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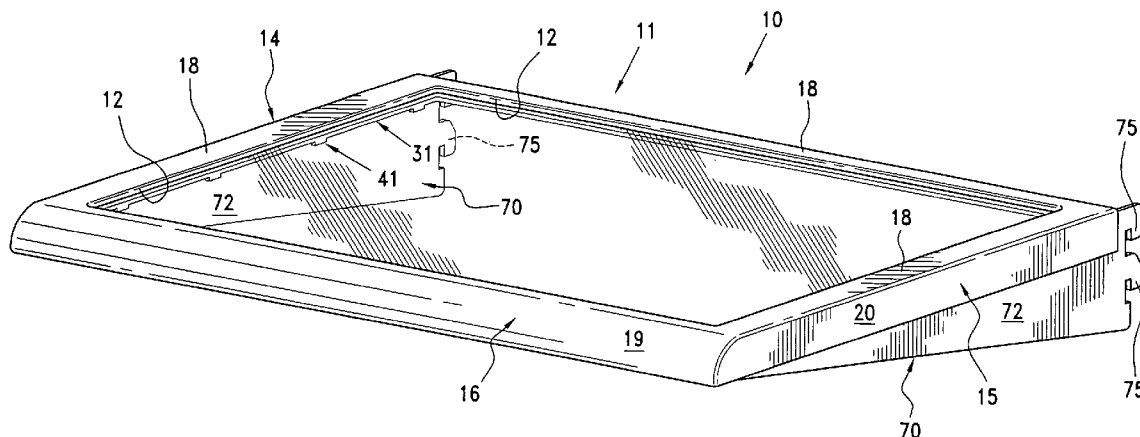
(19) **United States**(12) **Patent Application Publication**
Daley et al.(10) **Pub. No.: US 2009/0085453 A1**(43) **Pub. Date: Apr. 2, 2009**(54) **SHELF ASSEMBLY FOR A REFRIGERATOR
COMPARTMENT****Publication Classification**(76) Inventors: **Howard Daley**, Zeeland, MI (US);
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Ramik, Annandale, VA (US)(51) **Int. Cl.**
F25D 23/00 (2006.01)
A47B 96/06 (2006.01)
(52) **U.S. Cl.** **312/408; 248/205.1**(57) **ABSTRACT**

A vertically step-adjustable shelf includes a panel of tempered glass and two open frames. A pair of metal shelf brackets can be staked to the frames to provide vertical step-adjustment of the shelf. The vertically step-adjustable shelf can be further simplified by eliminating one of the open frame members and staking the metal shelf brackets to side frame portions of but a single outer/uppermost open frame member. In each of the shelves various components utilized in the assembly thereof, such as stake projections, heads and openings are hidden from view when the shelves are in their horizontal in-use position. Hence, each shelf presents a highly desirable aesthetic appearance, yet is strong and can be manufactured and sold at a reasonable price.

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ANNANDALE, VA 22003 (US)(21) Appl. No.: **12/314,170**(22) Filed: **Dec. 5, 2008****Related U.S. Application Data**

(62) Division of application No. 11/029,347, filed on Jan. 6, 2005.



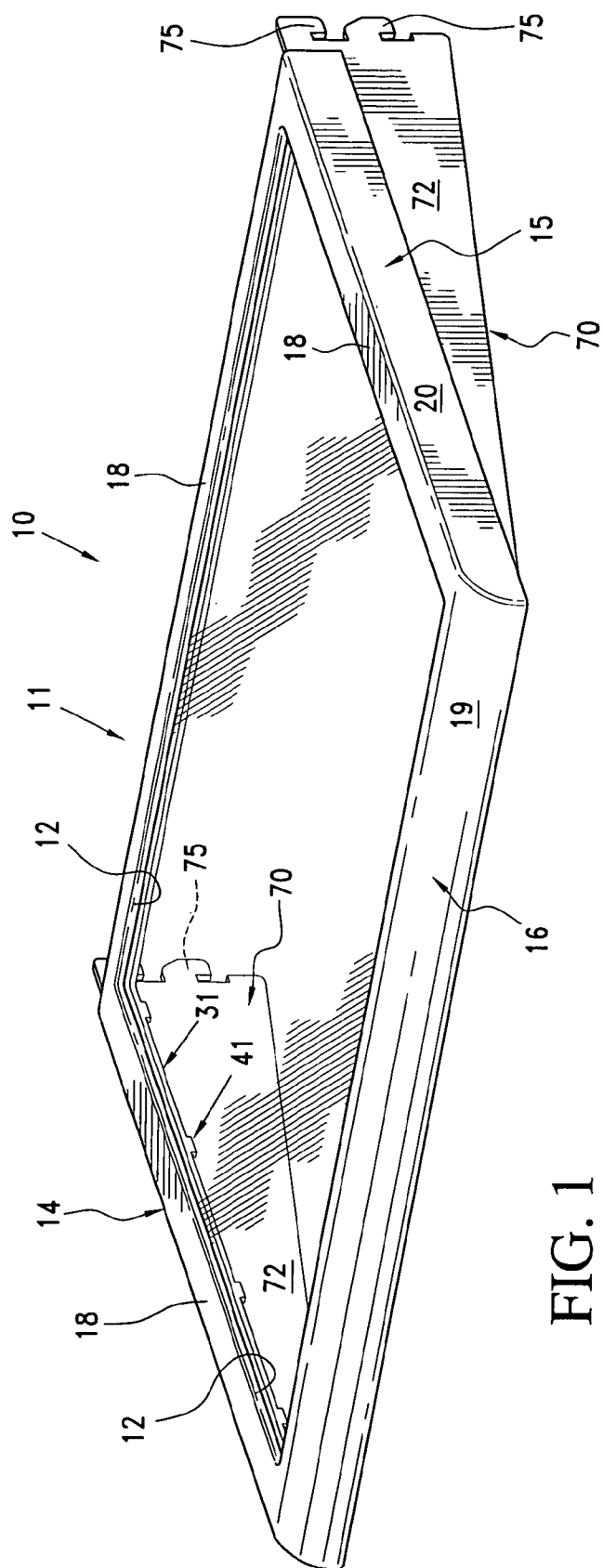
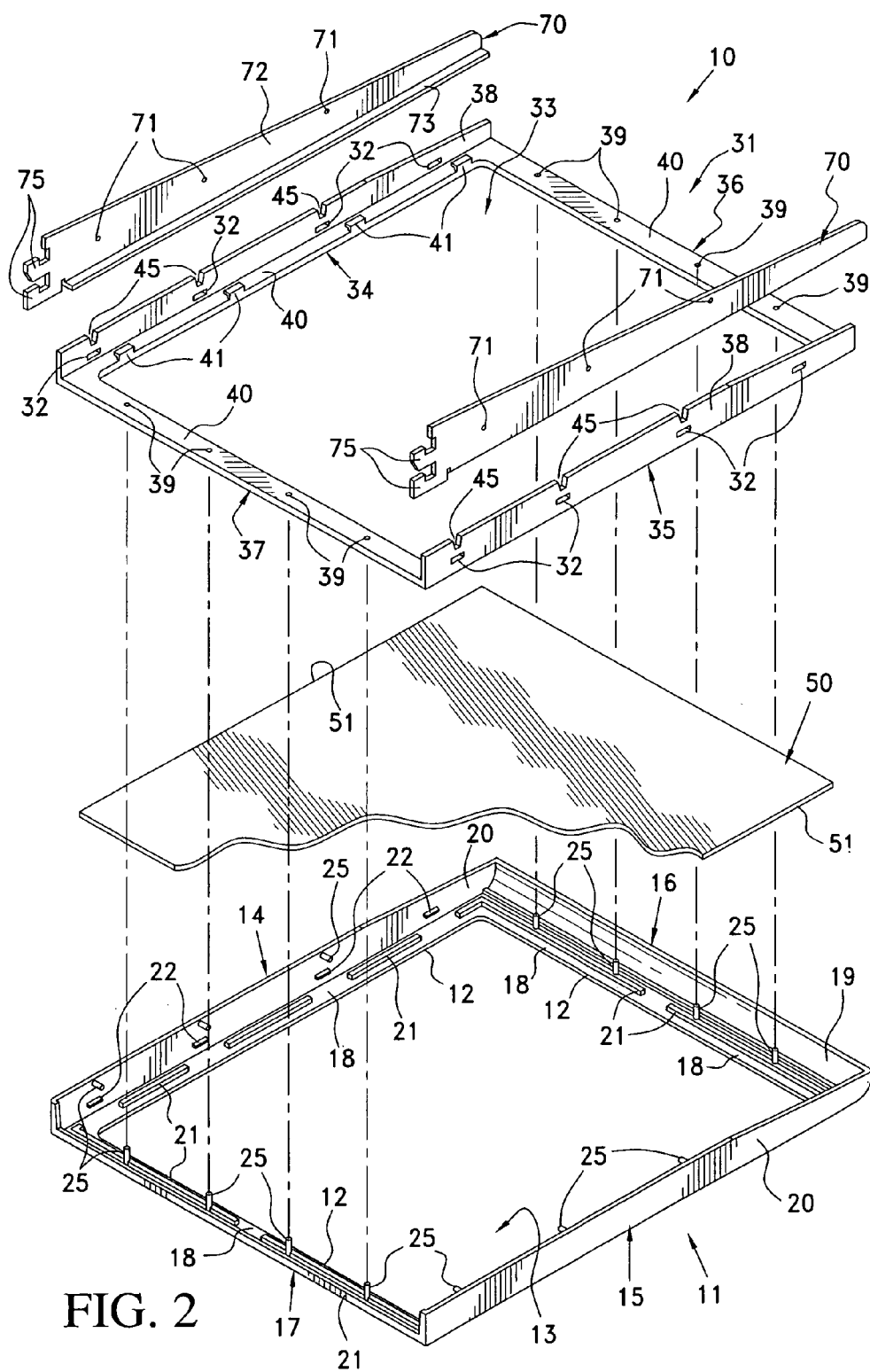


FIG. 1



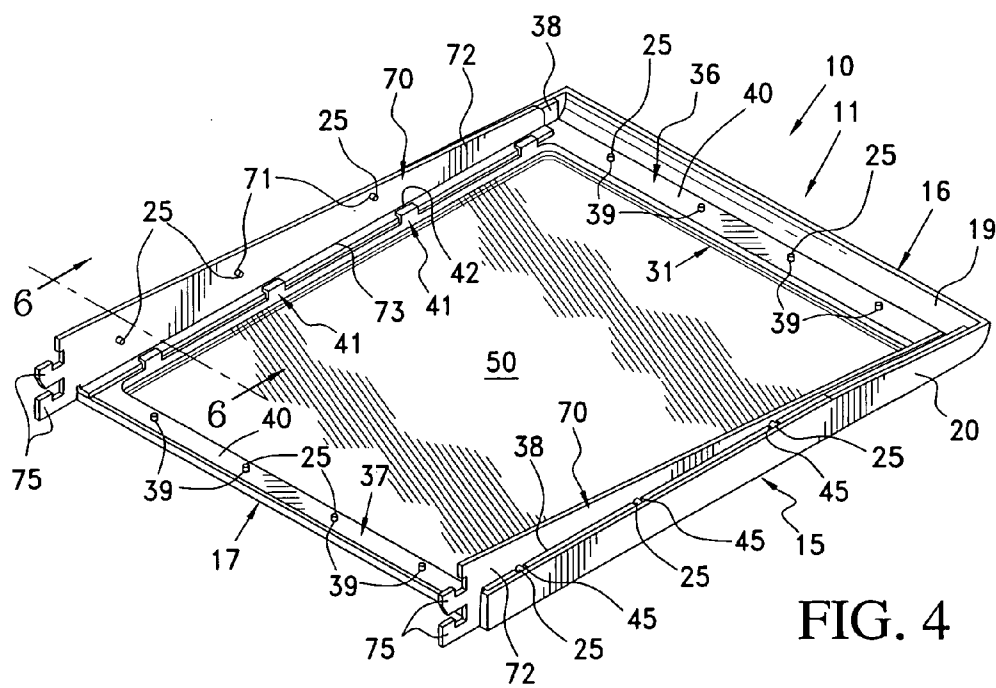
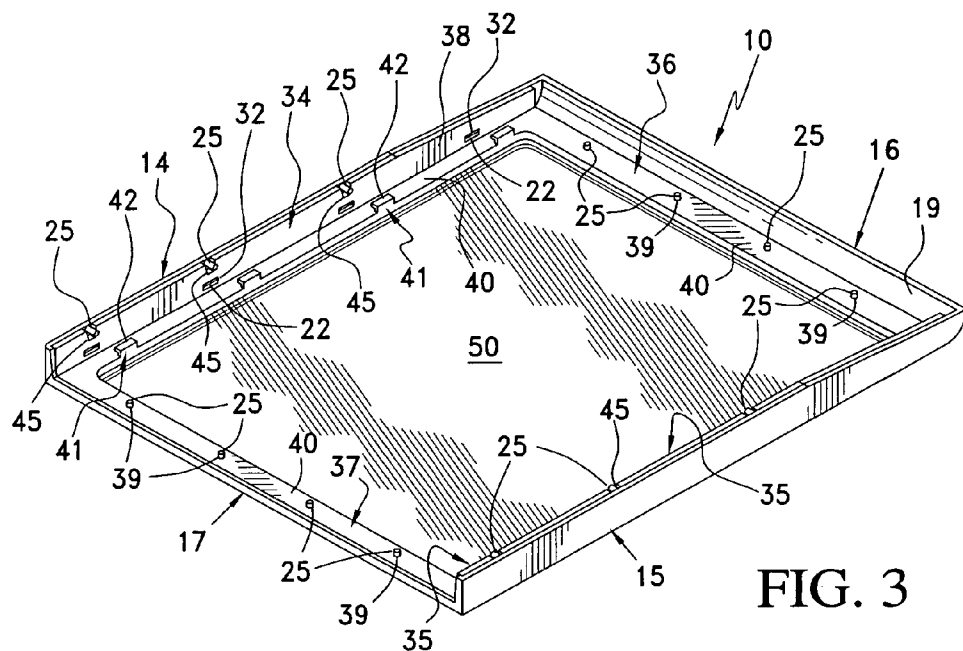


FIG. 5

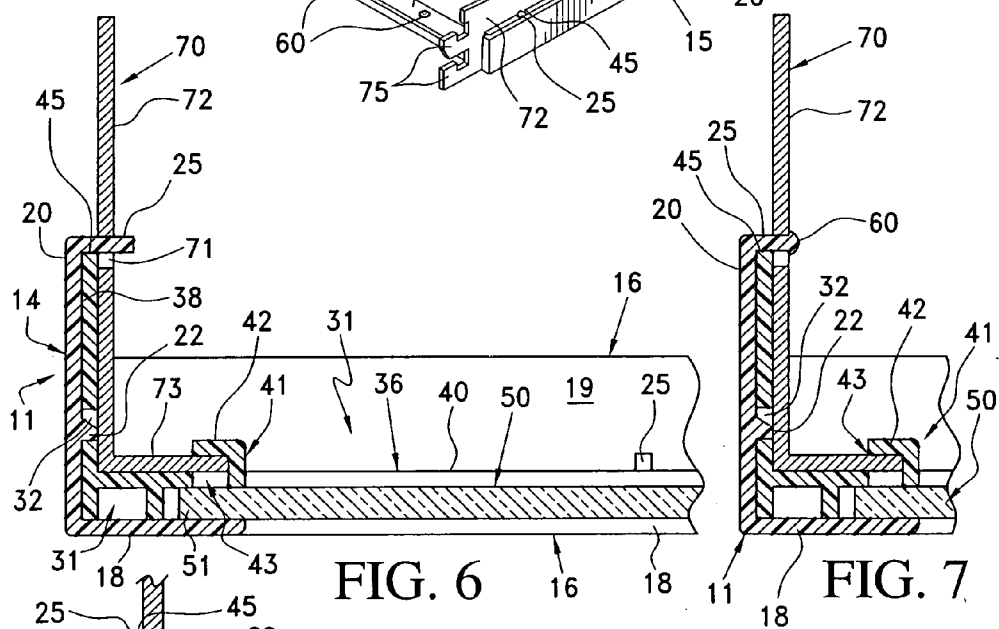
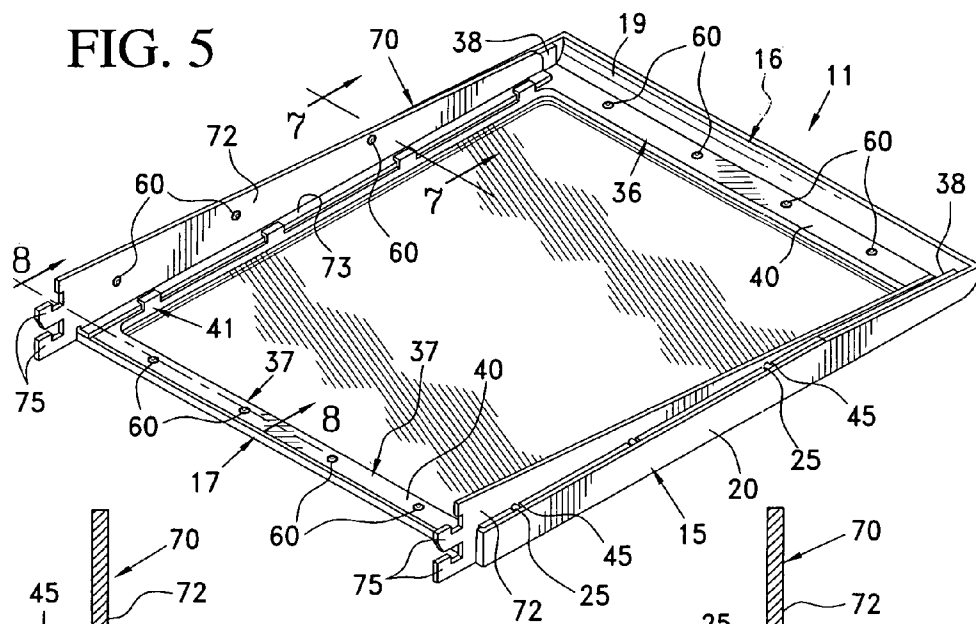
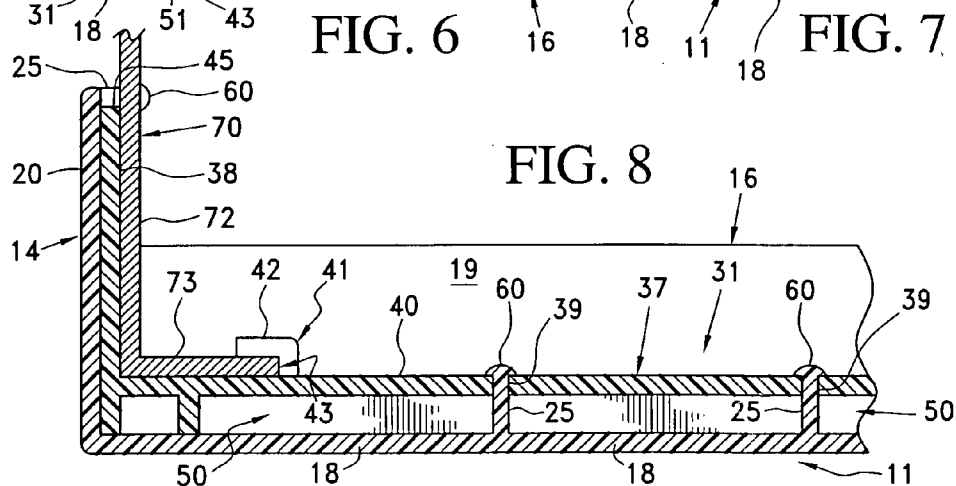
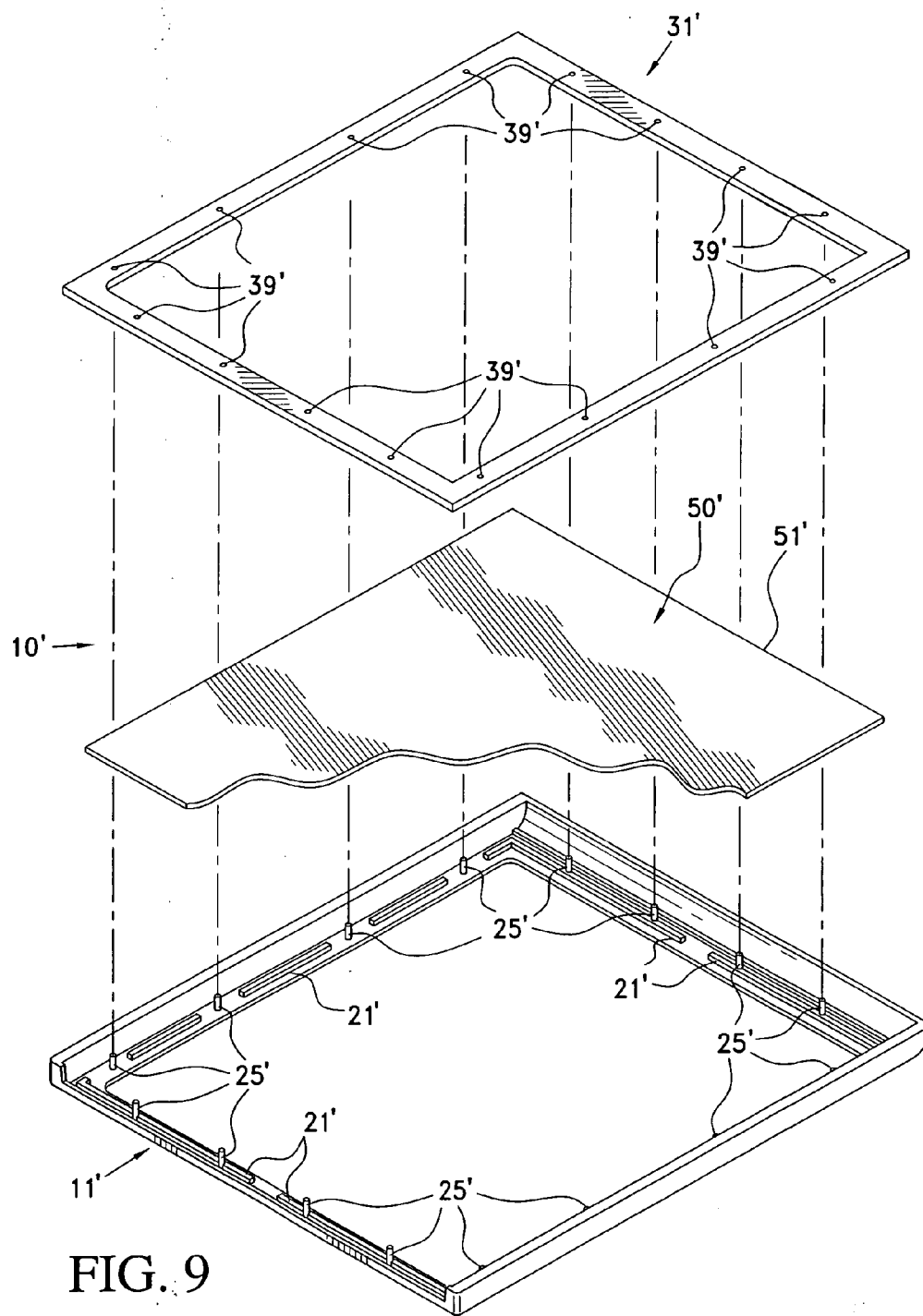


FIG. 6

FIG. 7

FIG. 8





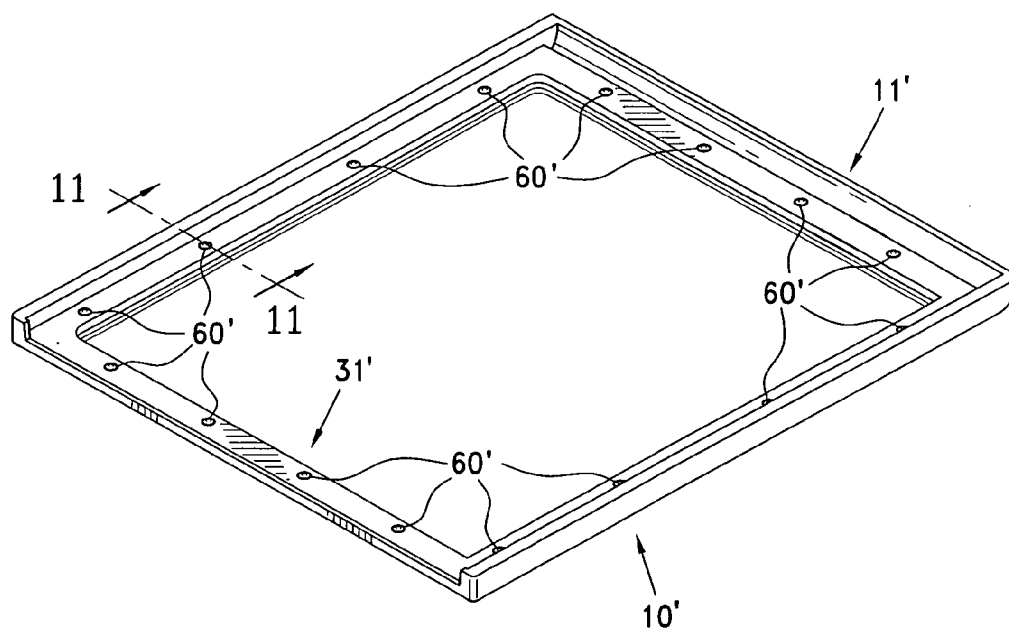


FIG. 10

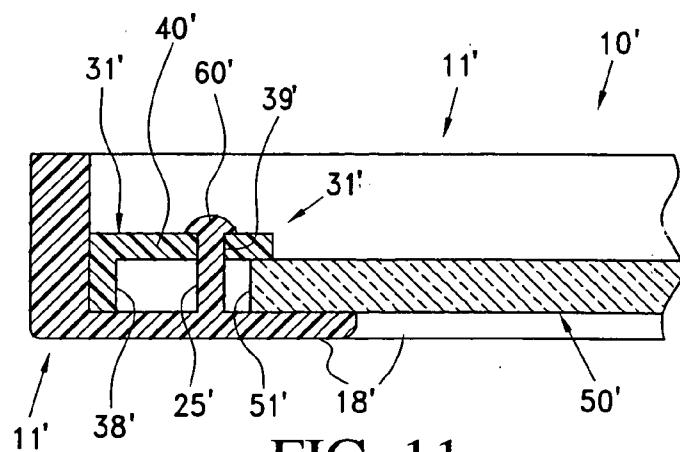


FIG. 11

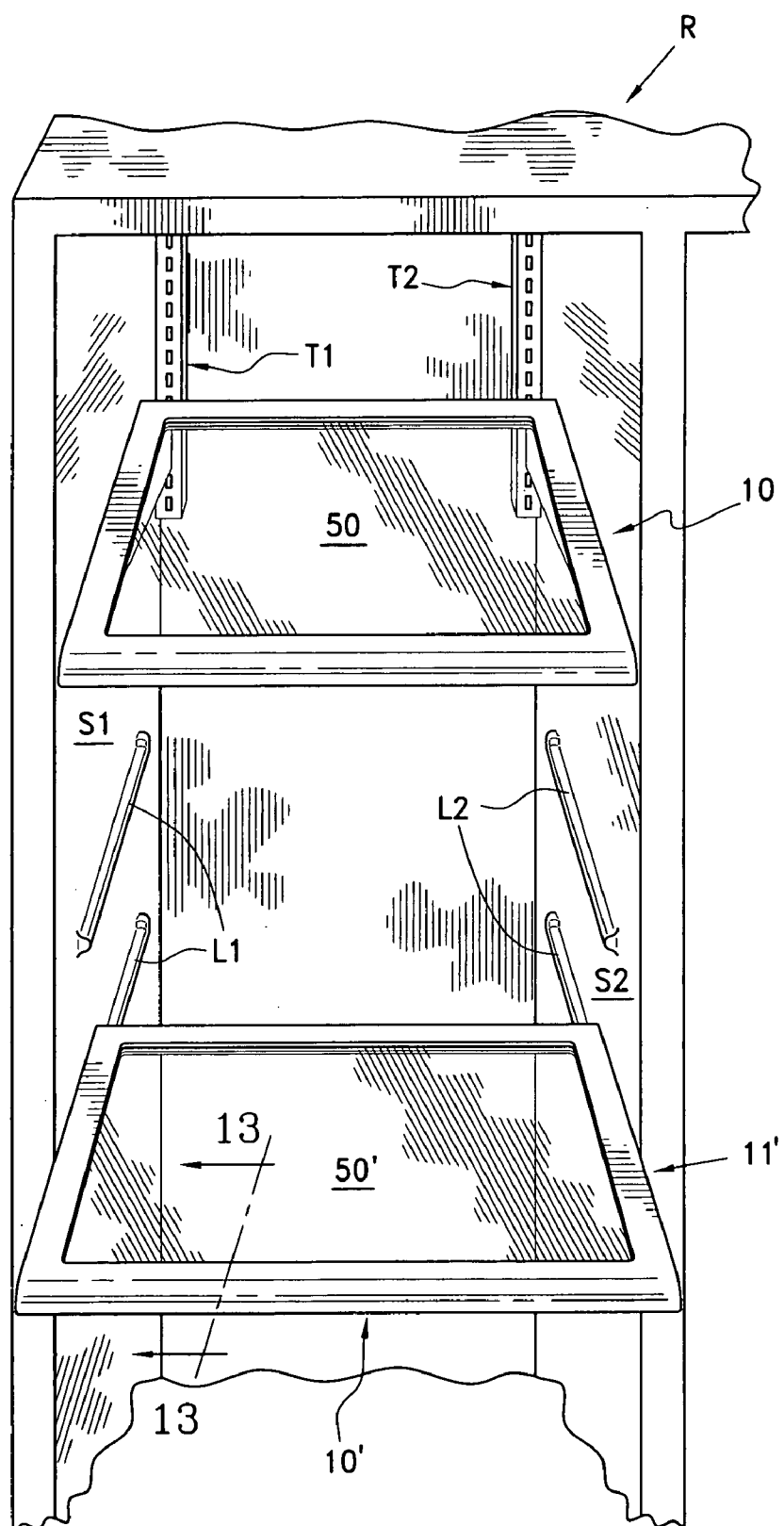
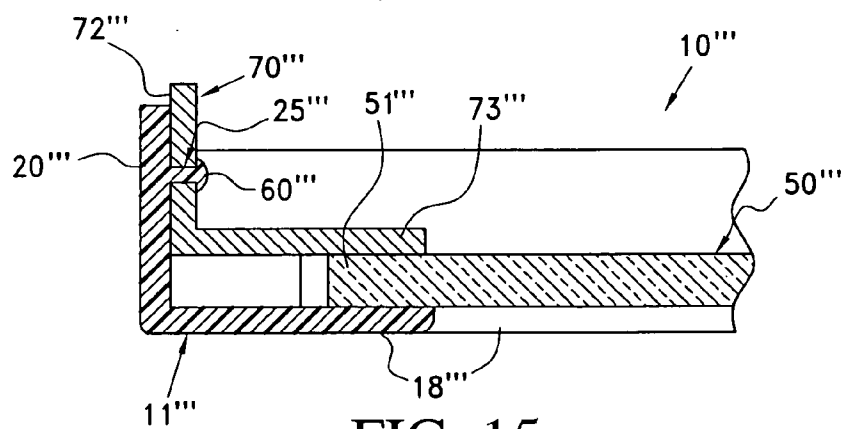
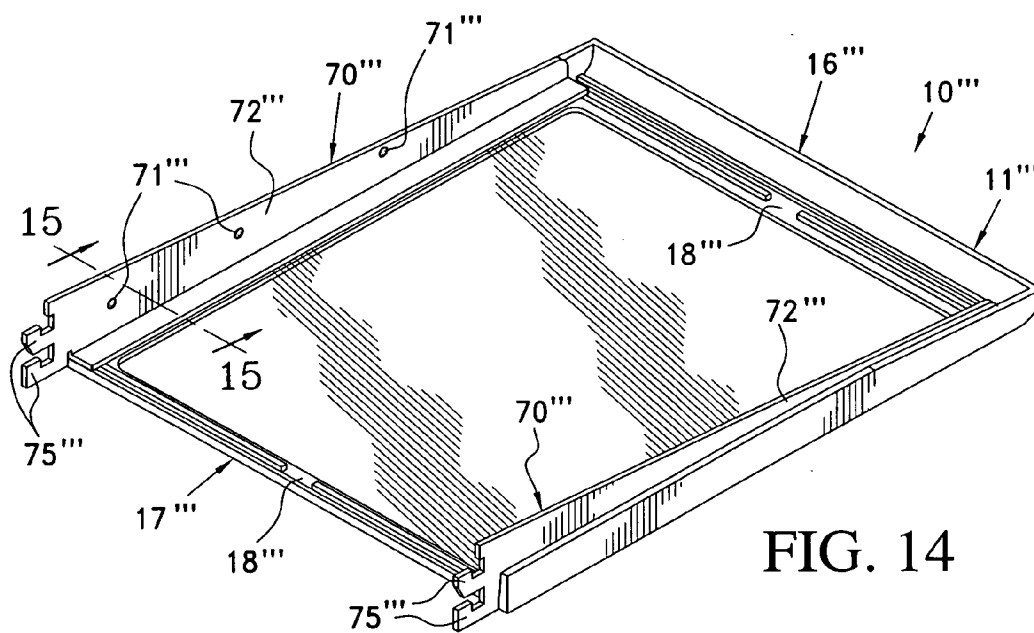
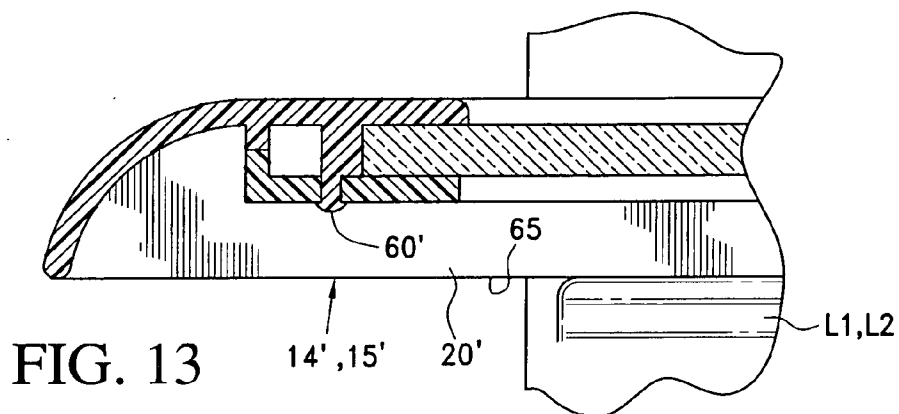


FIG. 12



SHELF ASSEMBLY FOR A REFRIGERATOR COMPARTMENT

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application is a divisional application of Ser. No. 11/029,347 filed on Jan. 6, 2005 and entitled SHELF ASSEMBLY FOR A REFRIGERATOR COMPARTMENT and now patent Ser. No. _____.

BACKGROUND OF THE INVENTION

[0002] Adjustable shelves are conventionally associated with both the freezer compartment and the fresh food compartment of conventional refrigerators. Such shelves or shelf assemblies are normally constructed as cantilevered step-adjustable shelving or as a slidable shelf which slides along channels or ledges in opposite side walls of the freezer or fresh food compartment. Typical of such shelves and shelving, both sliding and cantilevered, are disclosed in the following patents.

[0003] U.S. Pat. No. 1,119,982 issued to Ohnstrand discloses a glass slab 3 which sits upon "a filler 7 of suitable material, as cement" (page 1, lines 52-53). A ledge 1 of an annular frame or "truss flange 2" (page 1, line 40) supports the entire shelf. The glass slab 3 is basically "dropped-in" from above.

[0004] In lieu of bonding a piece of glass to a frame, several patents to Bienick (U.S. Pat. Nos. 6,422,673 and 6,679,573) provide a sliding shelf in which a piece of tempered glass is snapped-fit into a substantially polygonal plastic frame. The latter is an innovation which excludes the utilization of separately applied adhesive and does not include complete rim encapsulation, as disclosed in U.S. Pat. Nos. 5,362,145; 5,429,433 and 5,524,981, each of which are assigned to the assignee of the present application. The latter three patents require sophisticated molding techniques because a pair of metal shelf brackets and a piece of tempered glass are held accurately during the closing of an injection mold and thereafter polymeric/copolymeric material is injected into the mold creating a rim or encapsulation which holds the shelf brackets to the piece of tempered glass. Thus, glass-to-frame bonding, snap-fitting, encapsulation and the like are all quite commonplace whether the shelving assembly is slidable or can be vertically adjusted through the utilization of conventional refrigerator compartment trackways.

[0005] U.S. Pat. No. 4,886,236 in the name of Randall discloses a shelf having a rim in which an edge of a piece of tempered glass is inserted, followed by the insertion of a plurality of wedge members which are driven or forced into a notch or groove which receives the edge of glass to retain the latter components assembled.

[0006] Numerous other patents disclose frames made of a single piece of plastic material, as in U.S. Pat. No. 3,633,983 to Whitcomb; individual frame members, as in U.S. Pat. No. 4,923,260 granted to Poulsen; extruded rims, as in U.S. Pat. No. 5,947,574 in the name of Avendano; and multi-piece reinforced frames, as in U.S. Pat. No. 4,960,308 in the name of Donaghy.

[0007] The shelves of the latter patents and patents listed in U.S. Pat. No. 6,422,673 fairly reflect the scope and content of the prior art as a whole in the field of shelving, particularly shelving or shelf assemblies utilized in refrigerators, be they sliding shelves or vertically step-adjustable shelves.

[0008] The particular shelf which is selected for a particular refrigerator depends upon numerous factors, primarily among which is price. Obviously, for so-called top-of-the-line refrigerators, more expensive, durable, aesthetic, etc. shelving is generally utilized, and the best shelving for the best and/or most expensive refrigerators is the encapsulated shelving manufactured by the assignee of the present application, and is reflected in such patents as U.S. Pat. Nos. 5,524,981; 5,362,145; 5,429,433; etc. Such encapsulated shelving, whether sliding shelves or vertically adjustable shelves, are the so-called "Cadillac" of the industry and are utilized in most of the more expensive refrigerators found in the marketplace. As total wholesale/retail prices become more competitive, particularly toward mid-line and lower cost refrigerators, more expensive shelves, such as encapsulated shelves, can prove competitively disadvantageous, irrespective of the quality of the products and the aesthetics thereof. Because of the latter, the shelves of U.S. Pat. Nos. 6,422,673 and 6,679,573 were developed because they provide excellent aesthetics at a lesser price without adversely effecting functionality. However, the optimum shelf or shelf assembly would be a combination of maximum functionality, highest aesthetics and lowest price. In an effort toward achieving the latter, the present invention provides each of the latter three objectives at as low a cost of manufacture as is possible.

BRIEF SUMMARY OF THE INVENTION

[0009] A novel shelf assembly or shelf is constructed in accordance with the present invention from but a single panel of tempered glass and two plastic frame members in the case of a sliding shelf and from a single piece of tempered glass, a single frame member, and two support brackets in the case of a vertically step-adjustable shelf or shelf assembly. In both cases, adhesive is not required and in lieu thereof, the components of the shelves, whether sliding or vertically step-adjustable, are provided with a plurality of inter-engageable stake projections and stake projection openings. When appropriately assembled, axial end portions of the stake projections are upset or staked to form enlarged heads which unitize the shelf frames to the tempered glass panel or a pair of shelf brackets, a single shelf frame and the tempered glass panel to each other in manufacturing sliding and vertically step-adjustable shelving, respectively.

[0010] In further accordance with the present invention, both in the case of a sliding shelf and a vertically step-adjusting shelf, two polymeric/copolymeric plastic frames are utilized and are stake-assembled to each other to impart additional strength/reinforcement to the shelf assemblies.

[0011] In accordance with the present invention, in the case of a shelf assembly made of a single piece of tempered glass and two frame members, one of the frame members is provided with stake projections and the other frame member is provided with openings for receipt therein of the stake projections. A peripheral edge of the tempered glass panel is sandwiched between the two frame members and upon staking of the axial ends of the stake projections, the three components of the shelf are securely and rigidly assembled to each other absent the addition of adhesive, bonding material, sealants or the like.

[0012] In the case of a vertically step-adjustable shelf, preferably at least one of a pair of frame members includes depending vertical flanges which carry stake projections which are inserted into and through openings of shelf brackets

and are thereafter staked or headed to retain the shelf components in a rigid, unitized, aesthetic shelf assembly.

[0013] With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 is front top perspective view of a novel shelf or shelf assembly constructed in accordance with this invention, and illustrates a pair of metal shelf brackets each having a pair of hooks, a tempered glass panel, and two generally polygonal open frame members collectively defining a rim bordering the glass panel of the shelf.

[0015] FIG. 2 is an exploded fragmentary perspective view of the underside of the shelf assembly of FIG. 1, and from bottom to top illustrates an upper/outer polygonal open frame member, the tempered glass panel, a lower/inner polygonal open frame member and the pair of shelf brackets prior to assembly of the components.

[0016] FIG. 3 is a top perspective view of the shelf assembly of FIG. 2 partially assembled, and illustrates a peripheral edge of the tempered glass panel sandwiched between the upper and lower polygonal open frame members with stake projections of the upper outermost open frame member being each received in a stake projection opening of the lower innermost open frame member.

[0017] FIG. 4 is a perspective view of the shelf assembly of FIG. 3, and illustrates stake projection openings of the metal shelf brackets receiving stake projections of side frame portions of the upper open frame member.

[0018] FIG. 5 is a top perspective view of the shelf assembly of FIG. 4, and illustrates axial ends of the stake projections being staked or enlarged to retain the components of the shelf assembly in assembled relationship.

[0019] FIG. 6 is an enlarged fragmentary cross-sectional view taken generally along line 6-6 of FIG. 4, and illustrates the generally L-shaped transverse cross-sectional configuration of side frame portions of the inner and outer open frame members and the metal shelf bracket; a locating member or tongue of the outer frame member snap-secured in a locating opening of the inner open frame member; a stake projection of the outer frame member projecting through a stake projection opening of the shelf bracket, and a horizontal flange of the shelf bracket engaged beneath a generally inverted L-shaped locating portion or leg of the inner open frame member with the peripheral edge of the tempered glass panel being sandwiched between horizontal flanges of the inner and outer open frame member side portions.

[0020] FIG. 7 is an enlarged fragmentary cross-sectional view taken generally along line 7-7 of FIG. 5, and illustrates the identical components described with respect to FIG. 6 and additionally illustrating an axial terminal end portion of the stake projection being staked into an enlarged staked head to retain the shelf components in assembled relationship.

[0021] FIG. 8 is an enlarged fragmentary cross-sectional view taken generally along line 8-8 of FIG. 5, and illustrates a plurality of stake projections having enlarged stake heads disposed along a rear frame portion of the shelf assembly with axes thereof substantially normal to the axes of the stake projections of vertical flanges of the outer frame member side portions.

[0022] FIG. 9 is an exploded fragmentary perspective view of another shelf assembly, specifically a sliding shelf, and illustrates a pair of generally polygonal open upper and lower frame members and a polygonal tempered glass panel prior to being unitized, a plurality of abutment bars for locating the tempered glass panel relative to the upper open frame member, upwardly projecting stake projections of the latter, and stake projection openings of the lower open frame member associated therewith.

[0023] FIG. 10 is a perspective view of the sliding shelf or sliding shelf assembly of FIG. 9, and illustrates the components staked together in assembled relationship.

[0024] FIG. 11 is a fragmentary enlarged cross-sectional view taken generally along line 11-11 of FIG. 10, and illustrates the manner in which a peripheral edge of the polygonal tempered glass panel is sandwiched between horizontal flanges of the upper/outer and lower/inner open frame members which are in turn held together by one of a plurality of stake projections each received through a stake projection opening and retained therein by an enlarged/staked head.

[0025] FIG. 12 is a front fragmentary perspective view of a refrigerator including one of a pair of side-by-side compartments thereof, and illustrates the shelves of FIGS. 1 and 10 assembled respectively to a pair of slotted vertical trackways and slidable upon opposite side wall ledges.

[0026] FIG. 13 is an enlarged cross-sectional view taken generally along line 3-3 of FIG. 12, and illustrates the manner in which a lower surface of a vertical flange of a side frame portion of the outer open frame member slides upon an upper surface of one of the refrigerator compartment ledges.

[0027] FIG. 14 is a bottom perspective view of another step-adjustable shelf or shelf assembly constructed in accordance with this invention, and illustrates an upper/outer generally polygonal open frame member, a substantially polygonal tempered glass panel, and a pair of metal shelf brackets which are collectively held in assembled relationship by a plurality of stake projections of the open frame member housed in stake projection openings of the metal shelf brackets and having at axial ends thereof enlarged staked heads.

[0028] FIG. 15 is an enlarged fragmentary cross-sectional view taken generally along line 15-15 of FIG. 14, and illustrates the components of FIG. 14 in more detail, including one of the staked projections projecting through the stake projection opening and an enlarged staked head of the stake projection.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0029] A novel shelf or shelf assembly constructed in accordance with this invention is illustrated in FIGS. 1 through 8 of the drawings and is generally designated by the reference numeral 10. The shelf or shelf assembly 10 is designed for vertical step-adjustment with respect to a conventional pair of substantially vertically disposed slotted tracks T1, T2 (FIG. 12) in a freezer and/or fresh food compartment C of a conventional refrigerator R which also includes opposite horizontally aligned and vertically spaced pairs of ledges L1, L2 in respective side walls S1, S2 of the compartment C for slidably accommodating another shelf 10' of the invention which will be fully described hereinafter.

[0030] The shelf assembly 10 of FIGS. 1 through 8 and 12 is defined by a pair of substantially polygonal open polymeric/copolymeric synthetic plastic material frame members, including an upper, uppermost, outer or outermost sub-

stantially continuous polygonal open frame member or border 11 and an inner, innermost, lower or lowermost substantially polygonal continuous open frame member or border 31. The shelf assembly 10 further includes a substantially polygonal tempered glass panel or piece of glass 50 and a pair of substantially identical metal shelf brackets or shelf supporting brackets 70, 70.

[0031] The outer open frame member 11 includes an outermost substantially continuous border surface (unnumbered) and an inner polygonal peripheral edge 12 defining a substantially polygonal opening 13; a pair of substantially parallel side frame member portions 14, 15; a front frame member portion 16 having a forwardly and downwardly curved finger gripping wall portion 19 and a rear frame member portion 17 which is substantially parallel to the front frame member portion 16.

[0032] The side frame member portions 14, 15 each include a horizontal flange 18 and, as viewed in FIG. 1, a downwardly directed vertical flange 20 with the horizontal flanges 18, 18 of the side frame member portions 14, 15 being substantially in opposing relationship to each other.

[0033] Each horizontal flange 18, 18 of the side frame member portions 14, 15 carries means in the form of locating ribs or bars 21 which are also provided along the flanges 18, 18 continuing along the front frame member portion 16 and the rear frame member portion 17. The locating ribs, bars or abutments 21 set-off a peripheral dimension which corresponds substantially to a peripheral edge 51 of the tempered glass panel 50. This enables the glass panel 50 to be "dropped-in" inserted into the upper open frame member 11 from the position shown in FIG. 2 to the position evident from FIG. 3 in which the glass panel 50 is accurately located within and closes the opening 13 of the outer frame member 11.

[0034] The vertical flanges 20, 20 of the side frame member portions 14, 15 each include four inwardly directed opposing locating/latching tabs or tongues 22 which are each received in and are snap-secured to an associated locating opening 32 (FIGS. 2, 6 and 7) in a vertical flange 38 of the lower/inner open frame member 31. Inasmuch as the tongues 22 are aligned with the openings 32 (FIG. 2), the lower open frame member 31 need not be moved downwardly from the position shown in FIG. 2 into the upper/open frame member 11 and the tongues 22 each snaps into one of the openings 32 during the outward deflection and subsequent inward rebound of the vertical flanges 20 of the side frame member portions 14, 15.

[0035] The outer open frame member 11 also includes four stake projections 25 along the front frame member portion 16, the rear frame member portion 17 and three stake projections 25 along each of the vertical flanges 20 of the side frame member portions 14, 15. The stake projections 25 of the side frame member portions 14, 15 are in axially aligned opposing relationship to each other and axes (unnumbered) thereof are substantially normal to the axes of the stake projections 25 of the front and rear frame member portions 16, 17, respectively.

[0036] The inner/lower substantially open frame member 31 defines an outermost substantially continuous border surface (unnumbered) and similarly includes an inner peripheral edge (unnumbered) corresponding in size to the inner peripheral edge 12 of the outer frame member 11 which defines and borders a substantially polygonal opening 33. The inner open frame member 31 includes substantially parallel spaced side frame members portions 34, 35, a front frame member portion 36 and a rear frame member portion 37 which are ori-

ented for aligned assembly with the respective frame member portions 14 through 17 of the outer open frame member 11.

[0037] Each of the side frame member portions 34, 35 is of a generally L-shaped transverse cross-sectional configuration (FIGS. 6 through 8) and is defined by the vertical depending flange 38 and a horizontal flange 40 with the horizontal flanges 40 being disposed in opposing aligned relationship. The horizontal flanges 40 carry four substantially identical L-shaped locating and retaining legs, noses or feet 41 whose ends 42 (FIG. 6) are spaced above the respective horizontal flanges 40 and define therewith a locating or retaining channel 43 for a horizontal flange 73 each of the respective shelf brackets 70, as will be more apparent hereinafter. Each of the vertical flanges 38 of the side frame member portions 34, 35 includes four of the locating openings or slots 32 heretofore described, and above three of the four locating openings 32 in each flange 38 is an upwardly opening slot 45, as viewed in FIG. 2. The slots 45 of the vertical flanges 38 of the side frame member portions 34, 35 are aligned with each other and are each aligned with a stake projection receiving opening or stake projection opening 71 in a vertical flange 72 of each metal shelf bracket 70 which also includes the horizontal flanges 73 disposed in aligned opposing relationship with each other and a pair of hooks 75. The notches or slots 45 each receive or accommodate one of the stake projections 25 projecting inwardly from the vertical flanges 20 of the side frame member portions 14, 15, as is readily apparent in FIG. 3. In the partially assembled condition of the shelf 10 in FIG. 3, the stake projections 25 of the front frame member portion 16 and the rear frame member portion 17 of the outer frame 11 project into and through stake projections openings 39 of the respective front frame member portion 36 and rear frame member portion 37 of the inner or lower open frame member 31. The stake projections 25 of the side frame member portions 14, 15 of the outer frame member 11 each project through one of the notches 45 in the vertical flanges 38 of the side frame member portions 34, 35 of the lower frame member 31 and also pass through the stake projection receiving openings 71 of the shelf brackets 70 (FIG. 4), as will be immediately described hereinafter. Thus, fourteen terminal axial ends (unnumbered) of the stake projections 25, of which eleven are illustrated in FIG. 3, are accessible for subsequent staking or enlarging under heat and pressure deformation, as will be described hereinafter.

[0038] After the partial assembly of the shelf assembly 10 illustrated in FIG. 3 is completed, each of the shelf brackets 70 is either slid from left-to-right, as viewed in FIGS. 3 and 4, to insert each shelf bracket 70 in the position shown in FIG. 4 in which the stake projections 25 of the vertical flanges 20 of the side frame member portions 14, 15 project through the stake openings 71 of the shelf brackets 70 while each horizontal flange 73 is engaged beneath an associated leg 42 (FIG. 6) and within the channel 43 formed thereby of each locating member 41.

[0039] In lieu of sliding the metal shelf bracket 70, 70 from left-to-right in the manner just described with respect to FIG. 3, the shelf brackets 70 can be instead positioned substantially as shown in FIG. 2 in side-by-side relationship to the side frame member portions 14, 34; 15, 35 of FIG. 3. The horizontal flanges 73 are then merely slid under the legs or noses 41 of the locating members 41 which temporarily causes the vertical flanges 20 to deflect outwardly but subsequently rebound to the assembled position shown in FIGS. 4 and 6.

[0040] After the total assembly of the shelf or shelf assembly 10 of FIG. 4, the exposed axial ends (unnumbered) of each of the fourteen stake projections 25 are simultaneously staked in a conventional manner under the application of heat and pressure resulting in the deformation of the plastic material and the formation of enlarged heads or staked heads 60 which maintain and retain the components of the shelf 10 rigidly assembled. The shelf or shelf assembly 10 can thereafter be utilized in the compartment C (FIG. 12) of the refrigerator R by hooking the hooks 75 of the shelf brackets 70 in any selected horizontally aligned pair of the slots (unnumbered) in the trackways T1, T2 to afford step-adjustment of the shelf 10 in the compartment C in a conventional manner.

[0041] The shelf or shelf assembly 10' earlier alluded to is illustrated in FIGS. 9 through 11 of the drawings and has primed reference numerals applied thereto to identify structure which corresponds substantially identically to structure heretofore described with respect to the shelf or shelf assembly 10. However, the major difference between the two shelves 10, 10' resides in the fact that the shelf 10 includes the two metal shelf brackets 70, 70' for achieving the step-adjustment heretofore described, whereas the shelf 10' excludes such metal shelf brackets and is formed as a sliding shelf defined by three components, namely, a pair of substantially polygonal open polymeric/copolymeric synthetic plastic material frame member, including an upper, uppermost, outer or outermost open frame member 11' and an inner, innermost, lower or lowermost substantially polygonal open frame member 31'. The shelf assembly 10' further includes a substantially polygonal tempered glass panel or piece of glass 50' having a peripheral polygonal edge 51'

[0042] The outer open frame member 11' includes sixteen upwardly directed stake projections 25' having axes substantially in parallel relationship to each other with each stake projection 25' being aligned for inter-engagement into and with stake projection receiving openings or stake projection openings 39' of the inner lower open frame member 31' (FIG. 9).

[0043] As in the case of the assembly of the shelf 10 described with respect to FIGS. 2 through 4, the sliding shelf 10' is assembled in a similar manner by the drop-in insertion or placement of the tempered glass panel 50' into the upper open frame member 11' with the accurate location thereof being assured by the locating ribs 21'. Thereafter, the lower open frame member 31' is moved downwardly from the position shown in FIG. 9 to the position shown in FIG. 10 at which axial end portions (unnumbered) of each of the upwardly directed stake projections project into and through the stake projection openings 39' and with the peripheral edge 51' of the tempered glass panel 50' being sandwiched between the flanges 18', 40' of the respective open frame members 11', 31'. As is best illustrated in FIG. 11, the vertical downwardly directed flange 38' of the lower open frame member 31' extends about the entire outer periphery of the lower open frame member 31' and bears against an inner surface (unnumbered) of the horizontal flange 18' of the outer/upper open frame member 11'. Thus, the peripheral vertical flange 38' reinforces the entire periphery of the lower open frame member 31' to prevent the same from distorting under the application of heat and pressure when the axial end of each stake projection 25' is staked under heated pressure to form the enlarged staked head(s) 60' thereof (FIG. 11). The sixteen staked projections 25' including the stake/enlarged heads 60' thereof maintain the sliding shelf 10' in rigid assembled rela-

tionship for its use in association with the ledges L1, L2 of the refrigerator compartment C (FIG. 12) in a conventional manner. It is to be particularly noted from FIG. 13 that each depending vertical flange 20' of the side frame member portions 14', 15' has a lowermost surface 65 which rides along the ledges L1, L2 and supports the shelf 10' in a manner such that the enlarged staked heads 60' are spaced well above and do not slide along upper surfaces (unnumbered) of the ledges L1, L2. This prevents the enlarged staked heads 60' from being worn under the influence of constant sliding friction during the use of the shelf 10', particularly under the load of articles positioned thereupon. Because of the absence of wear with respect to the enlarged staked heads 60', the longevity of the shelf 10' is enhanced and increased. It is also to be particularly noted that from an aesthetic standpoint, none of the stake projections 25, 25' or for that matter the locking members or tongues 22, legs 41 or the openings 32 are visible from above when the shelves 10, 10' are in use (FIG. 12). In other words, the uppermost/outermost surface (unnumbered) of the uppermost open frame members 11, 11' are essentially smooth, uninterrupted and offer no visible evidence of the internally hidden components latter-described. Thus, when viewed in the positions of use (FIG. 12), the shelves 10, 10' give the appearance of an expensive high-end encapsulated shelf absent the relatively higher cost thereof while retaining the excellent functionality and high aesthetics of encapsulated shelving.

[0044] Another vertically step-adjustable shelf or shelving assembly 10'' is illustrated in FIGS. 14 and 15 of the drawings and corresponds in all material aspects but one to the shelf 10, namely, the shelf 10'' excludes the corresponding open inner lower frame member 31 while including the upper outer open frame member 11'', a piece of thermal glass or glass panel 50'', and a pair of metal shelf brackets 70'' each having a vertical flange 72' with a plurality of stake projection openings 71'' therein, a pair of hooks 75'' and a horizontal flange 73''. As is most evident from FIG. 15, the peripheral edge 51'' of the tempered glass panel 50'' is accurately located and sandwiched between the flanges 18'' of the inner open frame member 11'' and the flange 73'' of each of the metal shelf brackets 70''. The stake projections 25'' of each of the vertical flanges 20'' of the outer upper open frame member 11'' project through the stake projection openings 71'' and are provided with enlarged staked heads 60'' under heat and pressure, as heretofore described to assemble the components in a rigid assembly suitable for supporting products in the compartment C of the refrigerator R. However, since there are no stake projections 25'' along the front or rear member portions 16'', 17'', respectively, of the upper open frame member 11'' of the shelf 10'', an appropriate bonding material or adhesive can be utilized in these areas to glue or bond an upper surface (unnumbered) of the tempered glass panel 50'' directly to the underside of the horizontal flanges 18'' of the front and rear frame member portions 16'', 17'', respectively.

[0045] Although a preferred embodiment of the invention has been specifically illustrated and described herein, it is to be understood that minor variations may be made in the apparatus without departing from the spirit and scope of the invention, as defined by the appended claims.

What is claimed is:

1. A shelf assembly comprising at least one substantially open frame member having an inner peripheral edge defining an opening and a shelf panel having an outer peripheral edge, said frame member including opposite spaced substantially

parallel frame portions each of a substantially L-shaped transverse cross-sectional configuration defined by a substantially horizontal flange and a substantially downwardly directed vertical flange when the shelf assembly is located in a position of use in which the shelf panel is substantially horizontal, a pair of support brackets each of a substantially L-shaped transverse cross-sectional configuration defined by a substantially horizontal flange and a substantially downwardly directed vertical flange in the shelf assembly position of use, said shelf panel outer peripheral edge being sandwiched between the horizontal flanges of the frame member and pair of support brackets, means for securing at least selected ones of said frame member and support brackets flanges to each other outboard of the panel outer peripheral edge, at least one of said open frame member and said pair of support brackets being formed of synthetic polymeric/polymeric plastic material, and said securing means being defined by a plurality of inter-engaged integral unitary one-piece in situ molded stake projections formed of said synthetic polymeric/copolymeric plastic material of said at least one open frame member received in stake projection openings of said pair of support brackets with the stake projections having stake heads securing said selected flanges to each other.

2. The shelf assembly as defined in claim 1 wherein said support brackets substantially horizontal flanges are in opposing substantially aligned relationship to each other.

3. The shelf assembly as defined in claim 1 including means for locating said shelf panel with respect to said frame member.

4. The shelf assembly as defined in claim 1 including means for locating said shelf panel with respect to said frame member, and said locating means are carried by said frame member flanges.

5. The shelf assembly as defined in claim 1 wherein said selected ones of said frame member and support bracket flanges are horizontal flanges.

6. The shelf assembly as defined in claim 1 wherein said selected ones of said frame member and support bracket flanges are vertical flanges.

7. The shelf assembly as defined in claim 1 wherein said selected ones of said frame member and support bracket flanges are horizontal flanges and vertical flanges.

8. The shelf assembly as defined in claim 1 wherein said frame member has an outermost surface, and said frame member outermost surface is devoid of discernible stake heads.

9. The shelf assembly as defined in claim 1 including means for locating said shelf panel with respect to said frame member.

10. The shelf assembly as defined in claim 1 including means for locating said shelf panel with respect to said frame member, and said locating means are carried by said frame member flanges.

11. The shelf assembly as defined in claim 2 wherein said frame member has an outermost surface, and said frame member outermost surface is devoid of discernible stake heads.

12. The shelf assembly as defined in claim 3 wherein said frame member has an outermost surface, and said frame member outermost surface is devoid of discernible stake heads.

13. The shelf assembly as defined in claim 5 wherein said frame member has an outermost surface, and said frame member outermost surface is devoid of discernible stake heads.

14. The shelf assembly as defined in claim 6 wherein said frame member has an outermost surface, and said frame member outermost surface is devoid of discernible stake heads.

15. The shelf assembly as defined in claim 7 wherein said frame member has an outermost surface, and said frame member outermost surface is devoid of discernible stake heads.

16. The shelf assembly as defined in claim 1 wherein said frame member is formed of said synthetic polymeric/copolymeric plastic material, and said pair of support brackets are each metal.

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