the door being hinged adjacent its lower edge, in a manner not spesifically shown, for pivotal movement between a lower, generally horizontal, open position and an upper, generally vertical, closed position. Below the door 34 is a front access panel 36 which is removably mounted, in a manner to be described, to provide access to an accessory compartment 38 below the tub 22. An angle-shaped toe plate 40, which provides the toe recess 18, is located below the access panel 36 and is mounted in a manner to be described hereinafter.

The tub 22 of the dishwasher 10 is supported by a frame which includes two pairs of spaced, upright frame members 42 respectively secured to the side walls 32 of the tub. The frame members 42 are preferably channels having webs 44 secured to the side walls 32, as by bolts 46, and having flanges 48 which face outwardly away from the side walls. The channels 42 extend upwardly above th top wall 28 of the tub 22 and depend downwardly below the bottom wall 30 thereof, thereby spacthe tub upwardly from the floor 14 to provide the accessory compartment 38. The flanges 48 terminate above the lower ends of the channels 42 and the webs 44 of the channels are bent outwardly at their lower ends to provide generally horizontal, floor-engaging flanges 50, which may be screwed or bolted to the floor 14. Similarly, the flanges 48 terminate below the upper ends of the channels 42 and the webs 44 thereof are bent inwardly to provide generally horizontal, counter-engaging flanges 52.

The channels 42 of each pair are rigidly interconnected adjacent their lower ends by a fore-and-aft frame member 54 bolted, or otherwise secured, to such channels. Preferably, the fore-and-aft frame members 54 are angles having vertical flanges 56 secured to the corresponding channels 42 and having inwardly extending, horizontal flanges 58 at the lower edges of the vertical flanges.

The channels 42 and the angles 54 constitute the entire frame of the dishwasher 10, all of the components of the dishwasher either being mounted on this frame, or on the tub 22. Securing the channels 42 to the tub 22 and interconnecting them by means of the angles 54 results in a very rigid structure. Thus, the construction described provides a very simple and rigid dishwasher frame, which is an important feature of the invention.

The channels 42 are provided adjacent their upper and lower ends with upper and lower weakened, breakable portions 60 and 62 to provide at the upper and lower ends of the channels upper and lower breakable sections 64 and 66 which may be broken off in various combinations to provide various over-all heights for the dishwasher 10 to accommodate various distances between the floor 14 and the underside of the counter 16. Four different over-all heights may be achieved with the invention, the greatest over-all height being achieved with the upper and lower breakable sections 64 and 66 in place, this over-all height being indicated by the dimensional arrow 68 in FIG. 2. By breaking off the upper breakable sections 64, a reduced over-all height is achieved, this being indicated by the arrow 70 in FIG. 6. The height of the lower breakable sections 66 is greater than that of the upper breakable sections 64 so that, by removing the lower breakable sections 66 and leaving the upper breakable sections 64 in place, a further reduced over-all height is attained, this being designated by the arrow 72 in FIG. 7. The minimum over-all height, designated by the arrow 74 in FIG. 8, is attained by removing both the upper and lower breakable sections 64 and 66 of each channel 42. Thus, four different vertical distances between the floor 14 and the under side of the counter 16 are accommodated.

Referring to FIG. 4 of the drawings, each upper breakable portion 60 is formed by providing the corresponding channel web 44 with two aligned, transversely elongated apertures 76 above the top wall 28 of the tub 22 and in alignment with the upper ends of the flanges 48 of the corresponding channel. Each upper breakable section 64 may be removed readily by gripping the corresponding counter-engaging flange 52 with a pair of pliers 78 and bending such breakable section back and forth until it breaks off along the axis of the apertures 76. The break line, 79, is flush with the upper ends of the flanges 48 so that a new counter-engaging surface, comprising the upper ends of the flanges 48 and the broken upper end of the web 44, is formed. This new counter-engaging surface of each channel 42 is spaced upwardly from the top wall 28 of the tub 22 slightly so as to provide a space between such wall and counter 16. It will be understood that if the new counter-engaging surfaces formed when the upper breakable sections 64 are removed do not quite engage the under side of the counter 16, suitable shims may be inserted.

Each lower breakable portion 62 includes, as best shown in FIG. 5, two axially aligned, laterally elongated apertures 80 in the corresponding web 44, two upwardly and outwardly sloping, elongated apertures 82 in the corners formed by the corresponding web and the corresponding flanges 48, and two notches 84 in the edges of the corresponding flanges. The notches 84, the corner apertures 82 and the apertures 80 are all aligned in an upwardly and outwardly sloping break plane which is indicated by the broken line 86 in FIG. 5. In order to break off each lower breakable section 66, it is first necessary to cut a slot in the break plane 86 from the notches 84 to the corner apertures 82, as by means of a hack saw 88. This accomplished, the lower breakable section 66 is broken off along the axis of the apertures 80 in the web 44 by means of a pair of pliers in the same manner as the upper breakable sections 64 are removed.

An important feature of the invention is that the lower edge of the break plane 86, which lies on the axis of the apertures 80, is slightly above the horizontal flange 58 of the corresponding angle 54. Consequently, when the lower breakable sections 66 are removed, the horizontal flanges 58 of the angles 54 form new floor-engaging surfaces which rest on and are adapted to be secured to the floor 14. Thus, the flanges 58 of the angles 54 replace

the floor-engaging flanges 50 of the channels 42 and serve as skids by means of which the dishwasher 10 may be moved into place.

When the height of the dishwasher frame is decreased by removing the lower breakable sections 66 of the channels 42, it is necessary to correspondingly adjust the position of the toe plate 40 upwardly. The toe plate 40 is angle shaped and includes a vertical flange 90 terminating at its upper edge in a forwardly extending, generally horizontal flange 92. The vertical flange 90 is provided therein with vertical slots 94 through which screws 96 extend into brackets 98 suitably secured to the forward ends of the angles 54. As will be apparent, the slots 94 and the screws 96 provide a vertical adjustment by means of which the toe plate 40 may be positioned properly relative to the floor 14, it being necessary to move the toe plate upwardly when the lower breakable sections 66 of the channels 42 are removed.

The access panel 36 at the front of the dishwasher 10 below the door 34 is provided adjacent its upper edge with a lip 100 inserted into notches in brackets 102 carried by the front wall 24 of the tub 22. The lower edge of the access panel 36 is secured by clips 104 engaging a flange 106 on the access panel and an upturned flange 108 on the horizontal flange 92 of the toe plate. To maintain the clips 104 in the proper position relative to the access panel 36 when the toe plate 40 is moved upwardly to compensate for removal of the lower breakable sections 66 of the channels 42, the horizontal flange 92 of the toe plate is bent downwardly relative to the vertical flange 90 thereof, the toe plate being beaded at the junction of the vertical and horizontal flanges 90 and 92 thereof to control such bending. One of these beads is visible in FIG. 1 and is designated by the numeral 110.

The vertical flanges 56 of the angles 54 are provided with outwardly struck lugs 112 forwardly of the forwardmost channels 42. These lugs 112 are notched so that tension springs 114 may be hooked thereover, these tension springs being connected to arms 116 on the door 34. The tension springs 114 act to bias the door 34 upwardly toward its closed position, thereby counterbalancing the weight of the door. The lugs 112 provide a simple and effective anchor means for the springs 114.

Turning now to another aspect of the present invention, the dishwasher 10 includes various electrical elements or components. For example, the dishwasher includes an electric motor 118 which is located within the accessory compartment 38 and which is mounted on the bottom wall 30 of the tub 22, this motor driving means, not shown, for circulating wash and rinse water throughout the tub 22, as is conventional in dishwashers. The dishwasher 10 also includes a thermostat terminal 120 and an electric heater terminal 122 located within the accessory compartment 38 and mounted on the bottom wall 30 of the tub 22. A solenoid valve 124 for filling the tub 22 is located within the accessory compartment 38, this valve and the manner in which it is mounted being considered in more detail hereinafter. A solenoid 125 for operating a drain valve, not shown, is also located in the accessory compartment 38. The dishwasher 10 further includes a timer 126 mounted in the door 34, the timer controlling the foregoing and various other electrical components of the dishwasher.

The foregoing and various other electrical components are connected in an electric circuit which includes a junction box 128 mounted on a forward one of the channels 42 beneath and in close proximity to the bottom wall 30 of the tub 22, as by means of a bolt or screw 130. Thus, the junction box 128 is located as high in the accessory compartment 38 as possible. Wires 132, 134, 136, 138, 139 and 140 extend from the junction box 128 to the electric motor 118, the thermostat terminal 120, the heater terminal 122, the solenoid valve 124, the solenoid 125 and the timer 126, respectively, similar wires, not shown, extending to other electrical components, not shown. The high location for the junction box 128 means that all of the wires mentioned are supported high in the accessory compartment 38 by the junction box so that these wires may run more or less directly to the components to which they are connected without the use of any intervening supporting clips, or the like. The net result of the junction box location is that the accessory compartment 38 is clean and uncluttered, which is an important feature.

The solenoid valve 124 is mounted just below the junction box 128 on the same channel 42, and extends downwardly from an inlet 142 to an outlet 144, the former being connected to a supply pipe 146 and the latter being connected to a line 148 which leads to an inlet device 150 communicating with the interior of the tub 22. A solenoid 152 for operating the valve 124 is mounted on the rear side of the valve immediately below the junction box 128 so that the wires 138 are very short. The valve 124 is provided on its forward side with a cleanout plug 154 which, due to its forward location, is readily accessible upon removal of the access panel 36. This lateral location of the valve 124 at one side of the accessory compartment 38 and immediately below the junction box 128 also contributes to a clean and uncluttered accessory compartment.

Although an exemplary embodiment of the invention has been disclosed herein for purposes of illustration, it will be understood that various changes, modifications and substitutions may be incorporated in such embodiment without departing from the spirit of the invention as defined by the claims which follow.

I claim:

1. In combination: a housing having front, rear, top, bottom and side walls; two spaced, upright frame members secured to each of said side walls, said upright frame members extending above said top wall and depending below said bottom wall, each of said upright frame members having an upper weakened, breakable portion adjacent its upper end, and having a lower weakened, breakable portion adjacent its lower end; and two fore-and-aft frame members located below and respectively located on opposite sides of said housing, each of said fore-and-aft frame members being connected to the said upright frame members which are located on the corresponding side of said housing, said fore-and-aft frame members having lower surfaces located below said lower breakable portions of said upright frame members.

2. In combination: a housing having front, rear, top, bottom and side walls; two spaced, upright frame members secured to each of said side walls, said upright frame members depending below said bottom wall, each of said upright frame members having a lower weakened, breakable portion adjacent its lower end; and two fore-and-aft frame members located below and respectively located on opposite sides of said housing, each of said fore-and-aft frame members being connected to the said upright frame members which are located on the corresponding side of said housing, said fore-and-aft frame members having lower surfaces located below said lower breakable portions of said upright frame members.

3. In combination: a housing having front, rear, top, bottom and side walls; two spaced, upright frame members secured to each of said side walls, said upright frame members extending above said top wall and depending below said bottom wall, each of said upright frame members having an upper weakened, breakable portion adjacent its upper end and above said top wall, and having a lower weakened, breakable portion adjacent its lower end; and two fore-and-aft frame members located below and respectively located on opposite sides of said housing, each of said fore-and-aft frame members being connected to the said upright frame members which are located on the corresponding side of said housing, said fore-and-aft frame members having lower surfaces located below said lower breakable portions of said upright frame members.

4. In combination: a housing having front, rear, top, bottom and side walls; two spaced, upright frame members secured to each of said side walls, said upright frame members extending above said top wall and depending below said bottom wall, each of said upright frame members having an upper weakened, breakable portion adjacent its upper end and above said top wall, and having a lower weakened, breakable portion adjacent its lower end; and two fore-and-aft frame members located below and respectively located on opposite sides of said housing inwardly of said upright frame members, each of said fore-and-aft frame members being connected to the said upright frame members which are located on the corresponding side of said housing, said fore-and-aft frame members having lower surfaces located below said lower breakable portions of said upright frame members.

5. In combination: a housing having front, rear, top, bottom and side walls; two spaced, upright channels on each side of said housing, each of said channels having a web connected to the corresponding side wall of said housing and having two flanges extending outwardly away from such corresponding side wall, said channels depending below said bottom wall of said housing and having lower weakened, breakable portions adjacent their lower ends; and two fore-and-aft frame members located below and respectively located on opposite sides of said housing inwardly of said channels, each of said fore-and-aft frame members being connected to the webs of the said channels which are located on the corresponding side of said housing, said fore-and-aft frame members having lower surfaces located below said lower breakable portions of said channels.

6. The combination set forth in claim 5 wherein said channels extend above said top wall of said housing and are provided adjacent their upper ends with upper weakened, breakable portions.

7. The combination defined in claim 5 wherein said channels extend above said top wall of said housing and

are provided adjacent their upper ends and above said top wall with upper weakened, breakable portions.

8. The combination defined in claim 5 wherein said channels extend above said top wall of said housing and are provided adjacent their upper ends and above said top wall with upper weakened, breakable portions, said upper breakable portions of said channels being formed in said webs thereof and said flanges of said channels having upper ends at said upper breakable portions of said webs.

9. The combination defined in claim 5 wherein said channels extend above said top wall of said housing and are provided adjacent their upper ends and above said top wall with upper weakened, breakable portions, said upper breakable portions of said channels being formed in said webs thereof and said flanges of said channels having upper ends at said upper breakable portions of said webs, said webs of said channels terminating in horizontal flanges at their upper and lower ends.

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