

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
31 May 2001 (31.05.2001)

PCT

(10) International Publication Number
WO 01/37705 A1

(51) International Patent Classification⁷: **A47B 43/00**,
61/00, 96/20

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(21) International Application Number: PCT/US00/31715

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(22) International Filing Date:
20 November 2000 (20.11.2000)

(25) Filing Language: English

(81) Designated State (*national*): CA.

(26) Publication Language: English

(84) Designated States (*regional*): European patent (AT, BE,
CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,
NL, PT, SE, TR).

(30) Priority Data:
60/167,225 24 November 1999 (24.11.1999) US
09/523,460 10 March 2000 (10.03.2000) US

Published:

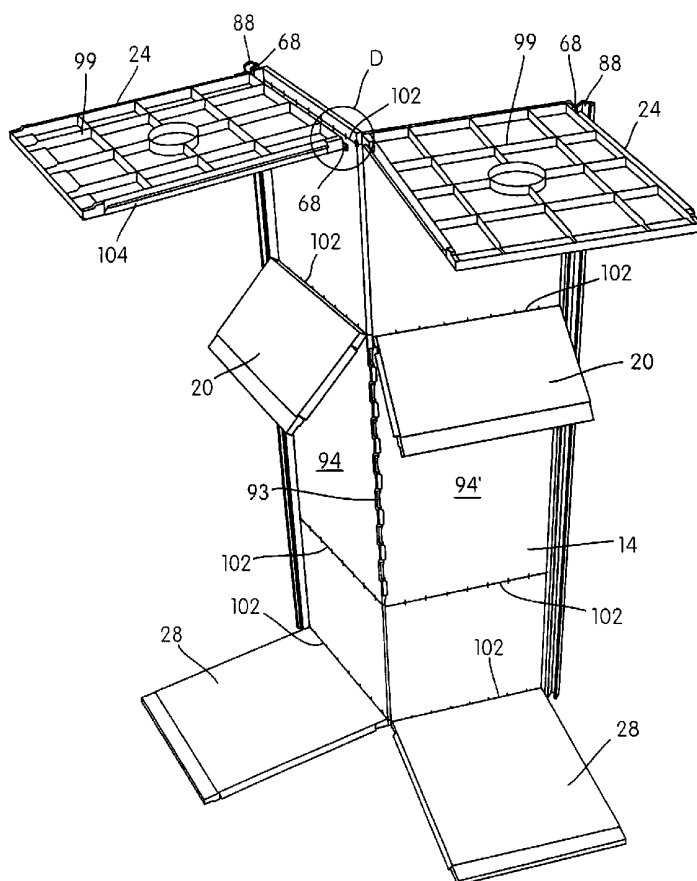
— With international search report.

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For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

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(54) Title: FREE STANDING FOLDABLE STORAGE



(57) **Abstract:** A foldable wardrobe unit is disclosed. A wardrobe unit has panels connected by hinges which allow the unit to be folded into a substantially flat package for transport or storage. Side, back, top and bottom panels made of hardboard, chipboard or plastic fold open into a deployed condition to define an article enclosing space. Aluminium frame members provide support and stability and act as tracks within which sliding doors travel. Hinges may be separately formed and adhered to the panels or may alternately be integrally formed with the panels.

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FREE STANDING FOLDABLE STORAGE

1. Field of the Invention

The present invention relates to storage units and more particularly to a wardrobe unit which may be folded into a compact, transportable configuration.

5 2. Description of Background Information

A consumer demand exists for inexpensive, easy to assemble furniture. Transportation costs are minimized when furniture can be shipped in flat packs for home assembly by the customer. Conventional furniture for home assembly typically requires a lengthy and tedious assembly process. Frequently, multiple components and fasteners are provided which require laborious assembly. Further, such furniture is rarely capable of repetitive building and disassembly. Frequently, the fasteners provided are single use, while in other cases, the materials are not suited to multiple uses. For example, screw receiving fixings in chipboard panels fail to sustain their optimum performance when screws are repetitively screwed in and out thereof.

15 The present invention overcomes the forgoing problems by providing a pre-assembled unit that folds flat for shipment and storage and is assembled quickly, essentially by unfolding and securing.

SUMMARY OF THE INVENTION

The present invention is a foldable wardrobe unit which is convertible between a deployed condition enabling storage of articles therein and a compact transporting condition facilitating transport of the wardrobe unit. The foldable wardrobe includes a back wall made up of a plurality of back panel members. Adjacent panel members are connected to one another by an adjoining hinge that enables the panel members to be folded relative to one another to assume the compact transporting condition and unfolded to assume the deployed condition. Side walls are connected to opposite sides of the back wall by adjoining hinges.

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The hinges enable the side walls to be folded relative to the back wall to assume the compact transporting condition, and to be unfolded to assume the deployed condition. A top wall includes a plurality of top panel members, each of the top panel members is connected to the back wall by an adjoining hinge that enables the top wall to be folded relative to the back wall to assume the compact transporting condition and to be unfolded to assume the deployed condition. A bottom wall includes a plurality of bottom panel members, each of the bottom panel members is connected to the back wall by an adjoining hinge that enables the bottom wall to be folded relative to the back wall to assume the compact transporting condition and to be unfolded to assume the deployed condition. A shelf includes a plurality of shelf panel members connected to the back wall by adjoining hinges that enable the shelf panel members to be folded relative to the back wall to assume the compact transporting condition and to be unfolded to assume the deployed condition. The back wall, the side walls, the top wall, and the bottom wall cooperate to define an article receiving space when in the deployed condition. The top wall, the side walls and the bottom walls provide a forward edge defining an opening to the article receiving space. A frame structure is provided which is constructed and arranged to be disposed at the forward edge and add structural stability to the wardrobe unit in said deployed condition. The frame structure includes upper and lower tracks which accommodate a plurality of sliding doors constructed and arranged to be disposed between the upper and lower tracks. The sliding doors are selectively movable when the wardrobe unit is in the deployed condition between a closed condition and an opened condition. When in the closed condition, the doors close the article receiving space and when in the opened condition, the doors permit access to the article receiving space.

It is a further object of the invention to provide a foldable wardrobe unit having a back wall, a pair of side walls, a bottom wall and a top wall. The back wall, side walls, bottom wall and top walls are interconnected by a plurality of hinges in a manner that enables the

walls to be folded into a substantially flat, overlapping condition that facilitates transport.

The walls also may be unfolded into a deployed condition, defining an article receiving space which may be used for storage of articles. Additionally, a frame structure is provided to add structural stability to the wardrobe. The frame structure has an upper track and a lower track.

5 A plurality of sliding doors are disposed between the upper and lower tracks and are selectively movable when the walls are in the unfolded deployed condition. The doors may be moved between a closed condition, closing the article receiving space and an open position, permitting access to the article receiving space.

10 BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1a-i is a series of isometric views illustrating deployment of a foldable wardrobe according to the present invention;

FIG. 2 is an isometric view illustrating detail of the assembly of the aluminum frame of a foldable wardrobe according to the present invention;

15 FIG. 3 is a top view of a portion of FIG. 2;

FIG. 4 is a enlarged detail of FIG. 3, taken at C;

FIG. 5 is a top view of a hinge used in the foldable wardrobe according to the present invention;

FIG. 6 is a top view of another hinge used in the foldable wardrobe according to the
20 present invention;

FIG. 7 is a top view of another hinge used in the foldable wardrobe according to the present invention;

FIG. 8 is a top view of yet another hinge used in the foldable wardrobe according to the present invention;

FIG. 9 is an isometric view of an extruded back wall of the foldable wardrobe according to one embodiment of the present invention;

FIG. 10 is an isometric view of a two part, injection molded, back wall of a foldable wardrobe according to another embodiment of the present invention;

5 FIG. 11 is a partial isometric view illustrating connecting hinge portions between panel members of a two part, injection molded, back wall of the foldable wardrobe according to the present invention;

FIG. 12 is a cross sectional view taken through the line 12-12 in FIG. 11;

FIG. 13 is an isometric view of injection molded back panels, top panels, bottom
10 panels and shelves hingedly connected to one another of the foldable wardrobe according to the present invention;

FIG. 14 is a top view of an extruded, three part back panel of the foldable wardrobe according to the present invention;

FIG. 15 is an isometric view showing detail of a top panel of the foldable wardrobe
15 according to the present invention;

FIG. 16 is an enlarged, cross-sectional view of FIG. 14 taken at A;

FIG. 17 is an enlarged view of FIG. 14 taken at B;

FIG. 18 is an enlarged view of FIG. 13 taken at D;

FIG. 19a-g is a series of isometric views illustrating deployment of the foldable
20 wardrobe according another embodiment of the present invention.

FIG. 20 is an isometric view of a three back panel wardrobe according to the present invention.

FIG. 21 is an isometric view of a partially folded three back panel wardrobe according to the present invention.

FIG. 22 is an isometric view of a four back panel wardrobe according to the present invention.

FIG. 23 is an isometric view of a partially folded four back panel wardrobe according to the present invention.

5 FIG. 24 is an isometric view of a folded wardrobe according to another embodiment of the present invention.

FIG. 25 is an isometric view showing a step in unfolding a wardrobe according to the present invention.

10 FIG. 26 is an isometric view showing another step in unfolding a wardrobe according to the present invention.

FIG. 27 is an isometric view showing a further step in unfolding a wardrobe according to the present invention.

FIG. 28 is an isometric view showing assembly of the frame of a wardrobe according to the present invention.

15 FIG. 29 is an isometric view showing assembly of the shelf and hanger bar of a wardrobe according to the present invention.

FIG. 30 is an isometric view showing a wardrobe according to the present invention.

FIG. 31 is an isometric view showing assembly of sliding doors in a wardrobe according to the present invention.

20 FIG. 32 is an isometric view of a fully assembled wardrobe according to the present invention.

FIG. 33 is an isometric view of a fully assembled wardrobe according to the present invention.

25 FIG. 34a is a cross-section of a hinge for use in a wardrobe according to the present invention.

FIG. 34b is a cross-section of a hinge for use in a wardrobe according to the present invention.

FIG. 34c is a cross-section of a joining member for use in a wardrobe according to the present invention.

5 FIG. 34d is a cross-section of a hinge for use in a wardrobe according to the present invention.

FIG. 34e is a cross-section of a joining member for use in a wardrobe according to the present invention.

10 FIG. 35 is a plan view of a right side wall end cap for use in a wardrobe according to the present invention.

FIG. 36 is a reversed plan view of a right side wall end cap for use in a wardrobe according to the present invention.

FIG. 36a is a cross-section of the end cap taken along the line X-X in FIG. 36.

FIG. 37a is a detail of the end cap taken at A in FIG. 36.

15 FIG. 37b is an isometric detail of the end cap taken at A in FIG. 36.

FIG. 38 is an isometric detail of the end cap taken.

FIG. 39a shows a half plan view of a shelf and hanger bar supporting bracket for use in a wardrobe according to the present invention.

20 FIG. 39b shows a reversed half plan view of a shelf and hanger bar supporting bracket for use in a wardrobe according to the present invention.

FIG. 39c shows a cross-section of a bracket taken along the line Y-Y in FIG. 39b.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now more particularly to the drawings, FIGS. 1a-1i show a foldable
25 wardrobe according to the present invention, generally indicated at 10. FIG. 1a shows the

wardrobe 10 in a completely folded, compact transporting condition. In one preferred folding arrangement, the side walls 12 form outer surfaces of the folded structure.

In FIG. 1b, the wardrobe 10 has been partially unfolded. In the condition illustrated, side walls 12 are parallel to each other and a back wall 14 is partially unfolded. As shown, the back wall 14 is made up of two flat, rectangular, back panel members 16 having a greater height than width. The back panel members 16 have adjoining sides that are hingedly connected to the other by an intermediate adjoining hinge 18. The opposite sides of the back panel members are each connected to associated side walls 12 by adjoining hinges 13. Shelf panel members 20 are each hingedly connected to an associated one of the back panel members 16 by a hinge construction, generally indicated at 15. In FIGS. 1b and 1c, the shelf panels 20 are disposed in a vertical position. Similarly, the top wall 22 is made up of two top panel members 24, which are hingedly connected to the top of the back panel members 16, and the bottom wall 26 is made up of two bottom panel members 28 which are hingedly connected to the bottom of the back panel members 16.

In FIG. 1c, the back panel members 16 are completely unfolded, forming a substantially planar back wall 14. Shelf, top and bottom panel members 20, 24, 28 have not yet been unfolded. As can be seen in FIGS. 1d and 1e, the shelf, top and bottom panel members 20, 24, 28 are simply unfolded into horizontal, operational positions. The two top panel members 24 together form a top wall 22 and touch, but are not joined along a shared edge. Similarly, the bottom panel members 28 together form a bottom wall 26 and the shelf panel members 20 together form a shelf 30. Preferably none of these pairs of members is joined along a shared edge, but rather simply touch and are disposed in a coplanar fashion. When the top wall 22, bottom wall 26 and side walls 12 are in their deployed positions, they define an article receiving space 32 and provide a forward edge defining an opening 33 to the article receiving space 32.

To provide structural stability to the wardrobe, a frame 34 is provided along the forward edges of the top wall 22, side walls 12, and bottom wall 26, as shown in FIGS. 1e-1i. The frame 34 is preferably made of extruded aluminum. Upright side members 36 of the frame 34 are preferably already in place on the forward edges of side wall 12, but optionally
5 may be added during assembly along with the upper and lower frame members 38, 40. The side members 36 have channels 37 receiving front edges of the side walls 12, as best seen in FIGS. 2-4. Upper and lower members 38, 40 of the frame include an upper track 42 and a lower track 44, respectively, as shown in FIG. 2. As shown in FIG. 1i, a pair of sliding doors 46 are preferably provided and disposed between the tracks 42, 44. The sliding doors 46 are
10 selectively movable between an opened and a closed condition. In the opened condition, access is permitted to the article receiving space 32 as shown in FIG. 1i. The sliding doors are preferably mounted on the tracks in accordance with the teachings of commonly assigned U.S. Patent Application 60/163,572, filed November 5, 1999, herein incorporated by reference in full.

15 Preferably, along with the frame 34, an extruded aluminum hanger bar 48 is disposed horizontally, below the shelf 30. The hanger bar 48 may be connected between the side walls 12 or alternatively connected to the forward portions of shelf 30. This hanger bar 48 beneficially provides additional structural strength, while at the same time providing convenient storage for hanger supported articles.

20 While the present invention may encompass a variety of embodiments, some aspects are preferably the same. For example, side walls 12 are preferably unitary, 7.5-8.5mm thick chipboard panels in each embodiment, while the back wall 14 is preferably hinged along a vertically extending hinge in each embodiment.

The frame 34 is also preferably made from extruded aluminum, steel or PVC. As best
25 seen in FIG. 2-4, upright side frame members 36 receive the side walls 12 in a compression

interference fit. The upper and lower frame members 38, 40 each have a channel 50 along a rearward edge to accept forward edges of the top wall 22 and bottom wall 26, respectively, in compression interference fit. Upper and lower frame members 38, 40 are connected to the side frame members 36 by screws 52. In the case that the frame side members are shipped
5 attached to the side walls of the wardrobe, the upper and lower frame members 38, 40 may be clip fit to the side members 36, as shown in the figure, and best seen in FIGS. 3 and 4. Clip fittings 54 are screwed into the upper and lower frame members 38, 40 and slid into slotted openings 56 in the side frame members 36. Alternately, the side frame members 36 may be directly screwed into the upper and lower frame members 38, 40, then the entire assembled
10 frame 34 may be engaged to the forward edges defining the opening 33 of the article receiving space 32.

In a first preferred embodiment, the side walls 36, the top wall 22, bottom wall 26 and shelf 30 are made from 7.5-8.5mm thick chipboard. The back wall 14 is made from 3.1-3.3mm thick hardboard. Connected panels are connected with extruded PVC hinges which
15 are preferably living hinges, as shown in FIGS. 5-8. The hinges are preferably cemented to the panels with a hot melt adhesive 62, preferably butyl based, which is applied while the hinges are being extruded.

FIGS. 5-8 show four types of hinges which are employed in the first embodiment. In FIG. 5, a first hinge 13 is shown. A pair of these hinges are used to attach the back wall 14 to
20 side walls 12 on opposite sides of the back wall 14 (see FIG. 16). The hinge 13 has two channels 64, 66. A first, relatively wide channel 64 accepts a side wall 12 therein. A second channel 66 is relatively narrow and accepts the back wall 14 therein. A flexible living hinge portion 68 integrally connects the two channels. Hot melt adhesive 62, such as a butyl based adhesive is provided within each channel 64, 66. The other hinges differ primarily in the
25 channels which are of widths and configurations, varying depending on which type of panel

the hinge is intended to engage. Preferably, each hinge includes a hot melt adhesive and is in the form of an integrally extruded PVC living hinge.

In FIG. 6, the hinge 18 is shown which hinges the panel members 18 forming the back wall 14 to one another. Each channel 74 of the second type of hinge is the same width to
5 accept back panel members 16, as can be appreciated from FIGS. 1b and 1c. FIG. 7 shows a third hinge 76, a pair of which joins the bottom of the back wall 14 to the rear of the bottom wall 26. A first channel 78 of each hinge 76 engages the rear of an associated bottom panel member 28 while a second channel 80 engages the bottom of an associated back panel member 16 of the back wall 14. FIG. 8 shows a fourth hinge 82, a pair of which is used to
10 joins the shelf 30 to the back wall 14. Particularly, each hinge 82 connects the rear of a shelf panel 20 with an associated back panel member 16. The fourth hinge 82 makes use of three channels 84, 86. For each hinge 82, two of the channels 84 engage upper and lower portions 87, 89 of an associated one of the back panel members 16 and are preferably not hinged (substantially rigid) with respect to one another. The third channel 86 engages the associated
15 shelf panel member 20 and contains a flexible living hinge portion 68. Thus, it can be appreciated that each of the back panel members 16 are split horizontally into a portion 87 disposed above the shelf 30 and a portion 89 disposed below the shelf 30, each portion engaging a channel 84 to provide a substantially planar back wall 14. The fifth hinge is best understood as a 180° rotation of the hinge shown in FIG. 7. A pair of these hinges is used to
20 connect the back wall 14 to the top wall 22. A first channel 78 of each hinge 76 engages the rear of a top panel member 24 while a second channel 80 engages the top of an associated back panel member 16 of the back wall 14.

A second embodiment of the foldable wardrobe makes use of extruded plastic for the top wall 22, back wall 14, bottom wall 26 and shelf 30. In this embodiment, the back wall 14
25 is a one piece extrusion, preferably made from PVC or polypropylene, and has an adjoining

living hinge 18 integrally formed therein along its vertical midline dividing it into two back panel members 16, as shown in FIG. 9. The living hinge 18 is a thinned linear portion of the plastic material (PVC) formed during the extrusion process. Additionally, opposite sides of the back wall 14 have integrally formed channels 88, also formed during the extrusion process. Channels 88 are constructed to engage the side walls 12. The channels 88 are integrally formed with and joined to the back wall 14 by thinned linear portions forming living hinges 68. The channels 88, back wall 14 and living hinges 68 are all being integrally formed by the extrusion process.

In the second embodiment, all other components are preferably essentially the same as in the first embodiment.

A third embodiment makes use of injection molded parts, preferably PVC, though other suitable plastic materials may be used, for the shelf 30, top wall 22, back wall 14 and bottom wall 26. In this embodiment, the back wall 26 does not make use of a living hinge to connect the two back panel members 94 and 94'. Instead, as shown in FIGs 10, 11, and 12, a series of integrally molded C-shaped channels 90 and pins 92 make up the hinge 93 connecting the back panel members to one another. FIG. 10 best shows the overall arrangement, while FIGS. 11 and 12 best show the detail of the construction of the hinges. A first back panel member 94 has alternating channels 90 and pins 92. A second back panel member 94' has the opposite alternating channel and pin arrangement. The panel members 94 and 94' are formed identically with one another, which allows the two back panel members 94 and 94' to be produced from a single mold. One of the panels is rotated so that it is inverted with respect to the other panel so that the channels 90 and pins 92 may properly engage each other. Though FIG. 10 shows only a portion of the back panels 94 and 94' connected by a hinge 93, preferably the entire length of the connection is hinged. FIG. 10 additionally shows cuts or slots 95 into which components such as the top panel members, shelf members and

bottom panel members can be inserted. Cuts or slots 95 may further be T-shaped slots 102 as described below. Further, channels 88 for engaging side walls 12 and living hinges 68 are integrally molded with back panels 94 and 94' to complete the back wall 14. As can be seen in FIGS. 11 and 12, strengthening ribs are preferably molded into the back panel members 94,
5 94'.

FIG. 13 is an isometric view of the injection molded back wall panels 94, 94', together with two identical injection molded top panel members 24, each foldably hinged with the upper end of an associated one of the back panels 94, 94'. Also shown are two identical injection molded shelf panel members 20, each foldably hinged with respect to an associated
10 one of the back panels 94, 94'. Also shown are two identical injection molded bottom panel members 28, each foldably hinged with respect to an associated one of the back panels 94, 94'.

As can be appreciated from FIG. 13, the folding wardrobe's compact transporting condition is achieved by folding back faces of the back panel members 94, 94' toward each
15 other. Top panel members 24 and shelf panel members 20 fold down against front faces of the back panel members 94, 94' and bottom panel members 28 fold up against the front faces of the back panel members 94, 94'. The side panels (not shown) would then be folded over in covering relation on the top panels 24, shelf panels 20, and bottom panels 28. In the third embodiment illustrated in FIGs 10-13, living hinges can be optionally integrally molded to
20 the top and bottom of the back panel portions 94, 94' to connect the top panels 24 and bottom panels 28. Alternately, living hinges such as those illustrated in FIGS. 5 and 7 can be used. In the broadest aspects of the invention, any conventional hinge (e.g., metal with fasteners) may be used.

Though the back wall 14 has been generally discussed as having a single hinge
25 disposed along its vertical midline, it may alternately have three back panel members, as

shown in FIG. 14. A three part back wall 14 is preferably made up of two panel members 94, 94' as discussed above. Between the two panel members 94, 94' is interposed a third panel member 97 which is of a different construction. The third panel member 97 has hinge engaging pins 92 and C-shaped channels 90 (not visible in FIG. 14) to engage the similar structures of 94 and 94' on each side. Alternately, a four panel back wall construction, not shown, using two identical panel members 94, 94' spaced apart and joined by two identical panel members 97 may be simply constructed. A first panel member 94 is connected to a second panel member 97 along one edge. The opposite edge of the second panel member 97 is connected to an edge of a third panel member 97. Finally, the opposite edge of the third panel member 97 is connected to an edge of a fourth panel member 94'. The three panel or four panel back wall 14, also has channels 88 and thinned linear portions forming living hinges 68, preferably integrally formed with the back panels 94, 94' during the injection molding process.

As shown in FIG. 15, an injection molded top panel member 24 may have additional detail such as an opening 98 through which a light, for example, may be placed. Stiffening ribs 99 may also be provided. As best seen in FIG. 17, the injection molded top panel member has a thinned linear portion forming a living hinge 68 and a channel 88 along the edge which engages the back wall 14. The living hinge 68 allows the top panel member 24 to fold down into the compact transporting condition.

A second, preferred, method of attaching an injection molded top panel member 24, best seen in FIG. 18, is to provide a T-shaped protrusion 100 along the back edge of the top panel member 24 which has a thinned linear portion forming a living hinge 68 at the base of the T. The back panel members 16, or preferably the injection molded back panel members 94, 94' are provided with a T-shaped slot 102. The T-shaped protrusion 100 of the top panel members 24 engages the T-shaped slot 102. The living hinge 68 at the base of the T-shaped

protrusion 100 allows the top panel member 24 to fold downwards into the transporting condition in overlying relation to the back panel. Though the illustrated application of the T-shaped protrusion 100 is to attach a top panel member 24 to the top of the back panel member 94 or 94', the same construction preferably serves to attach the bottom panel members 28 and shelf members 20 to the back panel members 94 or 94' to permit the bottom panel members 28 to fold upwards in overlying relation to the back panel.

A preferred folding arrangement for the wardrobe allows all of the panels to fold into an area within the periphery of the side walls, as seen in FIGS. 1a and 19a. This generally means that the top panel member 24 is slightly narrower than the back panel member to which it is attached. Thus, when the wardrobe is assembled, a gap will exist between a side edge of the top panel member 24 and the nearest side wall 12. Because it is preferable to eliminate such gaps, a flange 104 is provided along the side edge of the top panel member 24, as best seen in FIG. 16. The flange 104 is an integrally molded part of the top panel member 24 and is thin enough to be somewhat flexible. The flange 104 is biased outward so that it curves away from the top panel member 24, sealing any gap between the top panel member 24 and the side wall 12. When the top panel member 24 is folded downwardly into its compact transporting condition, the flange 104 is flexible enough to allow it to be pushed inwardly, so that the wardrobe may fold completely. Though not separately illustrated, bottom panel members 28 may likewise benefit from the use of a flange 104 along their side edges.

FIGS. 19a-g show a two part, three panel wardrobe 200 according to another embodiment of the present invention. A first part 202 is made up of two back panel members 16, a side wall 12, two top panel members 24 and a bottom panel member 28, along with a divider wall member 204. Each back panel member 16 has adjoining sides that are hingedly connected to the other by an intermediate adjoining hinge. Each top panel member 24 is

hingedly connected along a back edge thereof to the top of an associated back panel member 16. Each bottom panel member 28 is hingedly connected along a back edge thereof to the bottom of an associated back panel member 16. The side wall 12 is hingedly connected along a back edge thereof to the side of an associated back panel member 16. The divider wall 204
5 is hingedly connected along a back edge thereof to the side of the back panel member 16 which is not connected to the side wall 12.

A second part 206 is made up of a back panel member 16, a side wall 12, a top panel member 24 and a bottom panel member 28. The side wall 12 is hingedly connected along a back edge thereof to a side of the back panel member 16. The top panel member 24 is
10 hingedly connected along a back edge thereof to the top edge of the back panel member 16, while the bottom panel member 28 is hingedly connected along a back edge thereof to the bottom edge of the back panel member 16. The hinges in this embodiment are preferably living hinges such as those illustrated in FIGS. 5-8 and discussed above.

As seen in FIG. 19a, each part 202, 206 may be separately folded flat. As seen in
15 FIGS. 19b-19d, the back panel members 16 of each part 202, 206 are extended towards each other to form a back wall 14, while bottom panel members 28 are unfolded down to form a bottom wall 26. Top panel members 24 are unfolded up and over the back panel members 16. The divider wall member 204 is disposed parallel to the side walls 12 and perpendicular to the back wall 14 such that it divides the article receiving space 32. The side panels have
20 upright side frame members 36 mounted along a front edge. Upper and lower frame members 38, 40 are attached to the upright side frame members and to the top and bottom panel members, as shown in FIG. 19e. A hanger bar 48 is mounted within the article receiving space along with a shelf 208.

FIGS. 20-21 show a fourth embodiment of a foldable wardrobe unit according to the
25 present invention. As can be seen in FIG. 20, this embodiment has a back wall 14 which is

three panel members 16 wide. The top panel members 24 and bottom panel members 28 are longer (wider) than the width of back panels 16, so that the two bottom panel members 28 and the two top panels 24 are as wide as the width of three back panels 16. As shown in FIG. 21, two of the back panel members 16 are hingedly connected directly to the side walls 12.

5 One of the back panel members 16 which is connected to a side wall 12 is hingedly connected to one side of the third back panel member, forming a connected pair. The third (central) back panel member is then connected to the other back panel member connected to the other side wall 12. As can be seen in FIG. 21, the back panel members 16 fold outward toward the side walls 12, and the connected pair folds in half such that a first member of the pair is
10 directly adjacent to the side wall 12, while the second member of the pair is directly adjacent to first member. That is, the panels fold accordion style, such that the first back panel member 16 lies flat against the side wall 12 and the second back panel member 16 lies flat against the first, forming a three layer sandwich.

FIGS. 22-23 show a fifth embodiment of a foldable wardrobe unit according to the
15 present invention. In this embodiment, the top and bottom panel members 24, 28 are yet longer than those of the fourth embodiment, and each is equal in width to the width of two back panel members 16. Just as with the three panel unit, two back panel members 16 are hingedly attached to the side walls 12. Each of the outer back panel members 16 has a central back panel member 16 hingedly attached thereto. In folding the unit, each side folds just as
20 the two panel member side of the three panel unit folded. That is, each side folds accordion-style, with the central panel members folding onto the outer panel members and the outer panel members folding to lie flush against the side walls 12, forming a three layer assembly.

FIGS. 24-33 show a sixth embodiment of a foldable wardrobe according to the present invention. In this series of FIGS., an alternate connection and folding arrangement is shown.
25 In its collapsed form, the wardrobe container 240 consists of five separate parts, as shown in

FIG. 24. The side walls 12, upright side members 36 of the frame; and top, bottom and back panel members (not visible in FIG. 24) are all interconnected and folded up to form a single flat main unit, generally indicated at 242. The top and bottom frame members 38, 40, hanger bar 48 and shelf 30 are provided as separate pieces.

5 To assemble the wardrobe container according to the sixth embodiment, referring now to FIG. 25, the two side walls 12 of the main unit 242 are separated from each other, pulling the top panel members 24 and bottom panel members 28 into position. As may be seen, the bottom panel members 28 are each hingedly connected to one of the side walls 12 and are additionally connected to each other by a hinge 280. Similarly, the top panel members 24 are
10 each hingedly connected to one of the side walls 12 and are additionally hingedly connected to each other by a hinge 280. FIG. 26 shows a further extension of the top and bottom panel members 24, 28 as the side walls 12 move further apart.

In FIG. 27, the two back panel members 16 are folded away from the side walls and towards one another. The top and bottom panels 24, 28 are fully extended and the top panels
15 together form a top wall 22, while the bottom panels together form a bottom wall 26.

Mounted on each of the side walls 12 is a bracket 244 which supports the shelf member 30 and the hanger bar 48. Details of the bracket are discussed below.

FIG. 28 shows the mounting of the upper and lower frame members 38, 40 to the top and side walls 22, 12 and the bottom and side walls 26, 12 respectively. The frame in this
20 embodiment is mounted as discussed with respect to FIGS. 2-4, above. In FIG. 29, the frame and all of the walls are in place and the shelf 30 and hanger bar 48 are installed, supported by the brackets 244, completing the article receiving space 32 as shown in FIG. 30. The hanger bar 48 preferably has ends which engage tabs 324 which are best seen in FIG. 39b. Shelf 30 is supported by the horizontal supporting portion of the brackets 244 in any appropriate
25 manner.

To finish the wardrobe, a pair of sliding doors 46 are mounted into the tracks in the upper and lower frame members 38, 40, as discussed above with respect to FIG. 1 in general, and FIG. 1i in particular. FIG. 31 shows the mounting of one sliding door 46, and FIG. 32 shows both sliding doors 46 in place within their respective tracks in an open condition.

5 Finally, FIG. 33 shows the doors in the closed condition.

For connecting the panel members of a wardrobe according to the sixth embodiment, a variety of hinges and connectors are preferably used and are shown in FIG. 34a-e. As with the hinges shown in FIGS. 5-8, these hinges may employ a hot melt adhesive to bond the panels within the channels, however, the hot melt adhesive is not shown in FIGS. 34a-e. The
10 hinges are preferably made from a rigid PVC and the living hinge portions are preferably made from a flexible PVC or HYTREL®, a flexible polyester available from DuPont. The two-plastic hinges are preferably produced by a co-extrusion process.

In FIG. 34a, a hinge 250 for connecting a side wall to a back panel member is shown in cross-section. The hinge has a first channel 252 adapted to accept a back edge of a side
15 wall 12. This channel is preferably colored along a portion 254 of the outer edge so as to blend in with the side wall 12. A second channel 256 is adapted to accept a side edge of a back wall. A living hinge 258 is provided, connecting the two channels 252, 256.

FIG. 34b shows a hinge 260 adapted to connect two hinged back panel members such as each pair of a four panel back wall 14 as shown in FIG. 23 or the pair of a three panel back
20 as shown in FIG. 21. The two channels 262 are of the same width, to accept adjoining side edges of the two back panel members 16. For joining side edges of the two back panel members 16 of a two panel back wall, the two pairs of back panel members 16 in a four panel back wall, or for joining the pair of panels to the single back panel member 16 in a three panel back wall, FIG. 34c shows a back to back joiner 270. As with the hinge of FIG. 34b ,
25 the back to back joiner has two channels 272 of equal width. However, the back to back

joiner does not have a living hinge at the midpoint. In order to allow the back panel members 16 to be joined by the back to back joiner 270, it has one channel which is curved so that the panel members' side edges may be inserted into the channels 272.

As shown in FIG. 34d, a top to top hinge 280 has wider channels 282 than the back to back hinge so that it can accept side edges of the wider top panels. Additionally, protrusions 284 are provided to align the bottom edge of a partition 204, as shown in FIGS. 19d-f. The bottom panel members 28 are connected by a bottom to bottom hinge which is essentially the same as the top to top hinge 280, including protrusions to align the top edge of the partition 204.

FIG. 34e shows a back to base joiner 290. This joiner 290 has a first channel 292 which is wide to accept a rear edge of the bottom wall 26 and a second channel 294 which is more narrow to accept the bottom edge of the back wall 14. This joiner 290 runs the length of the joint between the back and bottom walls 14, 26 and holds them in place relative to each other. As can be seen in the FIG., the back channel is not a complete channel as in the hinges 250, 260, 280 or the back to back joiner 270. Instead, a shoulder 296 serves to retain the back wall 14, while still allowing easy assembly. If the back channel 294 were a full channel, it could be difficult to insert the back wall 14 into the channel 294 without bending of either the back wall 14 or the joiner 290.

Though the hinges shown in FIGS. 34a-e are described as being used in the wardrobe according to the sixth embodiment, they may be used in any embodiment of the present invention, where appropriate.

The right side panel end cap 300 (See FIG. 33) is shown in FIGS. 35-38. The left side panel end cap differs from the right in that it is essentially a mirror image, the parts and functions, however are the same. In FIG. 35, the end cap 300 is viewed from the top. In FIG. 36, the end cap 300 is viewed from underneath, that is, the channels 302, 304 are open

upward, perpendicular to the page. The end cap 300 is preferably a strong, relatively stiff plastic material such as polypropylene, but may be made from any appropriate material. One channel 302 extends most of the length of the end cap 300 and is adapted to accept the side wall 12. The other channel 304 is somewhat shorter and accepts one edge of a top panel member 24. Provided at the edge of the top panel channel 304 is a living hinge 306 which allows the top panel member to fold against the side wall. This can be best seen in FIG. 36a, a cross section taken on the line X-X in FIG. 36. The arrow in FIG. 36a indicates the direction of rotation of the channel 304 as the top panel member 24 is being unfolded into its position, perpendicular to the side wall 12. At the back of the end cap 300, a curved tab 308 is provided, as best seen in FIGS. 37a and 37b. The curved tab 308 acts as a leaf spring and provides an inward force and engages the top edge of the side wall 12, helping the end cap to remain situated atop the side wall 12.

As may be seen in FIGS. 35, 36 and 38, at the front of the end cap 300, a frame engaging structure 310 is provided and has an opening 312 to accept the top of the upright side frame member. Further, two recesses 314, which form ends of the two sliding door tracks, are provided along the inner side wall of the frame engaging structure 310.

The bracket 244 is preferably a molded polypropylene piece and is shown in half plan view in FIGS. 39a-b. FIG. 39c is a cross section along the line Y-Y in FIG. 39b. A pair of openings 320 accept a fastener to attach the bracket 244 to a side wall 12. A recess 322 has a pair of tabs 324 which connect to the end of the hanger bar 48 and provide an outward spring force to retain the hanger bar 48.

It will be appreciated that the above descriptions are intended only to serve as examples, and that many other embodiments are possible within the spirit and the scope of the present invention.

WHAT IS CLAIMED IS:

1. A foldable wardrobe unit being convertible between a deployed condition enabling storage of articles therein and a compact transporting condition facilitating transport of said wardrobe unit, comprising:

5 a back wall comprising a plurality of back panel members, adjacent ones of said panel members being connected to one another by an adjoining hinge that enables said panel members to be folded relative to one another to assume said compact transporting condition and unfolded to assume said deployed condition;

side walls connected to opposite sides of said back wall by adjoining hinges that
10 enable said side walls to be folded relative to said back wall to assume said compact transporting condition, and to be unfolded to assume said deployed condition;

a top wall comprising a plurality of top panel members, each of said top panel members connected to said back wall by an adjoining hinge that enables said top wall to be folded relative to said back wall to assume said compact transporting condition and to be
15 unfolded to assume said deployed condition;

a bottom wall comprising a plurality of bottom panel members, each of said bottom panel members connected to said back wall by an adjoining hinge that enables said bottom wall to be folded relative to said back wall to assume said compact transporting condition and to be unfolded to assume said deployed condition;

20 a shelf comprising a plurality of shelf panel members connected to said back wall by adjoining hinges that enable said shelf panel members to be folded relative to said back wall to assume said compact transporting condition and to be unfolded to assume said deployed condition;

said back wall, said side walls, said top wall, and said bottom wall cooperating to
25 define an article receiving space when in said deployed condition;

said top wall, said side walls and said bottom walls providing a forward edge defining an opening to said article receiving space;

a frame structure constructed and arranged to be disposed at the forward edge and adding structural stability to said wardrobe unit in said deployed condition, said frame structure including upper and lower tracks; and

a plurality of sliding doors constructed and arranged to be disposed between said upper and lower tracks and being selectively movable when said wardrobe unit is in said deployed condition between a closed condition wherein said doors close said article receiving space and an opened condition wherein said doors permit access to said article receiving space.

2. A foldable wardrobe unit according to claim 1, wherein said side walls are made from a chipboard material.

3. A foldable wardrobe unit according to claim 2, wherein said back panel members are made from a hardboard material.

4. A foldable wardrobe unit according to claim 3, wherein said top wall, said bottom wall, and said shelf are formed from a chipboard material.

5. A foldable wardrobe unit according to claim 4, wherein each of said hinges comprises an extruded plastic material formed into a living hinge.

6. A foldable wardrobe unit according to claim 5, wherein said living hinges are connected to associated walls by an adhesive material.

7. A foldable wardrobe unit according to claim 6, wherein said extruded living hinges each comprise a pair of channels constructed and arranged to receive end portions of adjacent walls.

5

8. A foldable wardrobe unit according to claim 5, wherein said plastic material comprises PVC.

9. A foldable wardrobe unit according to claim 7, wherein said adhesive is applied within said channels as said plastic material is extruded to form said living hinges.

10

10. A foldable wardrobe unit according to claim 4, wherein said hardboard back wall is about between 3.1-3.3 mm thick, and wherein said chipboard side, top and bottom walls are about between 7.5 -8.5 mm thick.

15

11. A foldable wardrobe unit according to claim 1, wherein said frame structure is formed from extruded aluminum.

12. A foldable wardrobe unit according to claim 11, wherein said frame structure includes side frame members having channels that receive front edges of said side walls.

20

13. A foldable wardrobe unit according to claim 12, wherein said side frame members are connected to said side walls by an interference fit connection of said front edges within said channels.

25

14. A wardrobe unit according to claim 13, wherein said upper track is secured to said top panel and has opposite end portions thereof connected to upper ends of said side frame members.

5 15. A wardrobe unit according to claim 14, wherein said upper track has a channel formed therein that receives a forward edge of said top panel in an interference fit relation.

16. A wardrobe unit according to claim 14, wherein said lower track is secured to said bottom panel and has opposite end portions thereof connected to lower ends of said side
10 frame members.

17. A wardrobe unit according to claim 16, wherein said lower track has a channel formed therein that receives a forward edge of said top panel in an interference fit relation.

15 18. A wardrobe unite according to claim 2, wherein said back wall is formed as a one piece extrusion including said back panel members and said adjoining hinge connecting said back panel members to one another, said adjoining hinge connecting said back panel members being in the form of a living hinge.

20 19. A wardrobe unit according to claim 18, wherein said adjoining hinges connecting said opposite sides of said back wall to said side walls comprises side living hinges extruded integrally with said back wall.

20. A wardrobe unit according to claim 19, wherein each of said side living hinges
25 comprises a channel constructed and arranged to receive near edge portions of said side walls,

further comprising an adhesive adhering said rear edge portions of said side walls within said channels.

21. A wardrobe unit according to claim 19, wherein said top wall, said bottom
5 wall, and said shelf are made from an extruded plastic material.

22. A wardrobe unit according to claim 21, wherein said top wall panel members
and said adjoining hinge therebetween are extruded as an integral structure, said adjoining
hinge therebetween being a living hinge.

10

23. A wardrobe unit according to claim 22, wherein each of said plurality of back
panel members, said plurality of top panel members, said plurality of bottom panel members,
and said shelf panel members are injection molded.

15

24. A wardrobe unit according to claim 23, comprising hinge connecting portions
integrally molded with rearward portions of said top panel members, said shelf panel
members, and said bottom panel members to enable connections thereof in pivotal relation on
said back wall.

20

25. A wardrobe unit according to claim 23, wherein one of said back panel
members comprises pin members and another of said back panel comprises a C-shaped
channel clips constructed and arranged to receive said pin members in a snap-fit relation, said
pin members and said channel clips constituting said adjoining hinge connecting said back
panel members to one another.

25

26. A wardrobe unit according to claim 24, wherein said back wall comprises a plurality of openings constructed and arranged to receive said hinge connecting portions of said top panel members, said shelf panel members, and said bottom panel members.

5 27. A foldable wardrobe unit, comprising:

a back wall;

a pair of side walls;

a bottom wall;

a top wall;

10 a plurality of hinges interconnecting said back wall, said side walls, said bottom wall and said top wall in a manner that enables said walls to be folded into a substantially flat, overlapping condition that facilitates transport thereof, and that enables said walls to be unfolded into a deployed condition defining a container having an article receiving space enabling storage of articles therein, said container having a peripheral edge portion defining
15 an opening into said space;

a frame structure mounted on said edge portion including an upper track and a lower track; and

a plurality of sliding doors constructed and arranged to be disposed between said upper and lower tracks and being selectively movable when said walls are in said unfolded
20 deployed condition between a closed condition wherein said doors close said article receiving space and an opened condition wherein said doors permit access to said article receiving space.

28. A foldable wardrobe unit according to claim 27, wherein said frame structure
25 includes vertical side frame members mounted on front edge portions of said side walls.

29. A foldable wardrobe unit according to claim 27, wherein:

said back wall comprises a plurality of back panel members, two of said back panel members each connected along one side edge to a rear edge of said side walls by an adjoining hinge that enables said back panel members and said side walls to be folded relative to one another to assume said compact transporting condition and unfolded to assume said deployed condition;

said top wall comprises a plurality of top panel members, a side edge of two of said top panel members connected to a respective top edge of one of said side walls by an adjoining hinge, adjacent ones of said top panel members connected to one another by an adjoining hinge, said adjoining hinge enabling said top panel members and said side walls to be folded relative to one another to assume said compact transporting condition and unfolded to assume said deployed condition; and

said bottom wall comprises a plurality of bottom panel members, a side edge of two of said bottom panel members connected to a respective top edge of one of said side walls by an adjoining hinge, adjacent ones of said bottom panel members connected to one another by an adjoining hinge, said adjoining hinge enabling said bottom panel members and said side walls to be folded relative to one another to assume said compact transporting condition and unfolded to assume said deployed condition.

30. A foldable wardrobe unit as recited in claim 27, further comprising a pair of brackets, disposed on interior sides of side walls, constructed and arranged to support at least one article supporting structure.

31. A foldable wardrobe unit as recited in claim 30, wherein the article supporting structure is selected from the group consisting of: a shelf and a hanger bar

32. A foldable wardrobe unit as recited in claim 29, wherein adjacent edges of adjacent back panel members are removably connected along said adjacent edges.

33. A foldable wardrobe unit as recited in claim 27, wherein said back wall further
5 comprises:

a first back panel member, connected along a first side edge to a rear edge of a side wall by an adjoining hinge, said adjoining hinge enabling said back panel member and said side wall to be folded relative to one another to assume said compact transporting condition and unfolded to assume said deployed condition;

10 a second back panel member, connected along a first side edge to a rear edge of a side wall, said adjoining hinge enabling said back panel member and said side wall to be folded relative to one another to assume said compact transporting condition and unfolded to assume said deployed condition;

a third back panel member, connected along a first side edge to a second side edge of
15 said first back panel member by an adjoining hinge said adjoining hinge enabling said back panel member and said side wall to be folded relative to one another to assume said compact transporting condition and unfolded to assume said deployed condition; and

a connector, releasably connecting a second side edge of said third back panel member to a second side edge of said second back panel member, said connector when released
20 allowing said back panel members to be folded to assume said compact transporting condition.

34. A foldable wardrobe unit as recited in claim 27, wherein said back wall further comprises:

a first back panel member, connected along a first side edge to a rear edge of a side wall by an adjoining hinge, said adjoining hinge enabling said back panel member and said side wall to be folded relative to one another to assume said compact transporting condition and unfolded to assume said deployed condition;

a second back panel member, connected along a first side edge to a rear edge of a side wall, said adjoining hinge enabling said back panel member and said side wall to be folded relative to one another to assume said compact transporting condition and unfolded to assume said deployed condition;

a third back panel member, connected along a first side edge to a second side edge of said first back panel member by an adjoining hinge, said adjoining hinge enabling said back panel member and said side wall to be folded relative to one another to assume said compact transporting condition and unfolded to assume said deployed condition;

a fourth back panel member, connected along a first side edge to a second side edge of said second back panel member by an adjoining hinge, said adjoining hinge enabling said back panel member and said side wall to be folded relative to one another to assume said compact transporting condition and unfolded to assume said deployed condition; and

a connector, releasably connecting a second side edge of said third back panel member to a second side edge of said fourth back panel member, said connector when released allowing said back panel members to be folded to assume said compact transporting condition.

35. A foldable wardrobe unit as recited in claim 27, wherein said pair of sidewalls are each formed from a single panel member, and wherein said back wall, said bottom wall,

and said top wall are each formed from a plurality of panel members, each of said panel member s being hingedly connected to at least one other of said panel members.

36. A method of providing a wardrobe unit which includes a back wall, a pair of
5 side walls, a bottom wall, a top wall, sliding doors, and a frame, at least some of said walls
comprising a plurality of panels, said panels and said walls being hingedly connected in a
manner that enables the walls to be folded into a substantially flat, overlapping condition that
facilitates transport thereof, and that enables said walls to be unfolded into a deployed
condition defining a container having an article receiving space, said container having a
10 peripheral edge portion defining an opening into said space, said method comprising:
- disposing said hingedly connected walls and panels in a folded overlapping condition;
 - positioning said hingedly connected and folded overlapped walls and panels thereof,
said frame, and said sliding doors in a shipping container;
 - transporting said shipping container and said walls and said panels thereof in the
15 shipping container;
 - removing said walls and said panels from said shipping container;
 - unfolding said walls and panels thereof into said deployed condition defining said
container having said peripheral edge portion defining said opening into said article receiving
space;
 - 20 mounting said frame on said peripheral edge portion defining said opening with said
walls and said panels thereof in said deployed condition, said frame including upper and
lower tracks; and
 - mounting said sliding doors between said upper and lower tracks so that said doors are
slidable on said tracks between space closing and space opening positions.

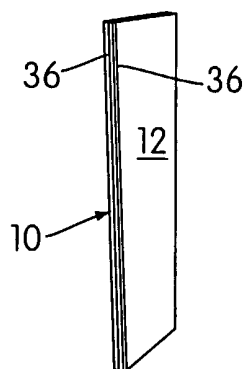


FIG. 1a

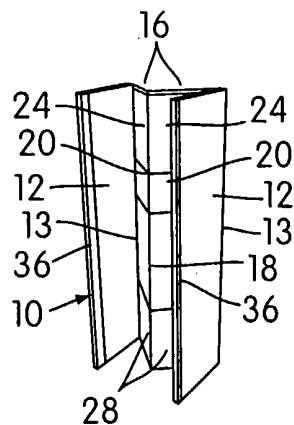


FIG. 1b

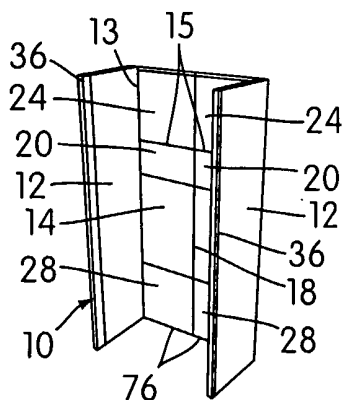


FIG. 1c

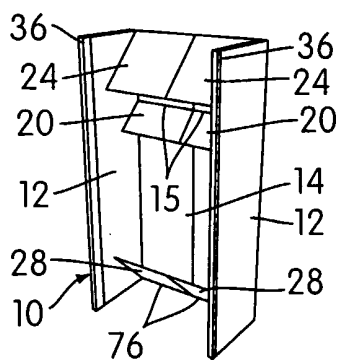


FIG. 1d

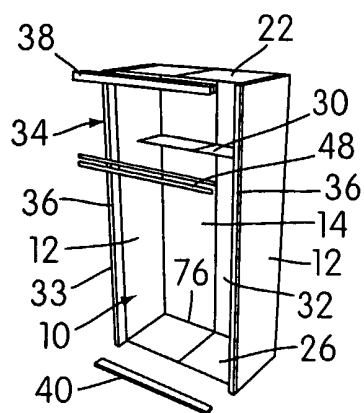


FIG. 1e

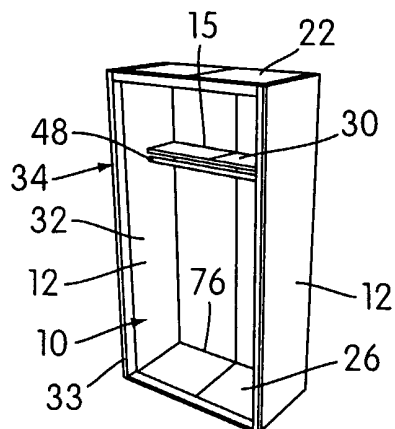


FIG. 1f

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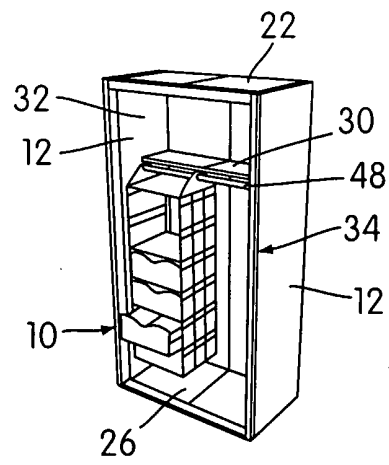


FIG. 1g

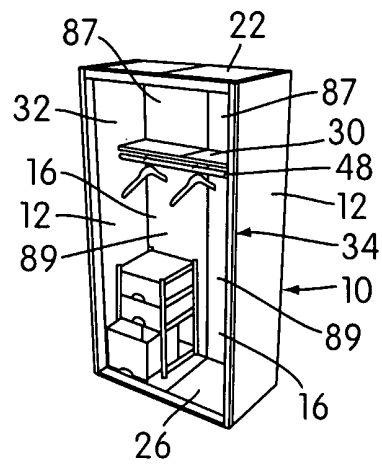


FIG. 1h

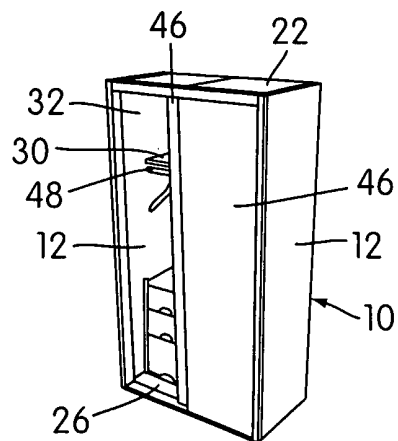


FIG. 1i

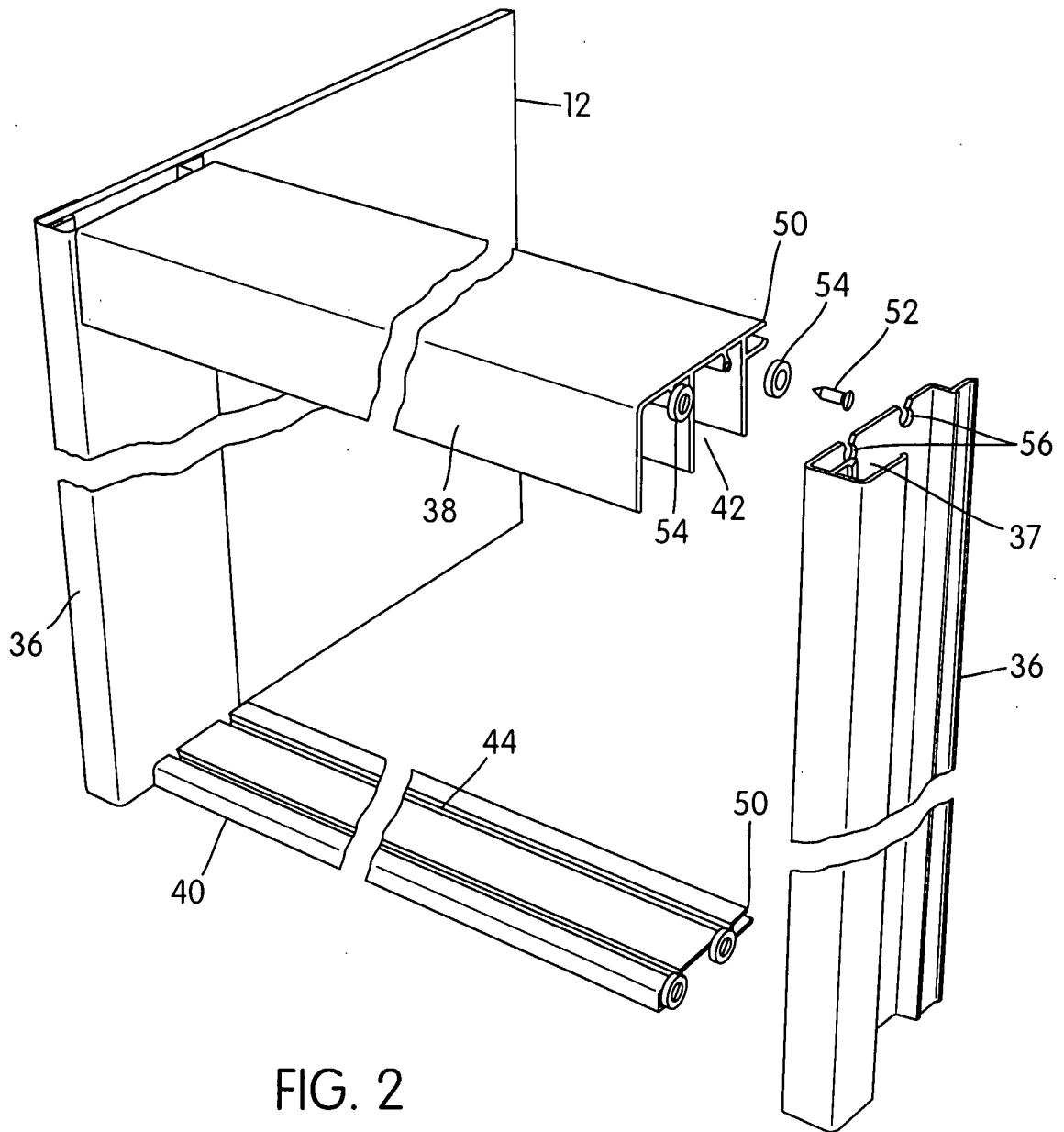


FIG. 2

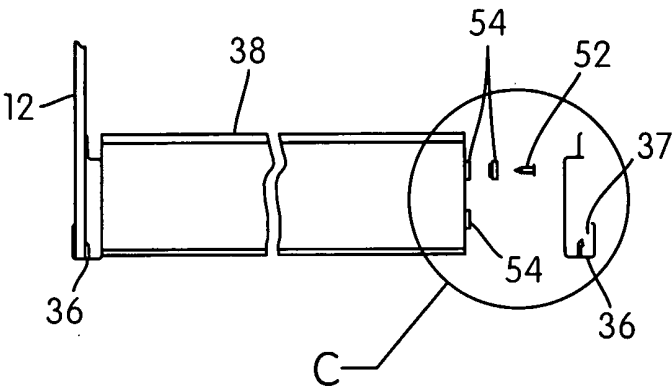


FIG. 3

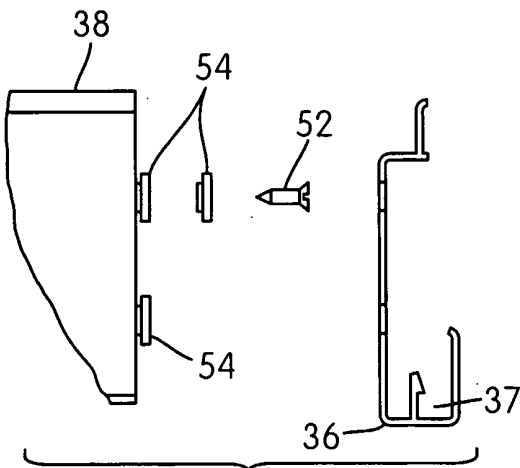


FIG. 4

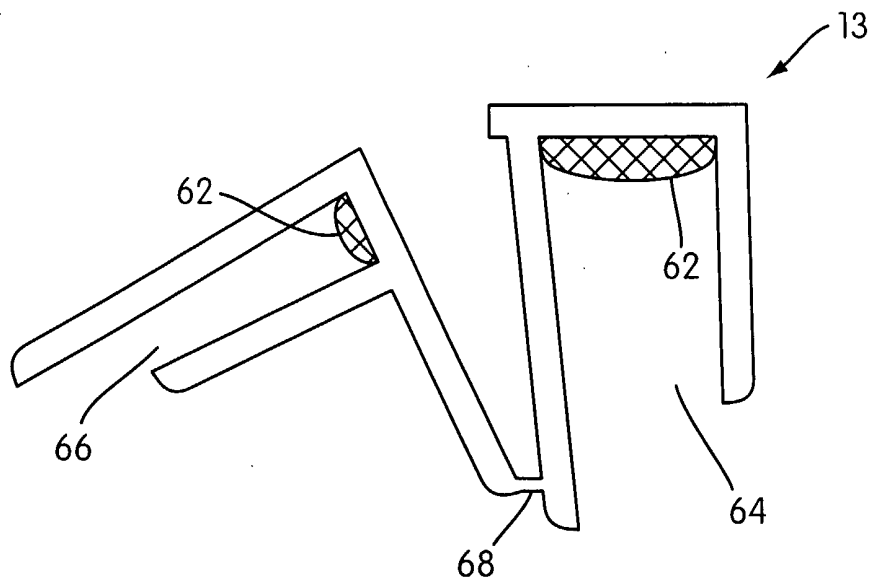


FIG. 5

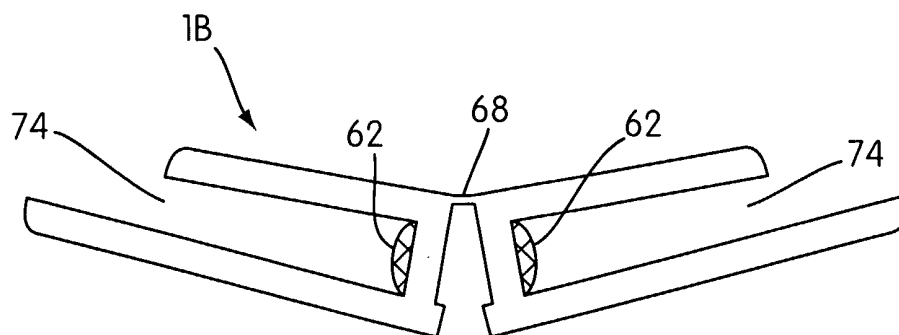


FIG. 6

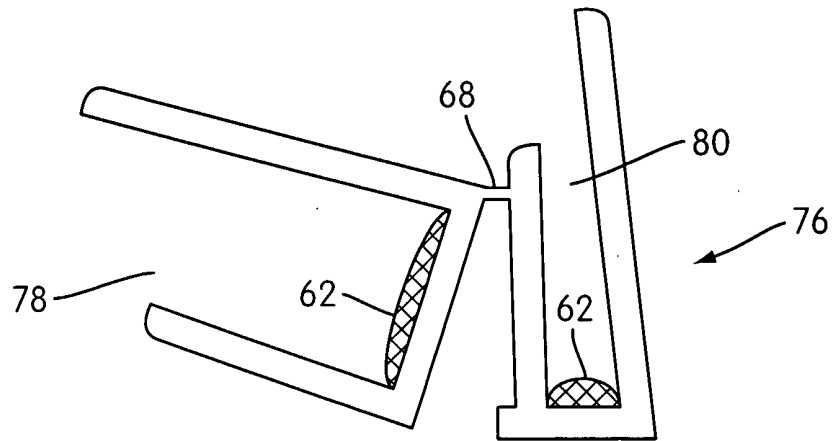


FIG. 7

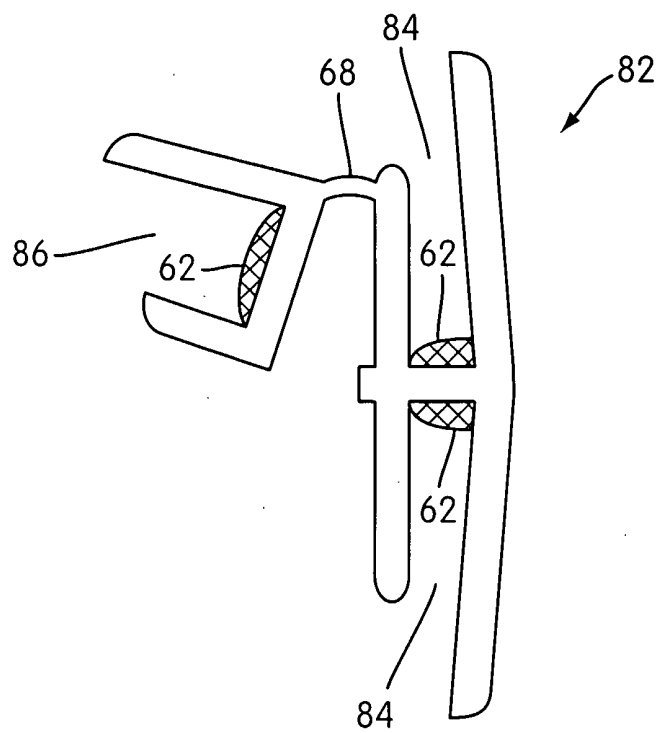


FIG. 8

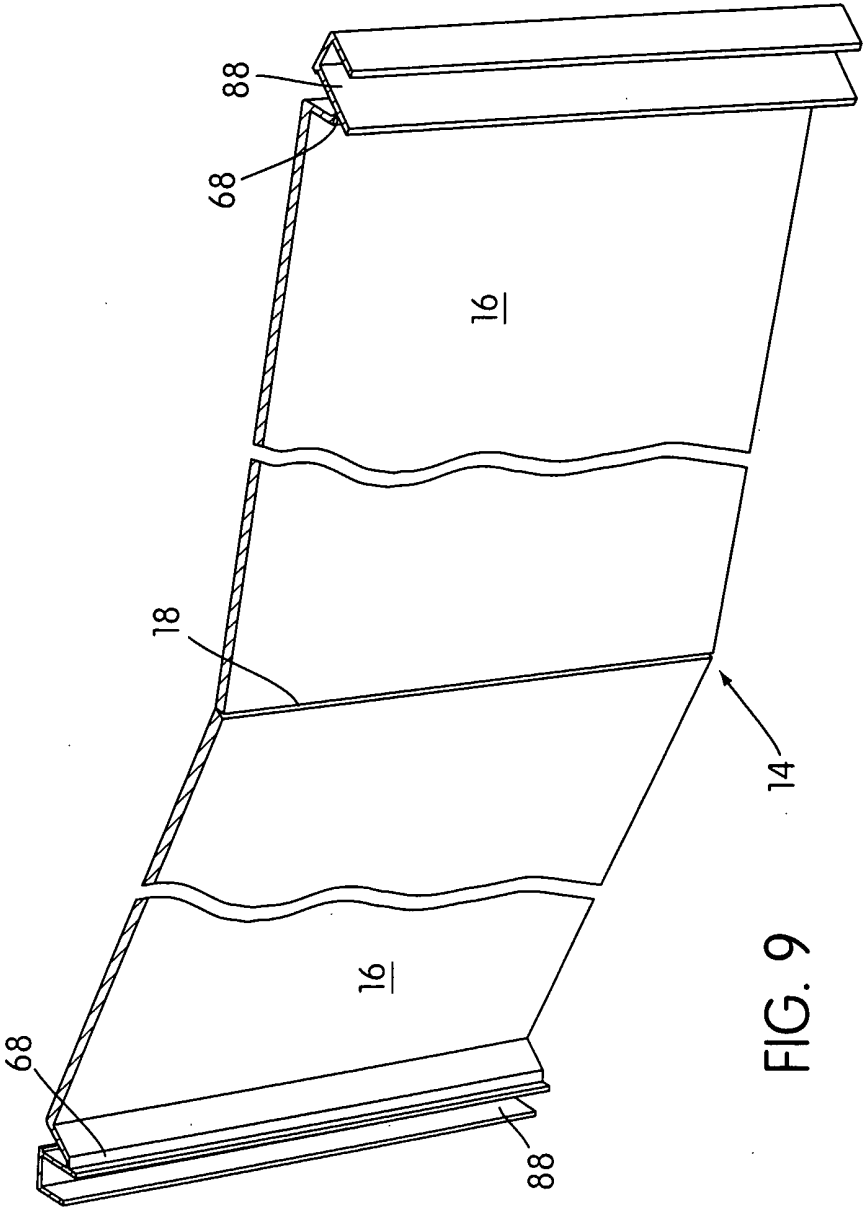


FIG. 9

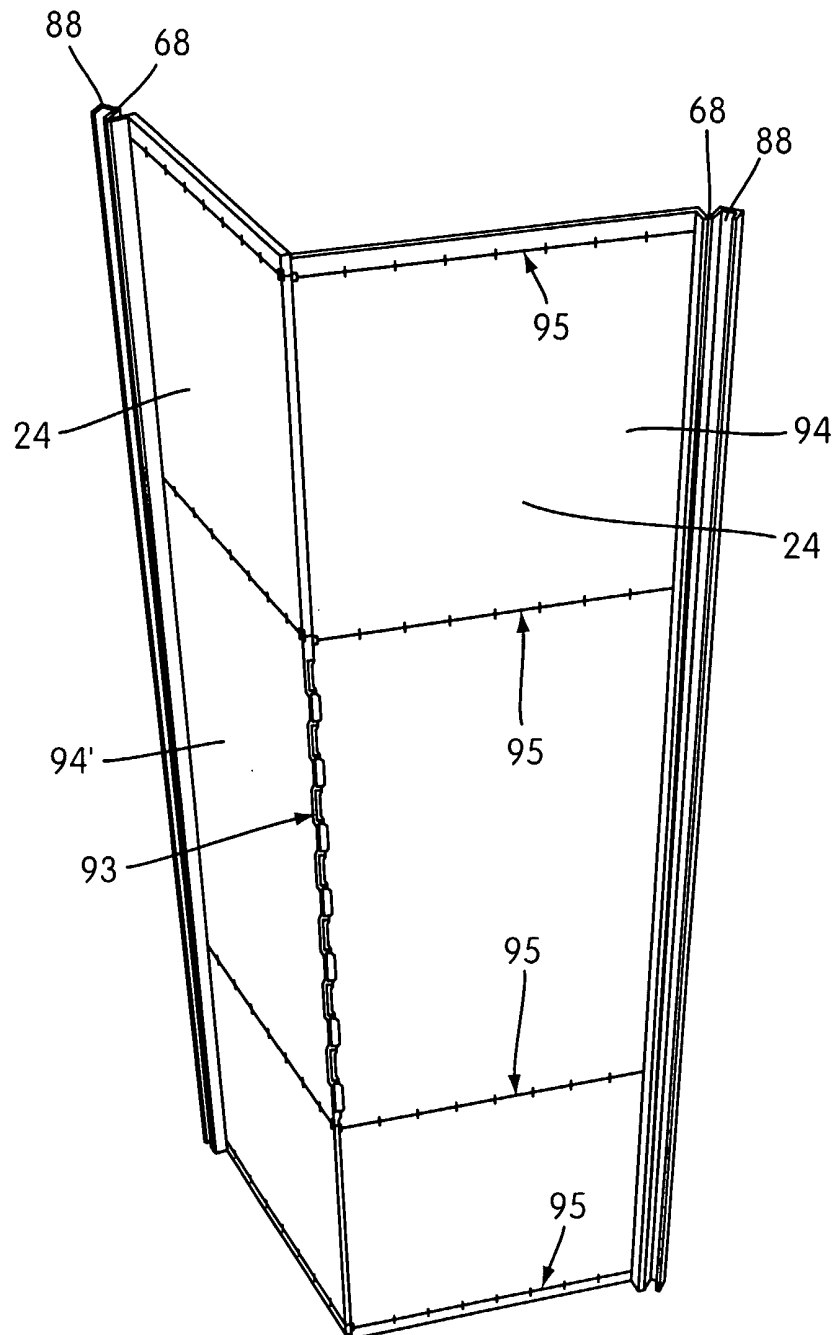
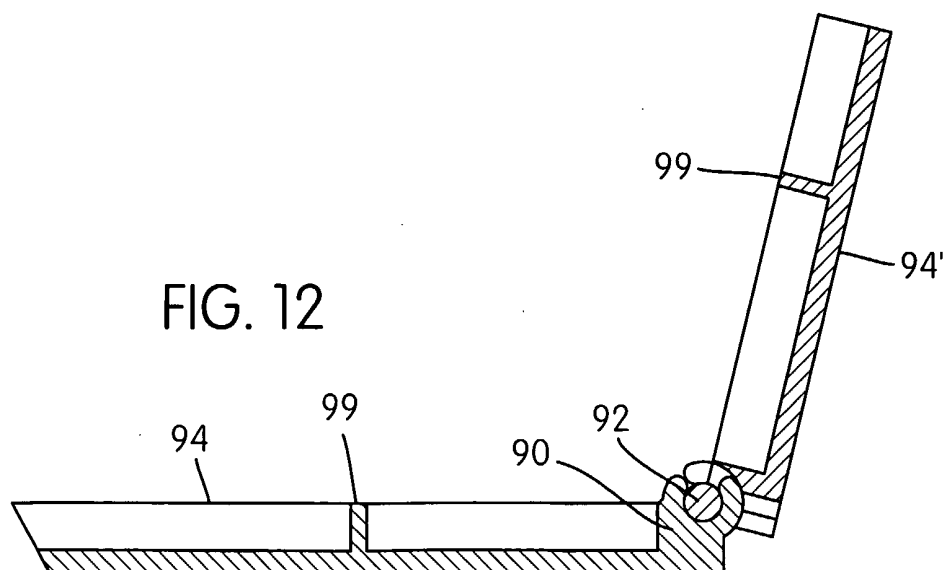
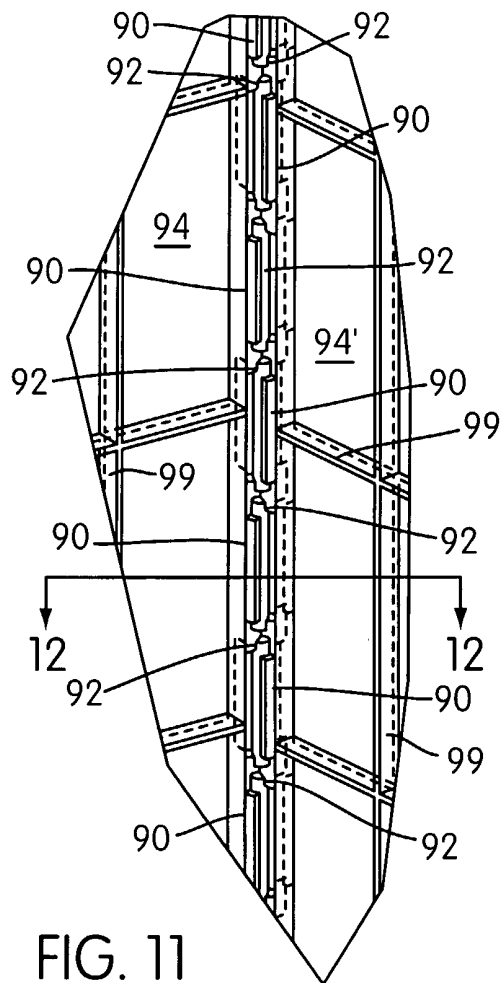
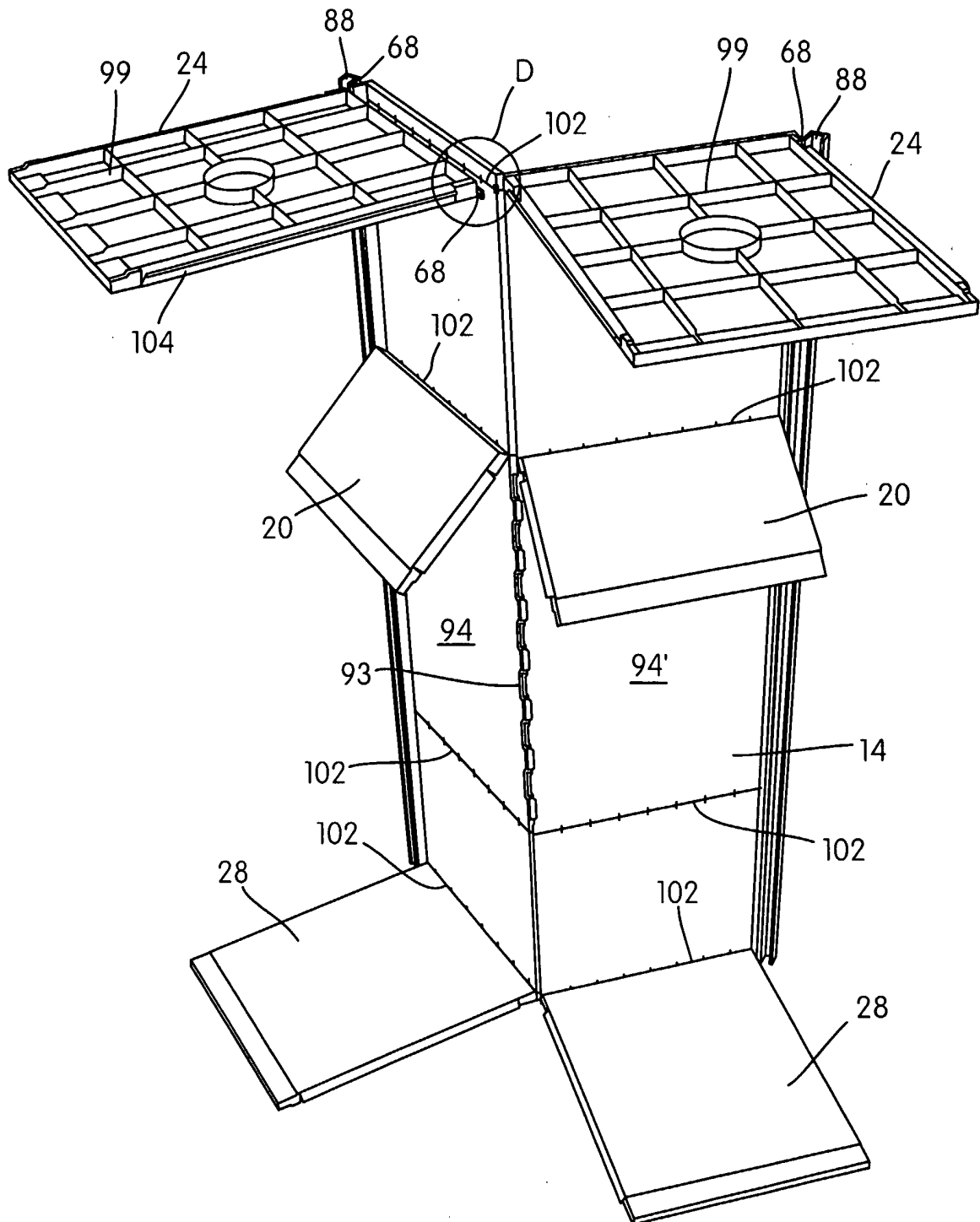


FIG. 10



10/32



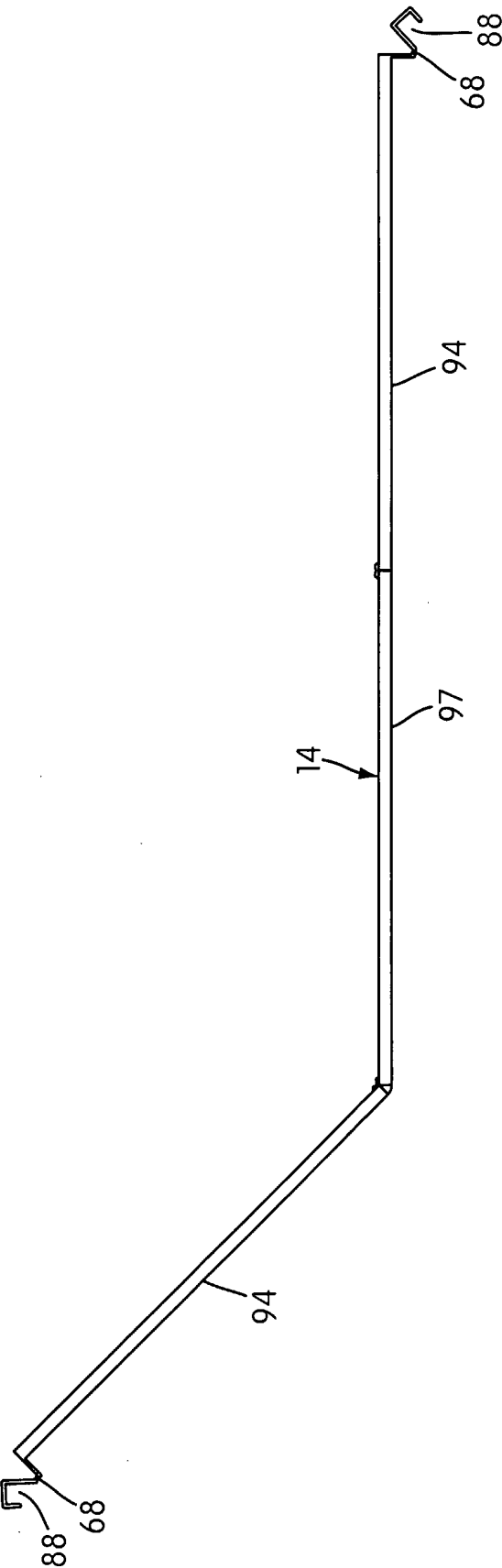


FIG. 14

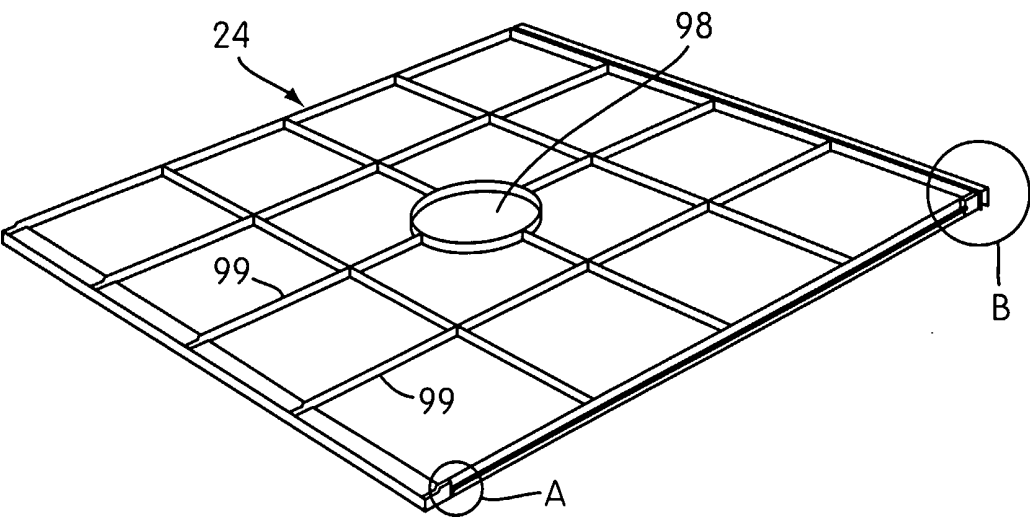


FIG. 15

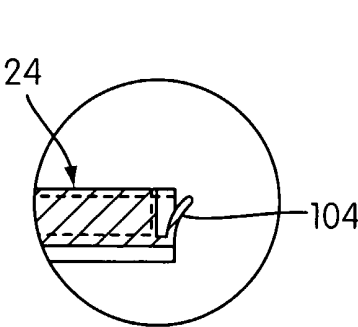


FIG. 16

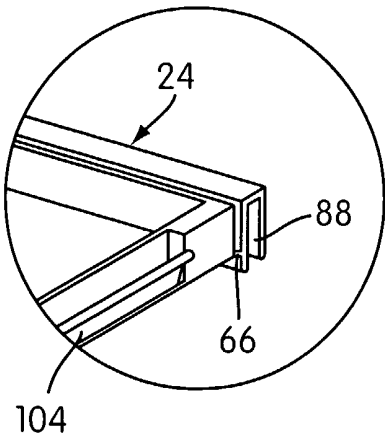


FIG. 17

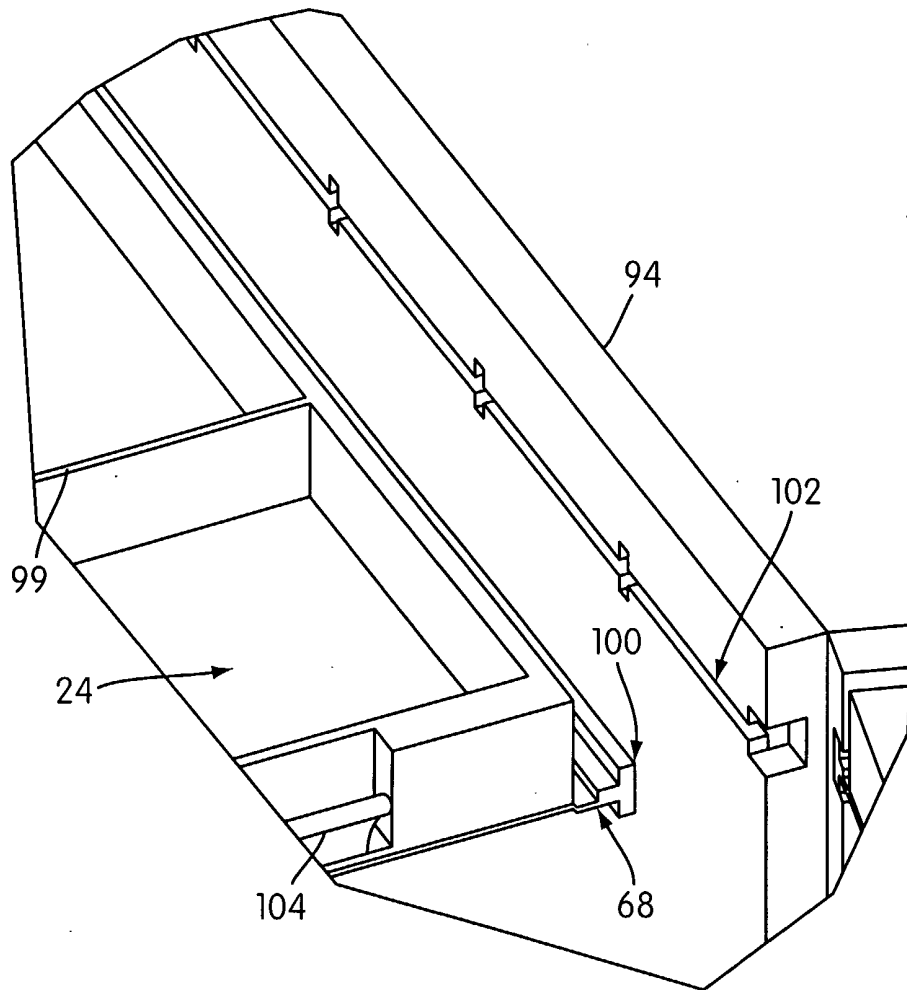


FIG. 18

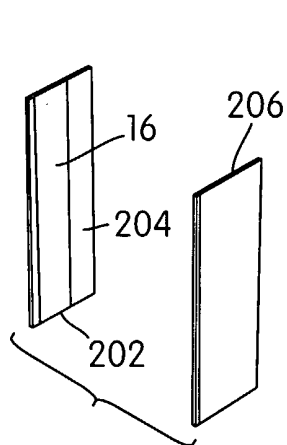


FIG. 19a

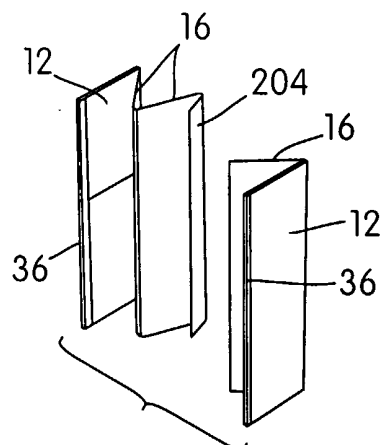


FIG. 19b

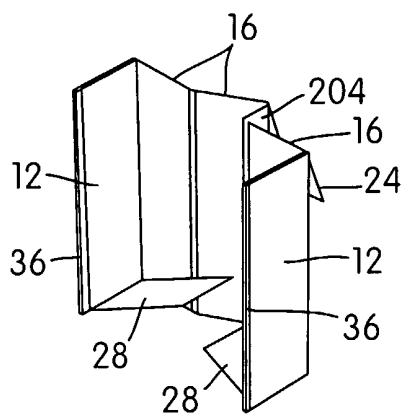


FIG. 19c

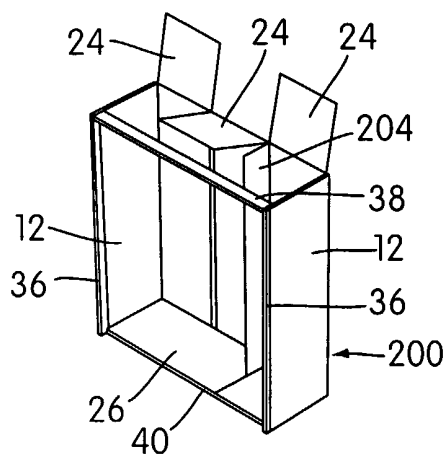


FIG. 19d

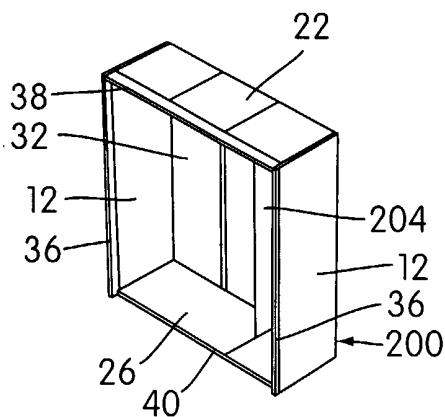


FIG. 19e

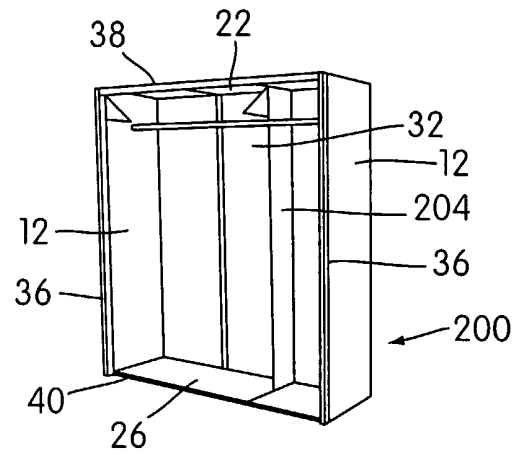


FIG. 19f

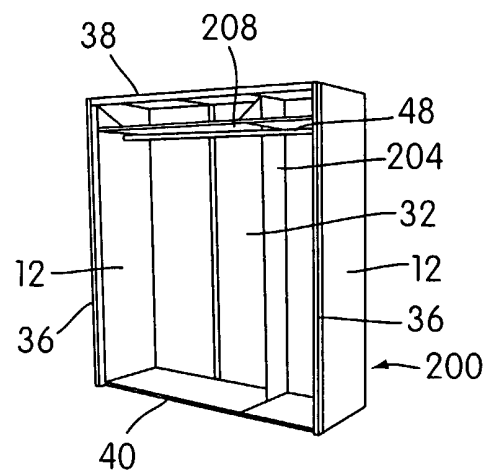


FIG. 19g

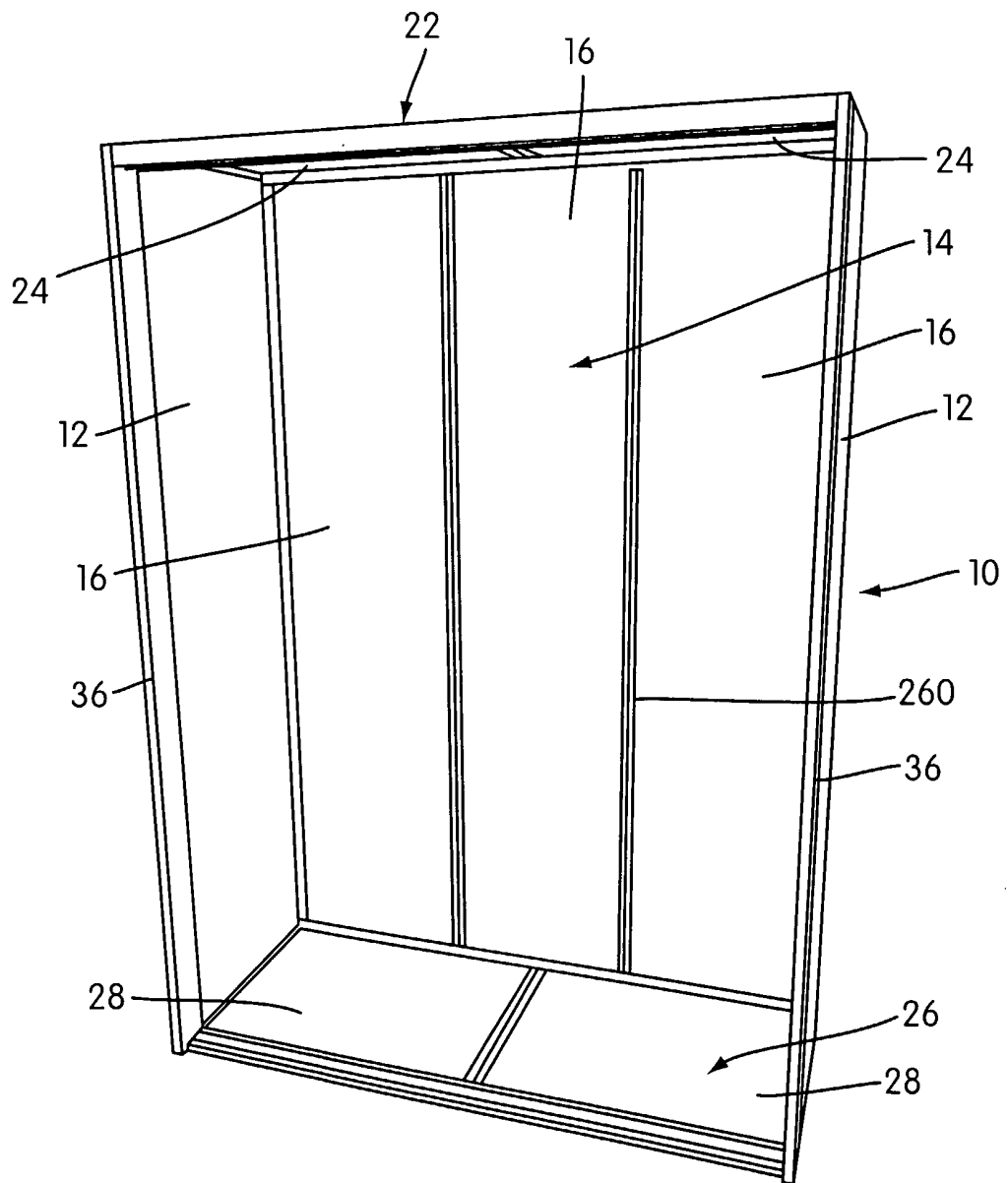


FIG. 20

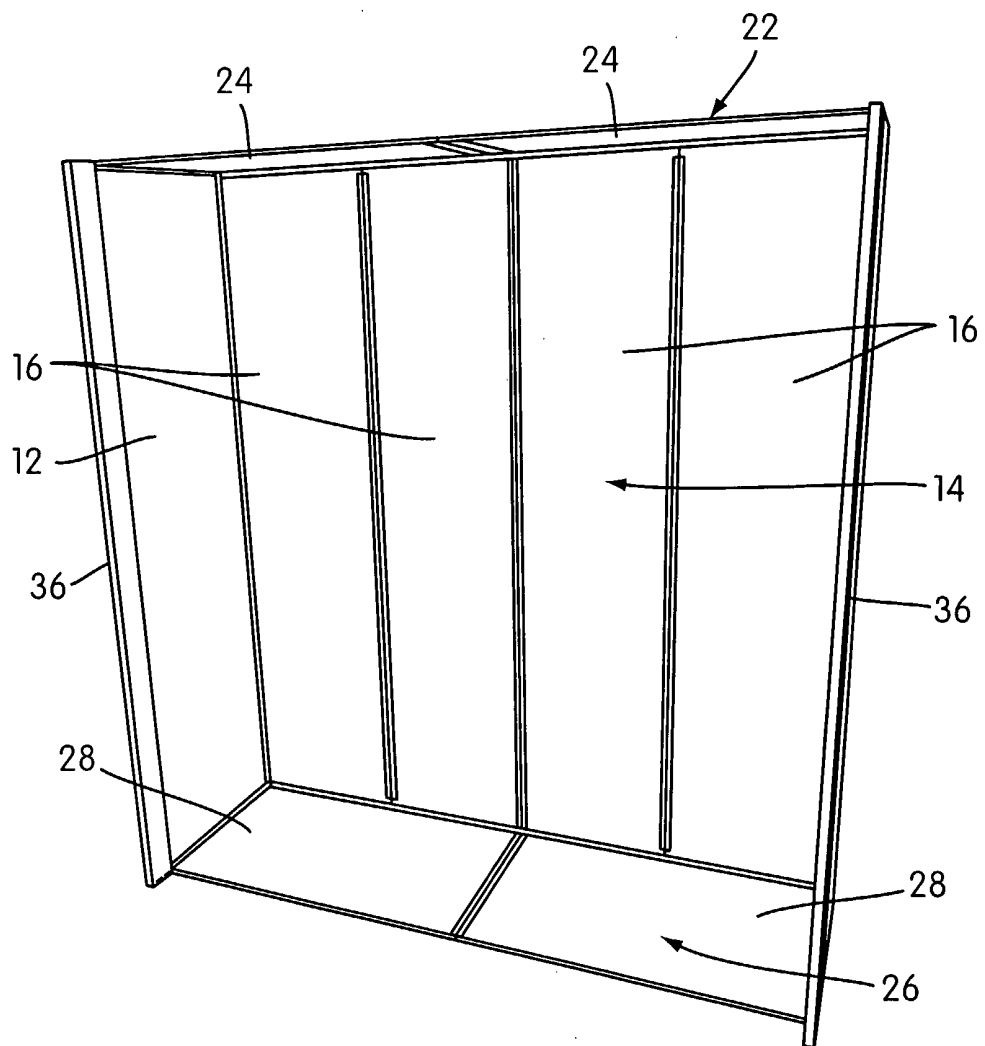


FIG. 22

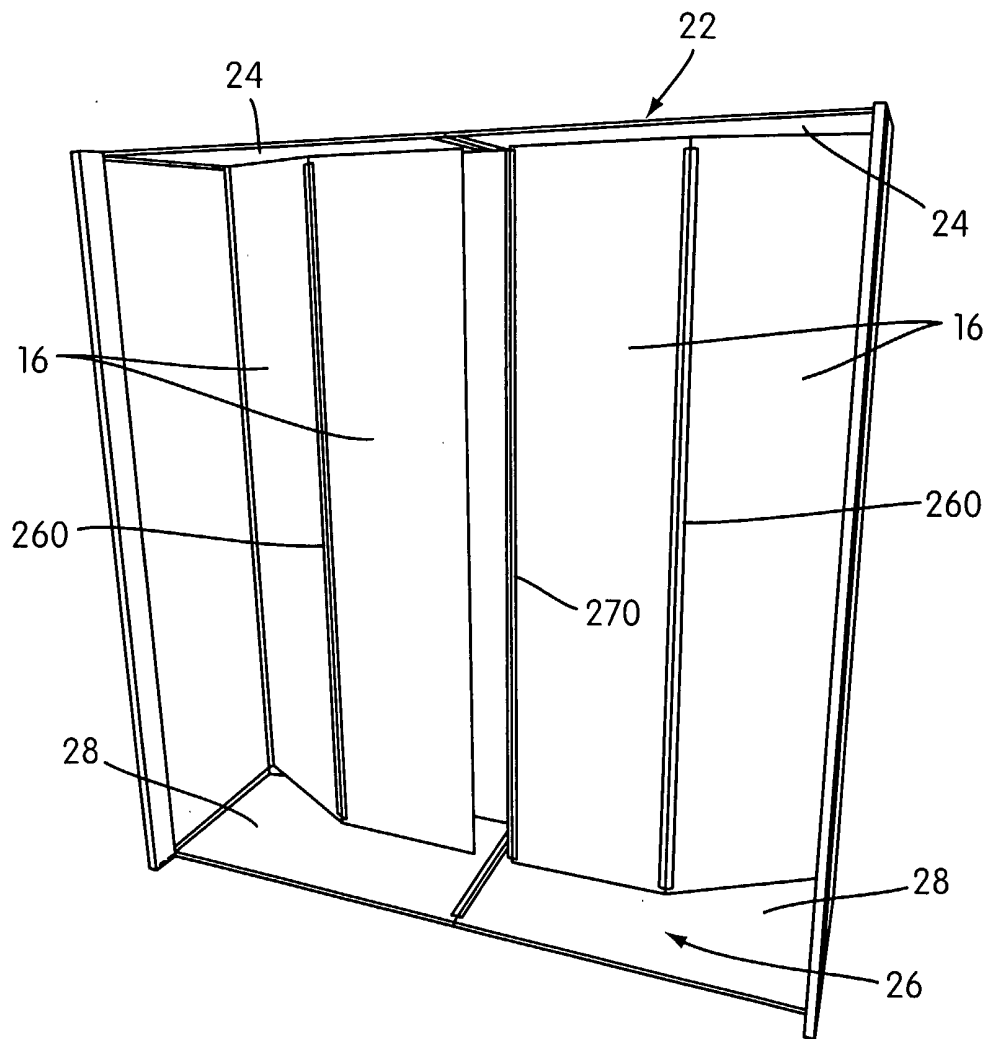
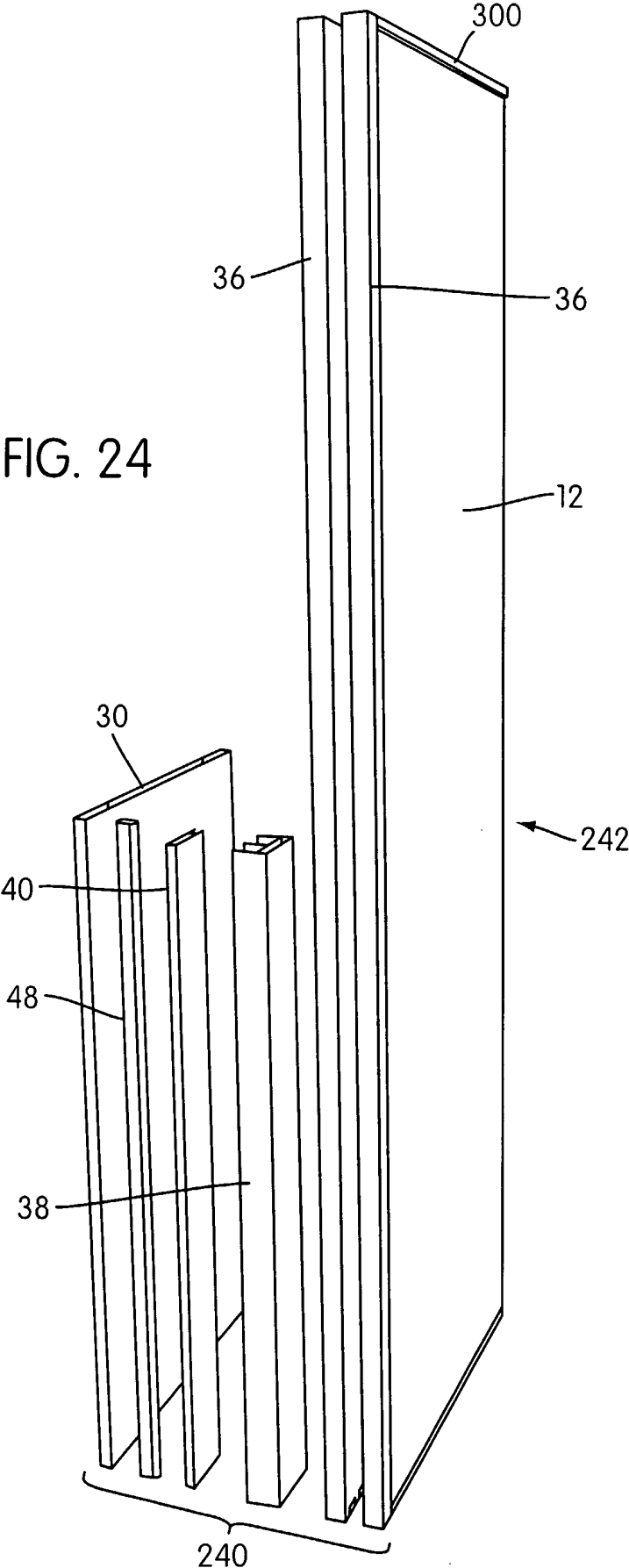


FIG. 23

FIG. 24



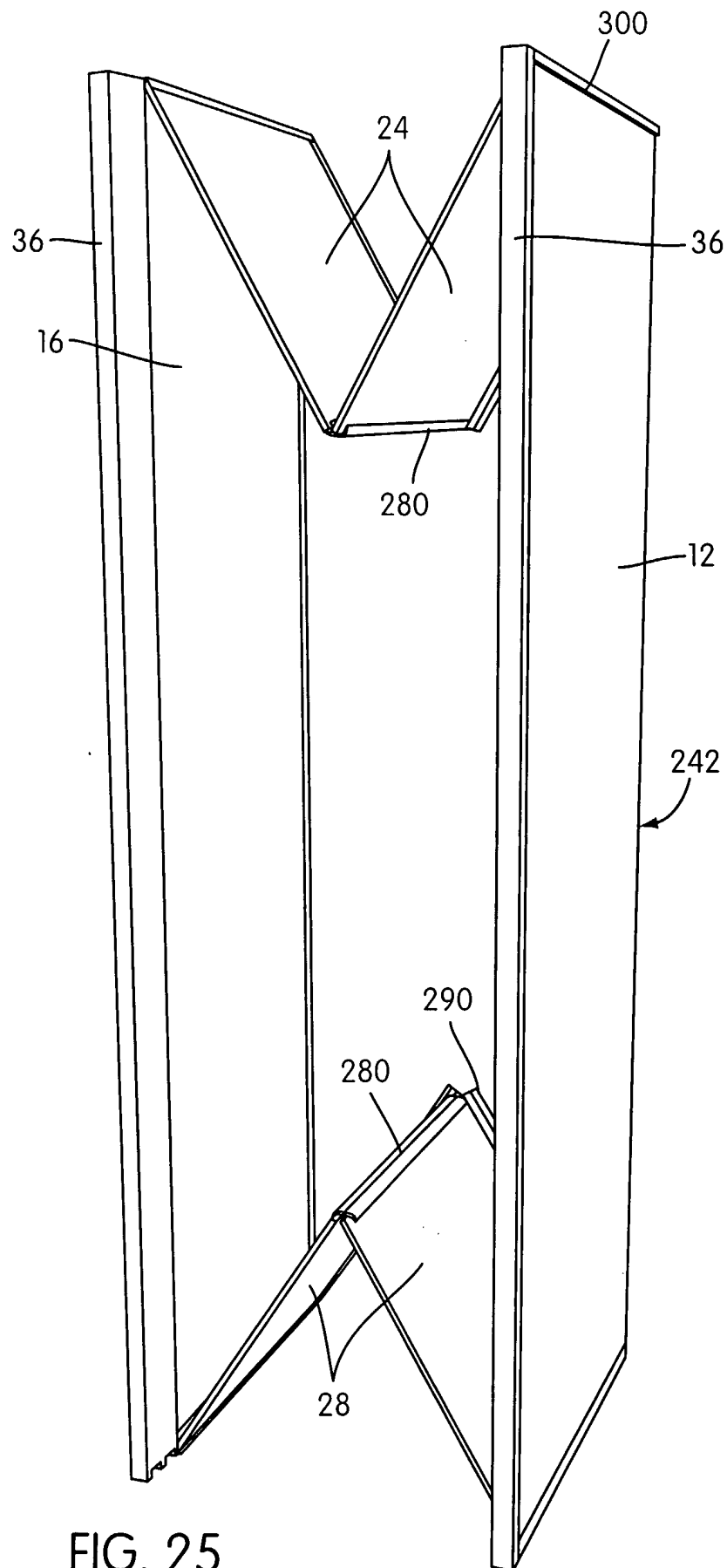
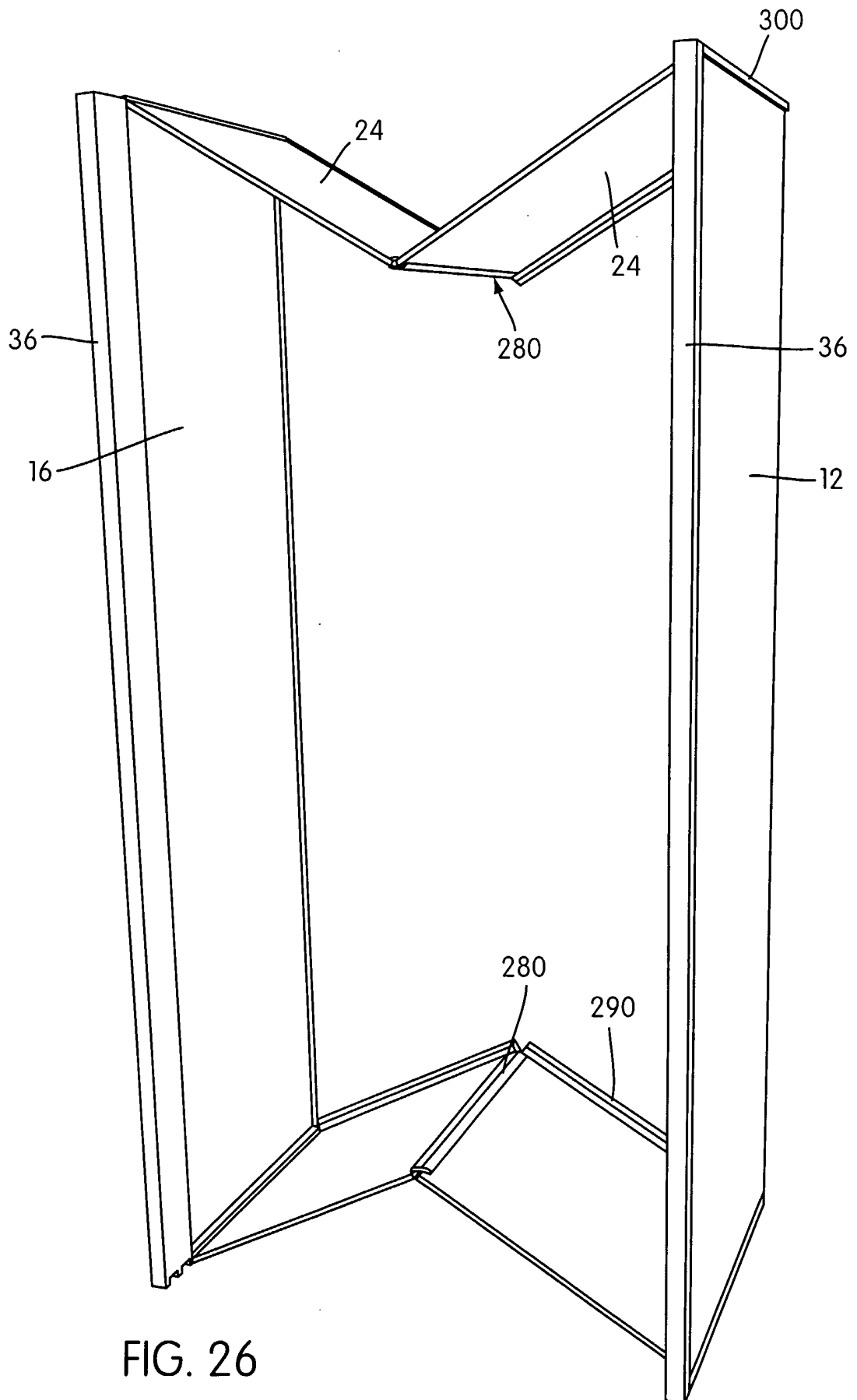
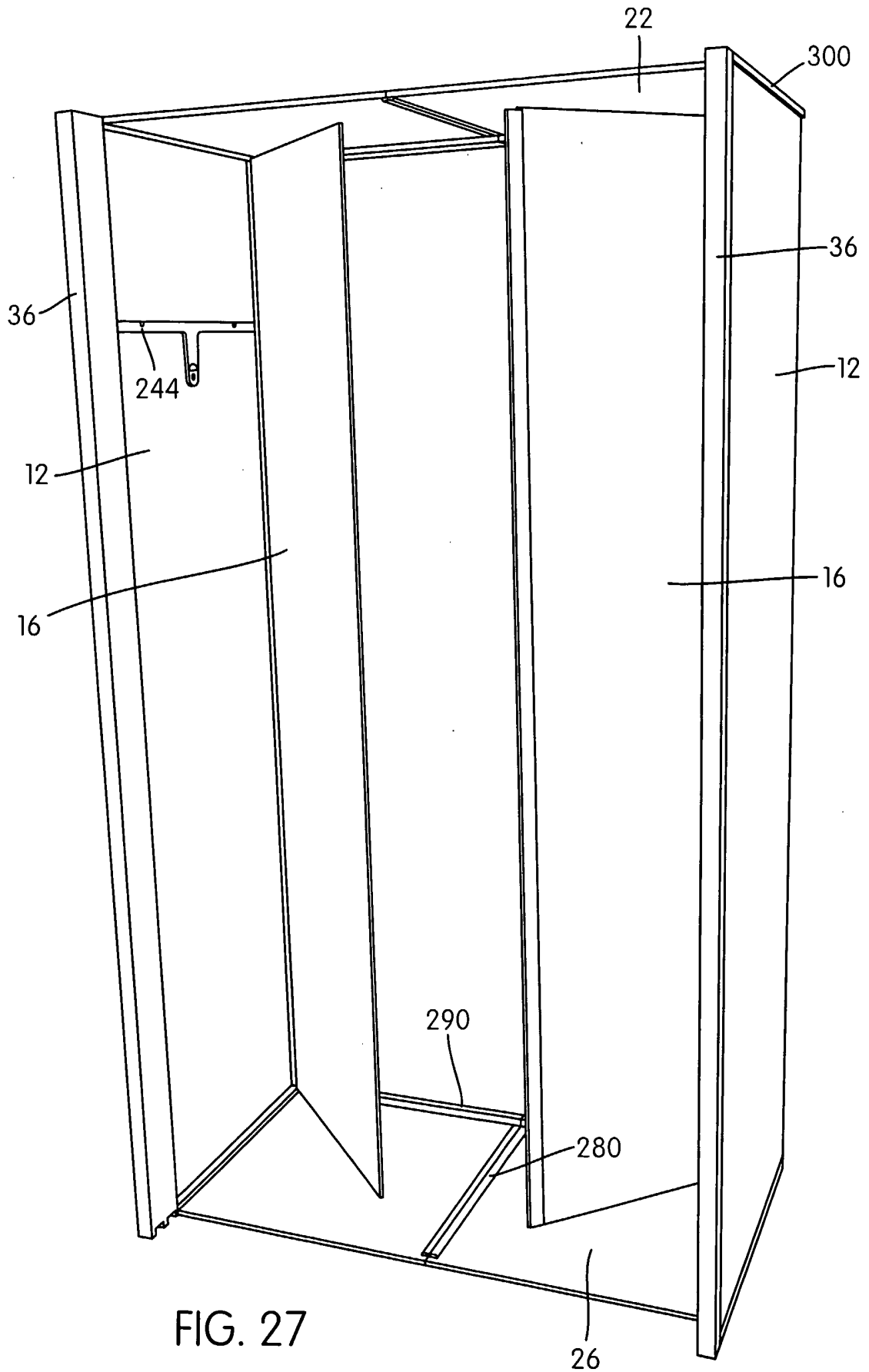
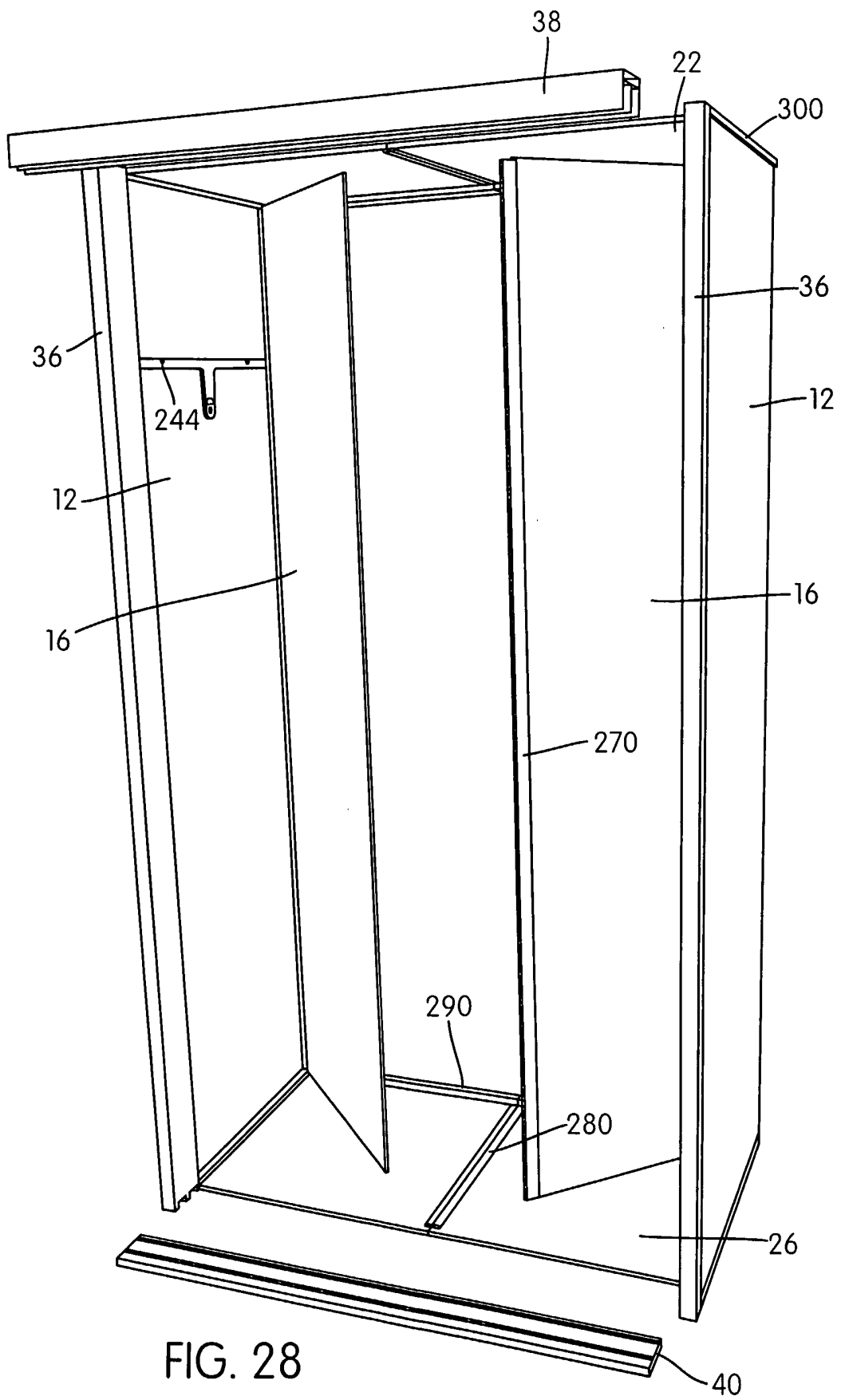


FIG. 25







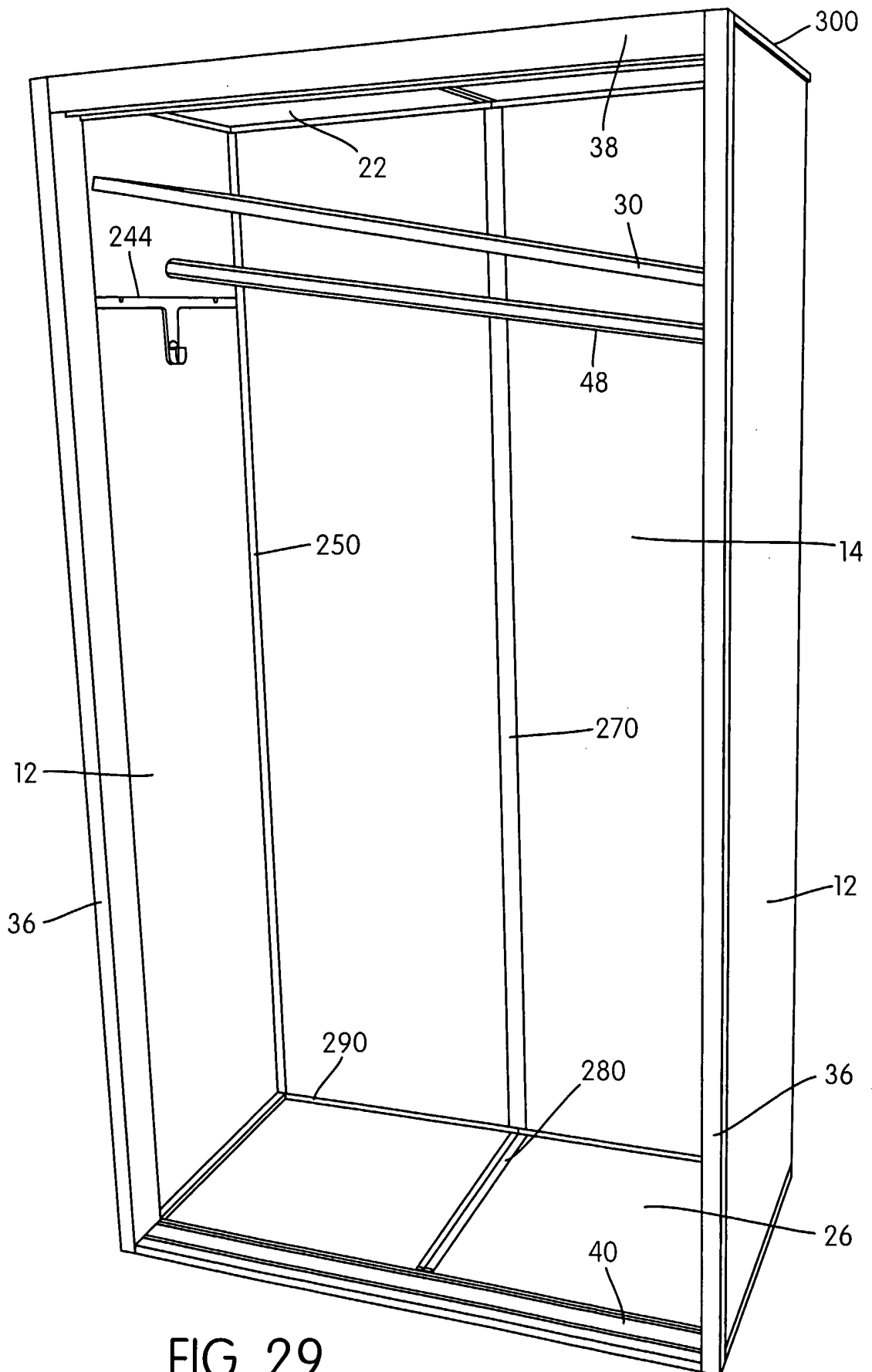
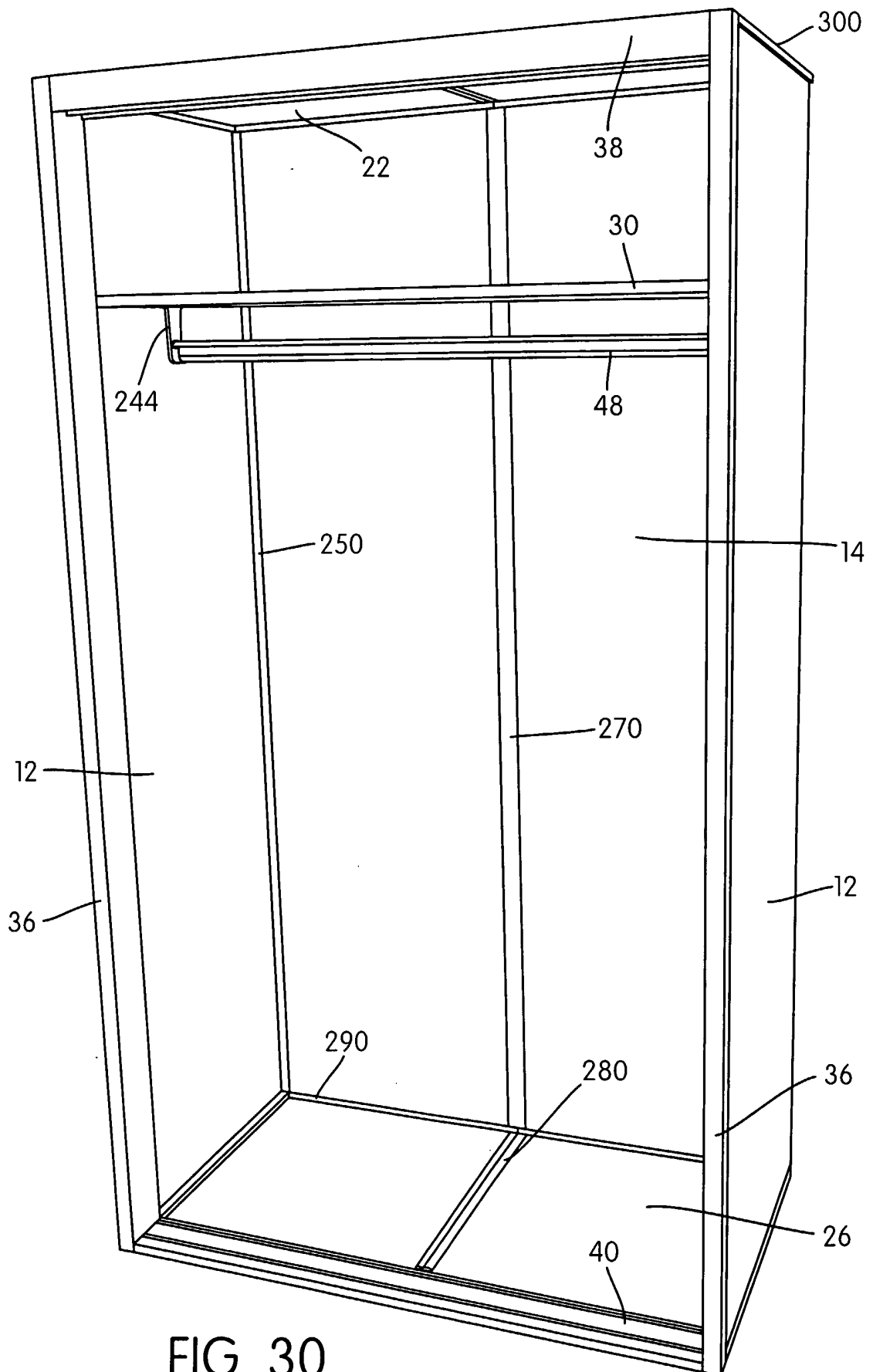


FIG. 29



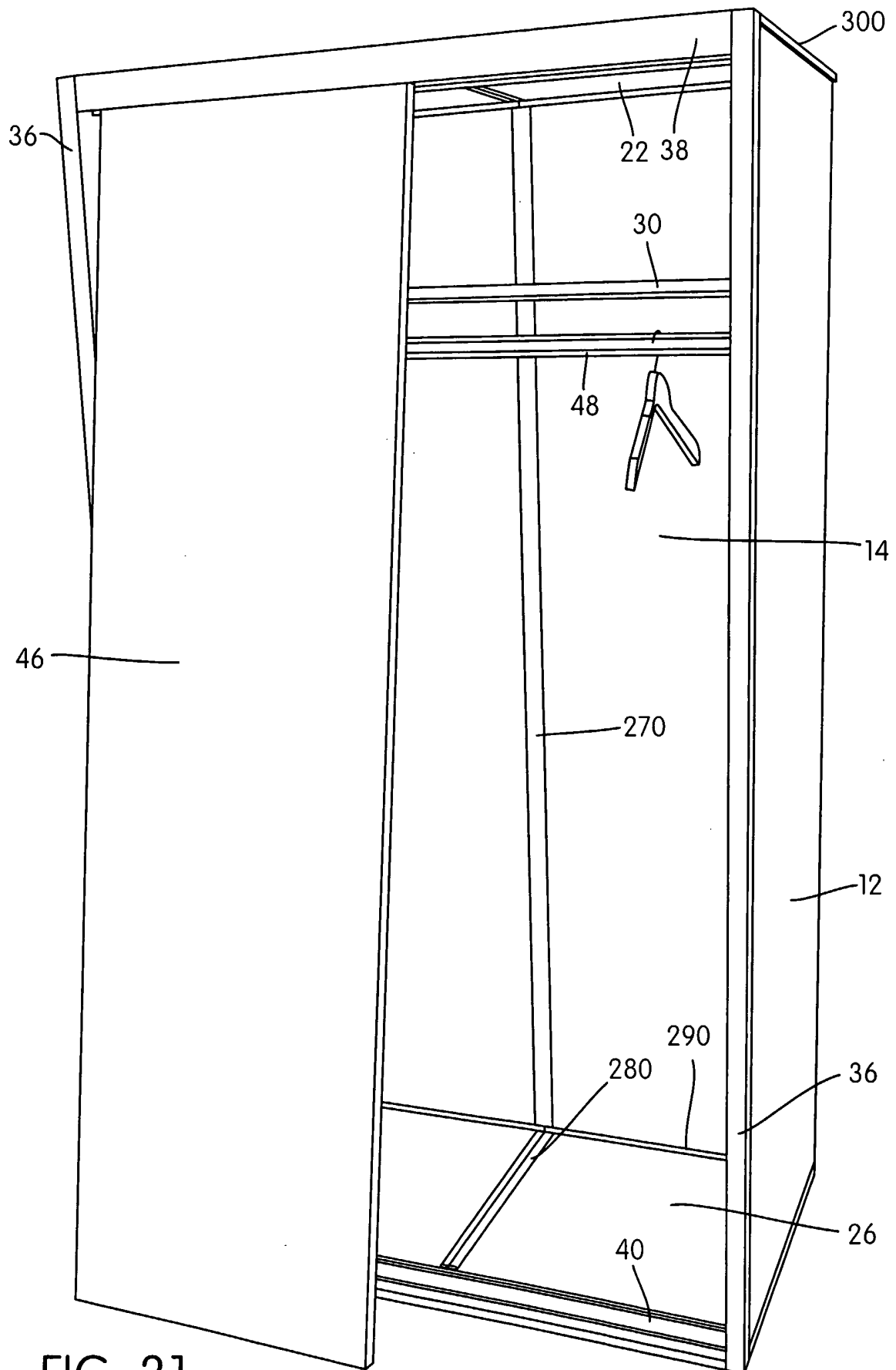
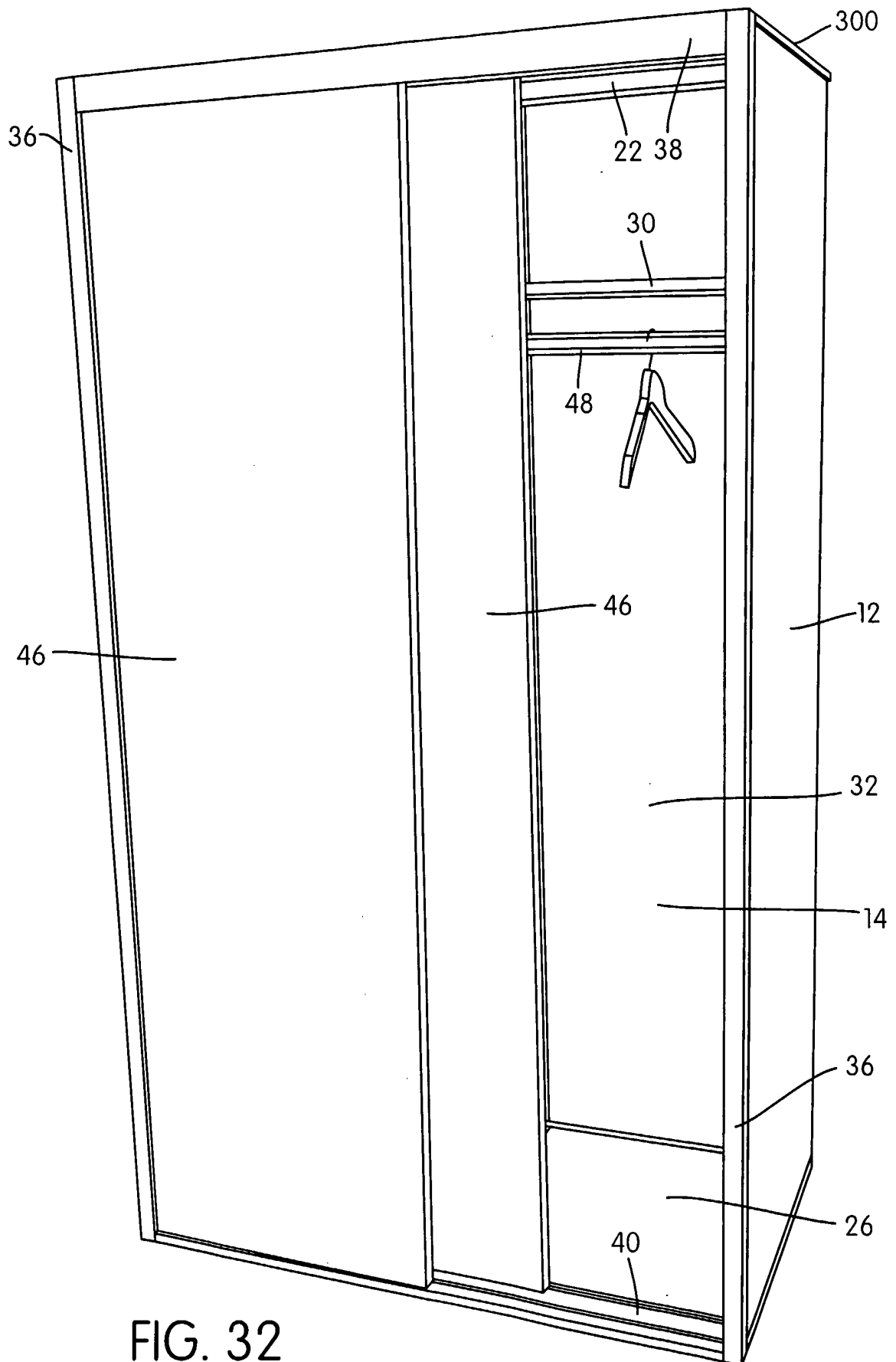


FIG. 31



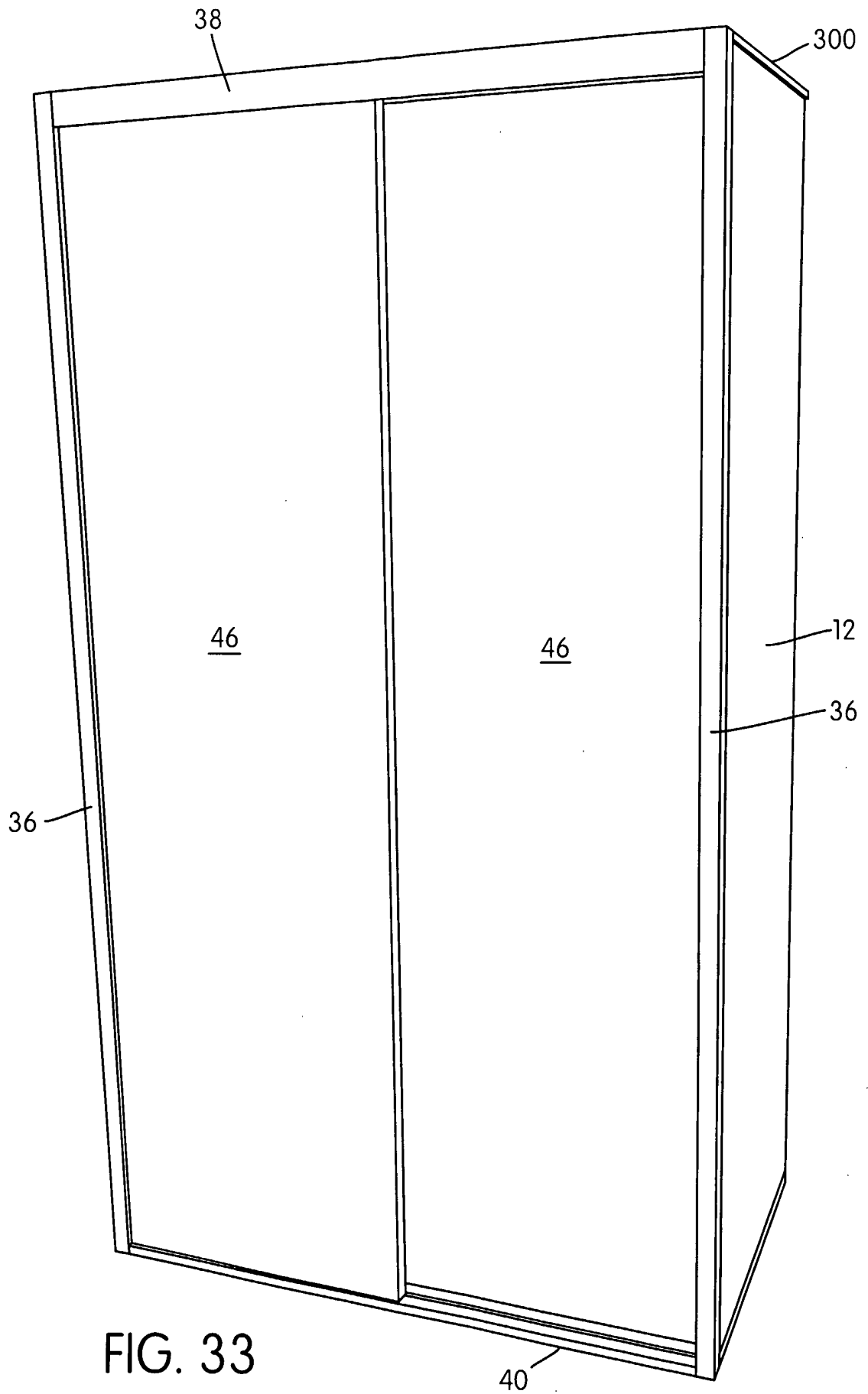


FIG. 33

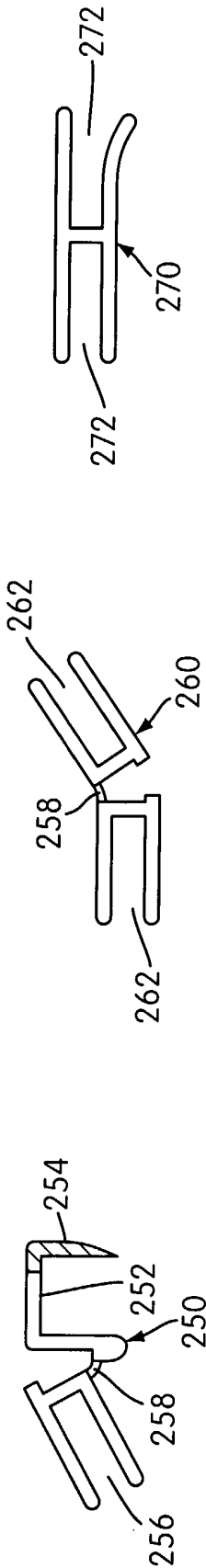


FIG. 34c

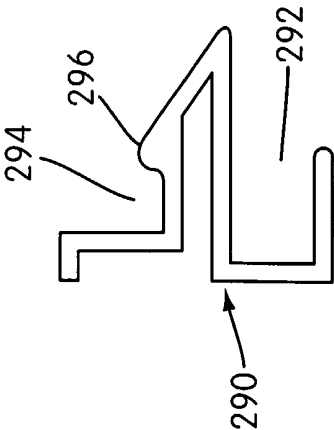


FIG. 34e

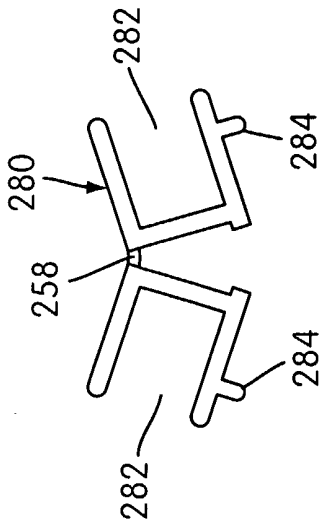


FIG. 34d

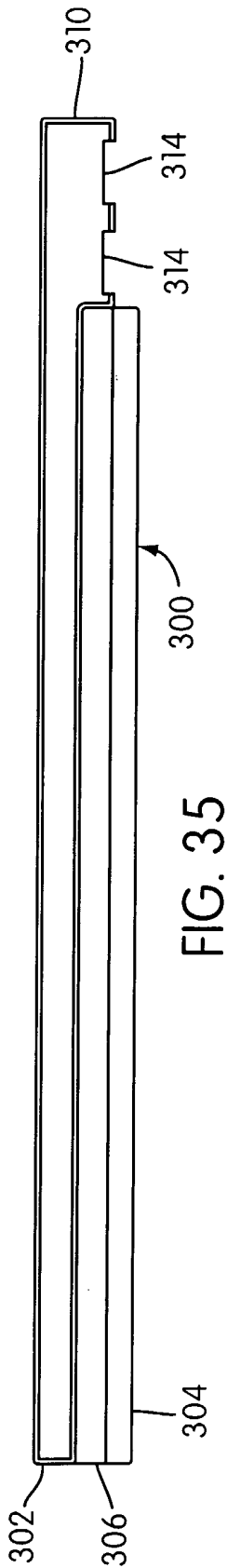


FIG. 35

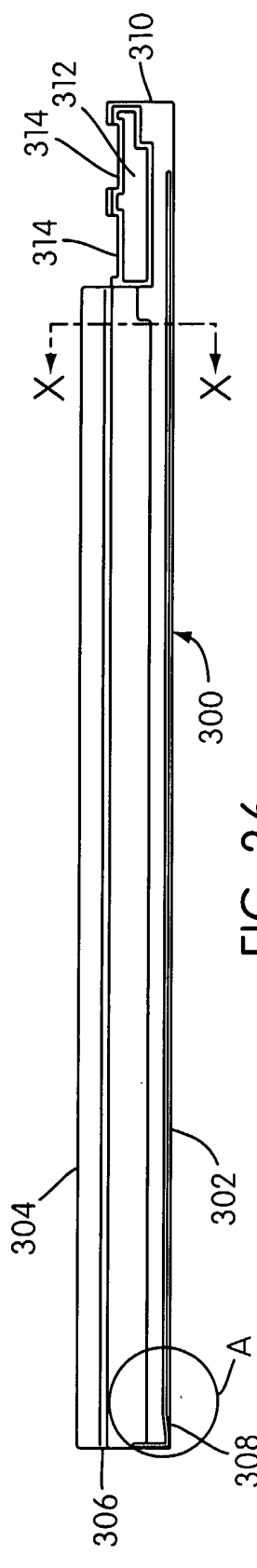


FIG. 36

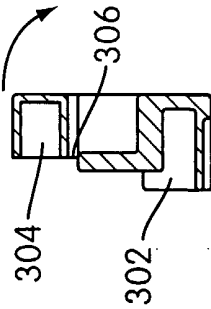


FIG. 36a

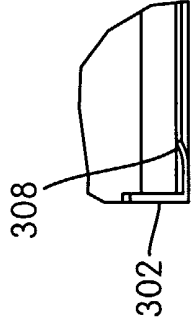


FIG. 37a

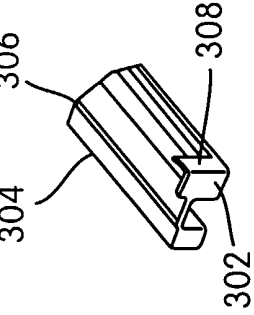


FIG. 37b

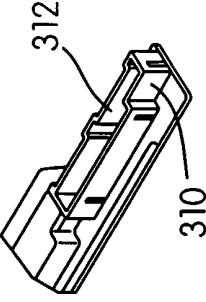


FIG. 38

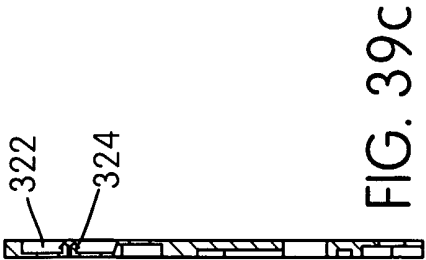


FIG. 39c

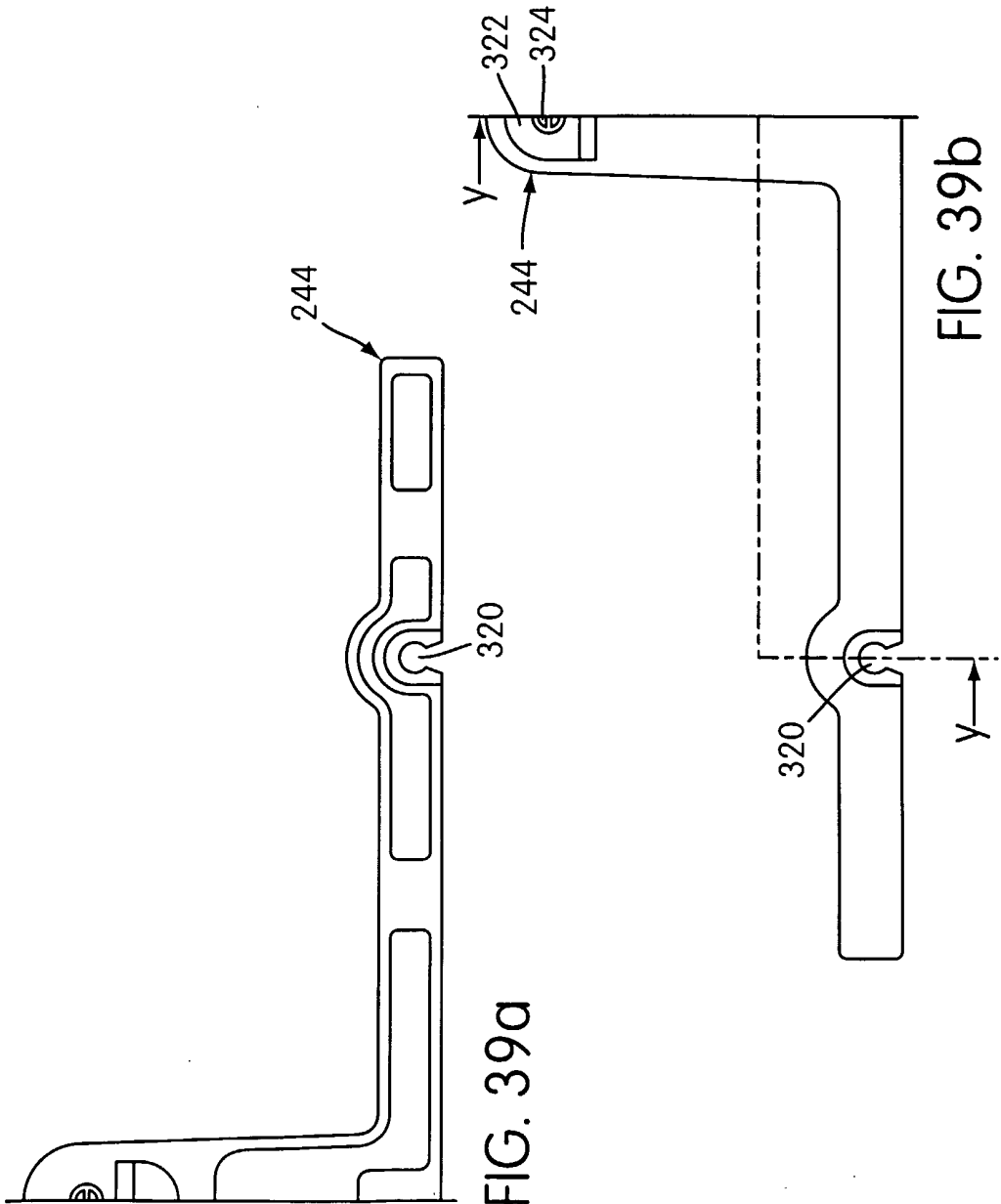


FIG. 39a

FIG. 39b

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/31715

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A47B43/00 A47B61/00 A47B96/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A47B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 664 854 A (LETCH RONALD C) 9 September 1997 (1997-09-09)	27, 28, 36
A	abstract; figures 1-3 column 3, line 51 -column 4, line 58 ---	1
A	EP 0 761 128 A (DOXEY FURNITURE CORP) 12 March 1997 (1997-03-12)	1, 29, 32-34
A	abstract; figures 1, 2, 4 ---	
A	FR 2 239 079 A (GUYOT GERARD) 21 February 1975 (1975-02-21)	1
A	page 2 -page 3; figure 1 ---	
A	DE 22 31 577 A (HEINZE FA R) 10 January 1974 (1974-01-10)	5, 7
	page 3; figures 1, 2 ---	
	--- -/--	

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

21 February 2001

Date of mailing of the international search report

01/03/2001

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INTERNATIONAL SEARCH REPORT

Intel onal Application No
PCT/US 00/31715

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 1 576 479 A (TOKO CURTAIN KK) 8 October 1980 (1980-10-08) figure 5 -----	25

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Information on patent family members

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