Oct. 8, 1968 H. S. FALL ETAL 3,404,931

CABINET STRUCTURE

Filed March 20, 1967 4 Sheets-Sheet 1

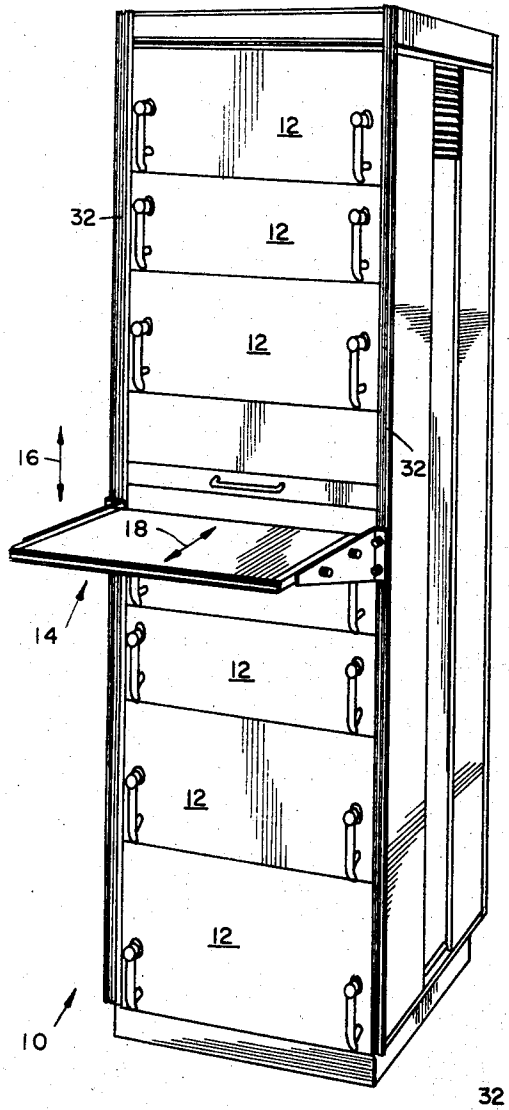
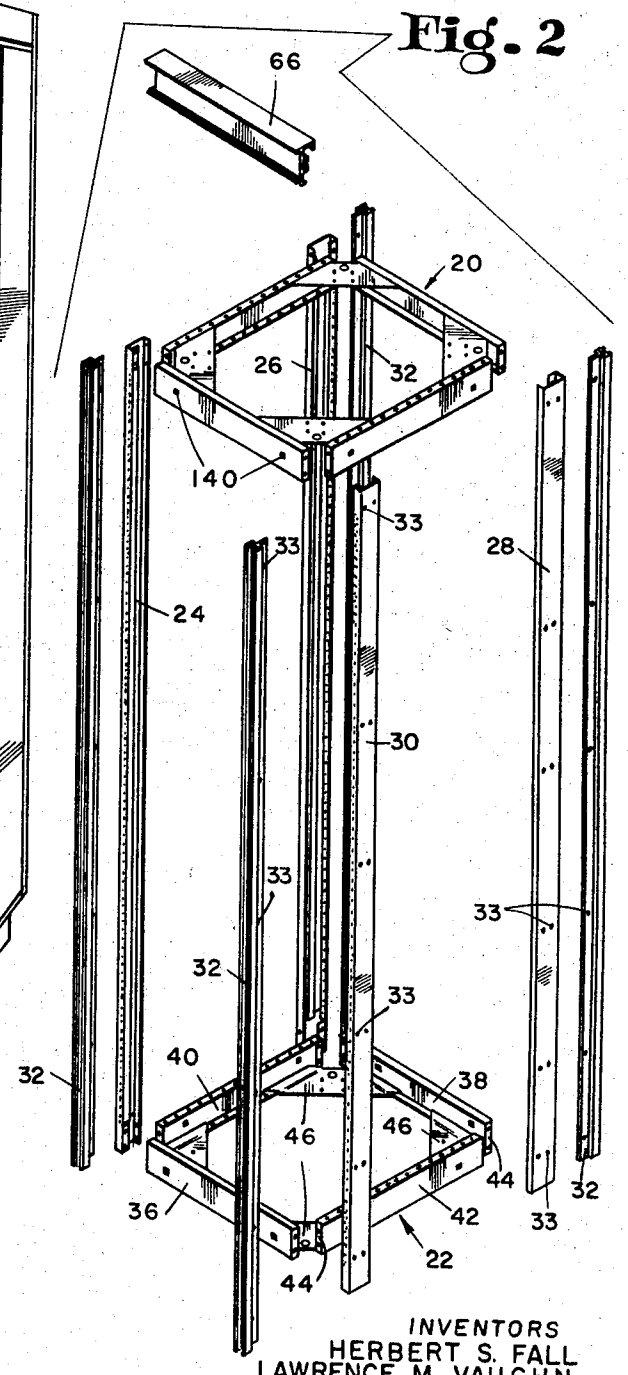


Fig. 1

Fig. 2



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CABINET STRUCTURE

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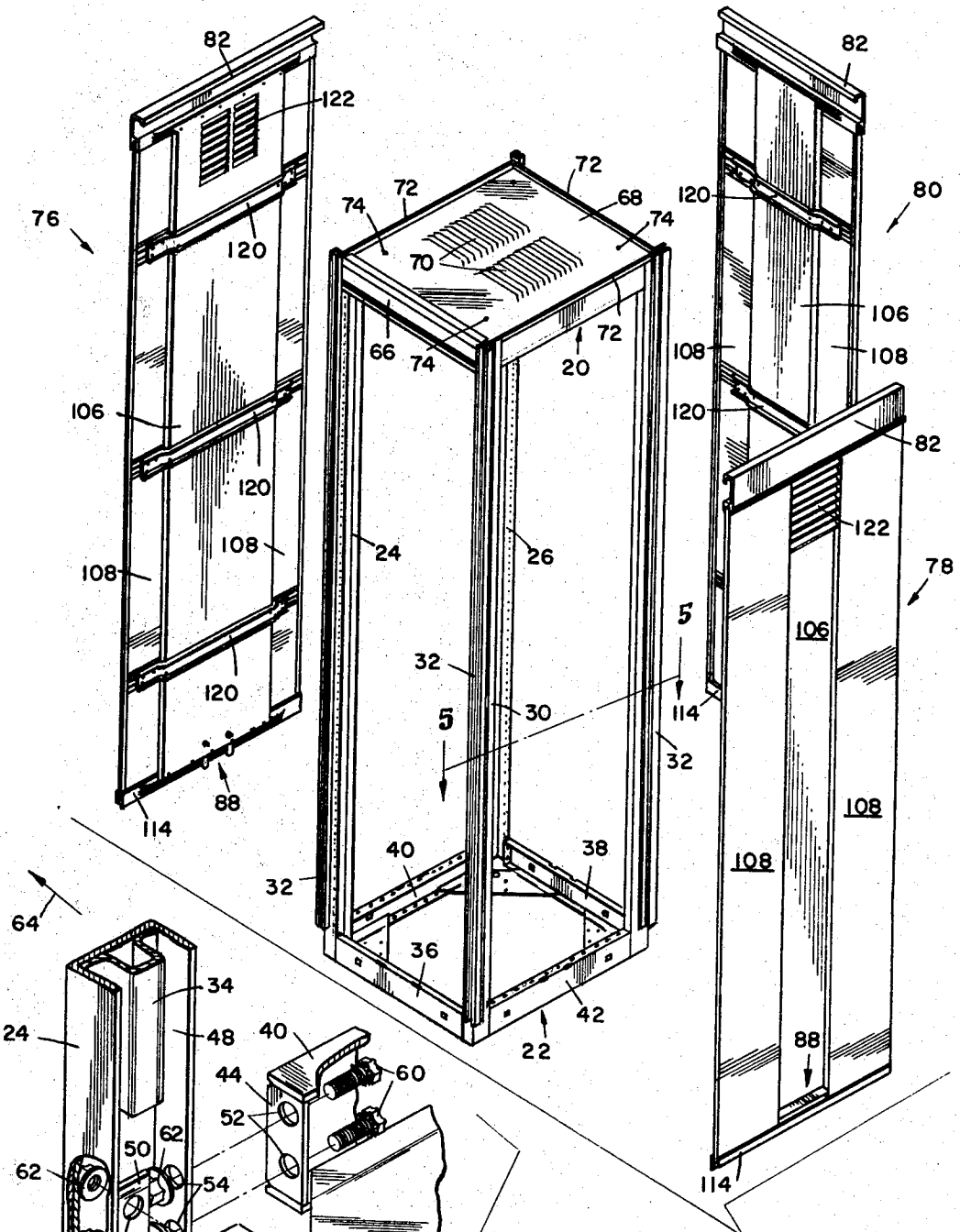


Fig. 3

Fig. 4

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CABINET STRUCTURE

Filed March 20, 1967 4 Sheets-Sheet 3

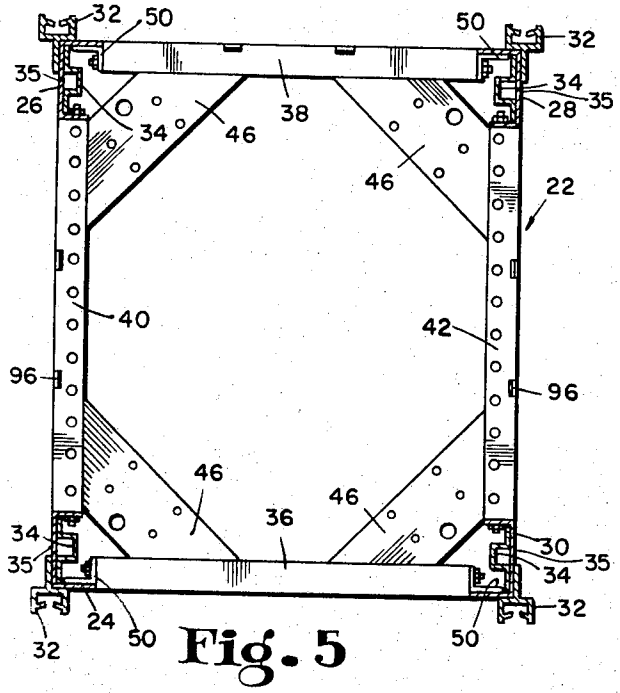


Fig. 5

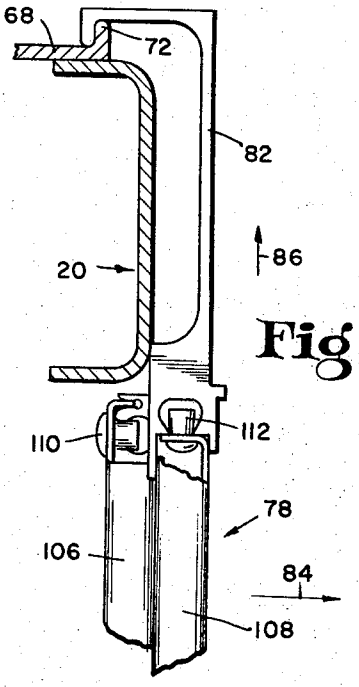


Fig. 6

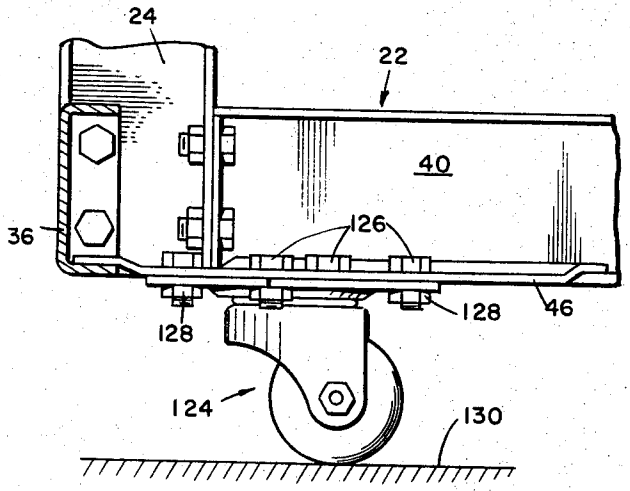


Fig. 8

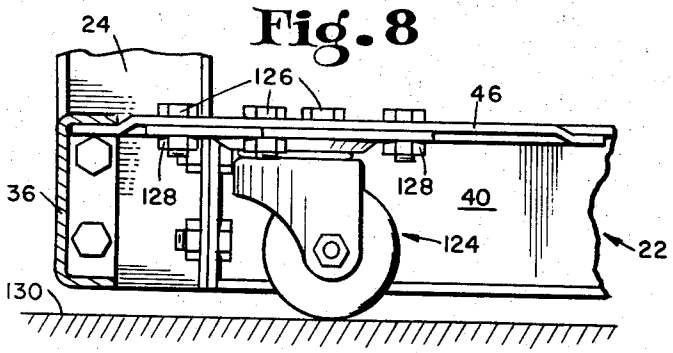


Fig. 9

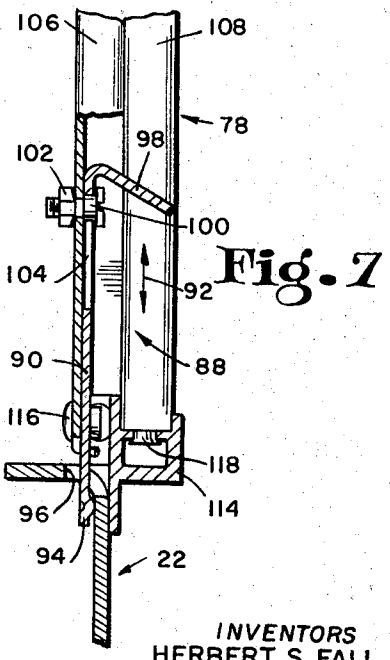


Fig. 7

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CABINET STRUCTURE

Filed March 20, 1967 4 Sheets-Sheet 4

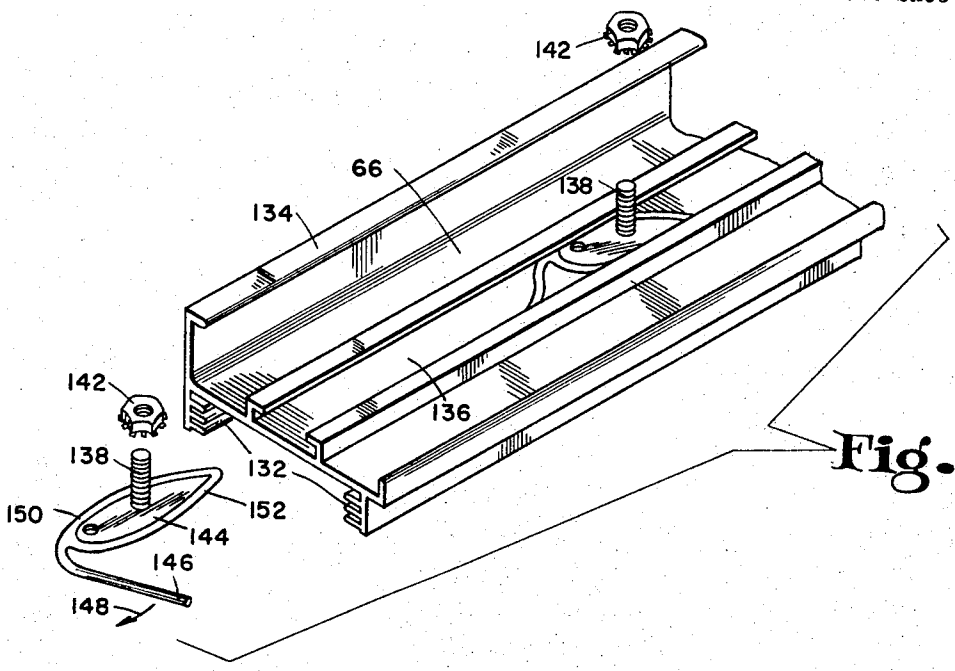


Fig. 10

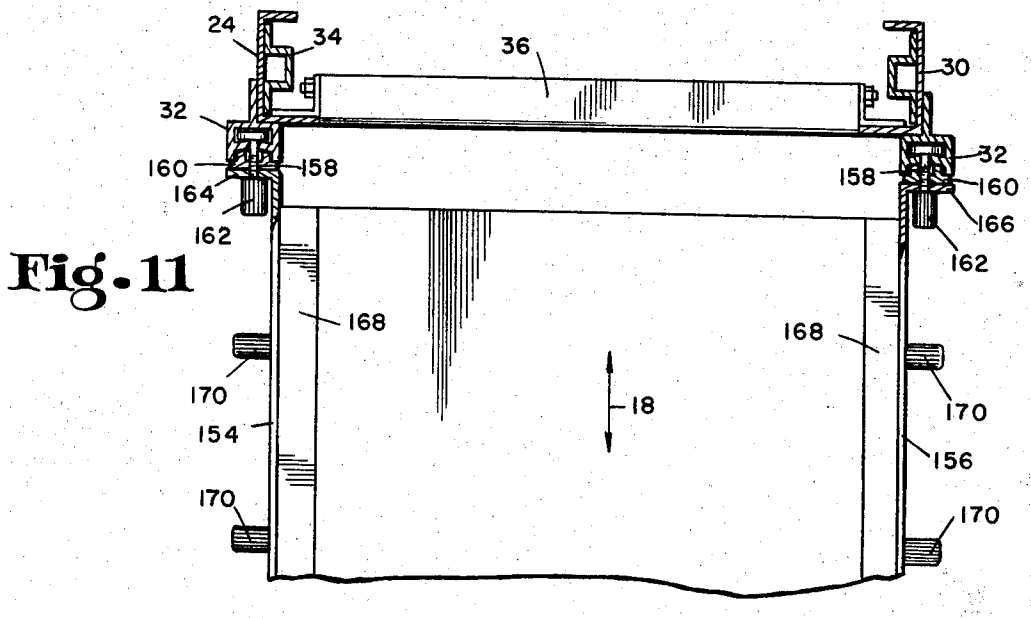


Fig. 11

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United States Patent Office 3,404,931 Patented Oct. 8, 1968

3,404,931

CABINET STRUCTURE

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10 Claims. (Cl. 312—257)

ABSTRACT OF THE DISCLOSURE

A cabinet structure comprising a pair of identical, horizontally disposed, generally rectangular rigid frames with open corners, one frame being congruently superposed above the other, and four identical corner posts secured within said corners to connect said frames and support said one frame. Removable side and rear wall panels are provided, each of the wall panels being disengageably connected to the top of said cabinet structure to hang vertically downwardly therefrom. Each of the wall panels is provided, at its lower end, with a latch mechanism which is engageable with the lower frame.

The present invention relates generally to cabinet structures, and more particularly to a cabinet structure which is characterized by its high strength, rigidity, versatility and ease with which it may be assembled.

The cabinet structure of the present invention is ideally suited to almost any type of commercial use and is specifically suited for use in packaging large quantities of electrical and electronic equipment. The cabinet structure of the present invention may be used as a module, several of which may be bolted together to form bays in unlimited combinations. As a further versatility feature, removable side and rear wall panels are provided, the panels being disengageably connected to the top of the cabinet structure to hang downwardly therefrom.

The cabinet structure comprises a pair of identical frames and four identical corner posts, the frames and corner posts being assembled to provide a frame structure on which the removable wall panels are mounted. In a preferred form of the present invention, a vertical track element is carried by each corner post, each track element being effective to stiffen the corner post on which it is carried. The corner posts are easily bolted to the frames to provide a rigid structure. It will be seen in the following description that none of the bolts which clamp a corner post to a frame is subjected to shear forces when the cabinet structure is tended to be racked.

It is a primary object of the present invention, therefore, to provide a cabinet structure comprising a pair of horizontally disposed polygonal frames, one frame being congruently disposed above the other and spaced a vertical distance therefrom, a corner post connected between each of the vertically aligned pairs of corners of the frames rigidly to support the upper frame above the lower frame, thereby to provide a frame structure on which removable wall panels are mounted. Preferably, each of such wall panels is adapted to be disengageably and pivotally connected to and supported from one side of the upper frame to hang vertically downwardly therefrom. Also, preferably, a latch mechanism is provided at the lower portion of each wall panel, the latch mechanism being engageable with the lower frame releasably to hold the wall panel against pivotal movement outwardly from the lower frame.

It is another object of the present invention to provide such a cabinet structure wherein such frames are generally rectangular, each of the frames comprising front, rear and side structural members and means for connecting the members so that, at each corner of the frame, the adjacent ends of the members define a receptacle for one of the corner posts. Means are provided for clamping each end of each post in one of the receptacles.

Still another object is to provide such a cabinet structure wherein each of such structural members has a flange at each end which is substantially perpendicular to the longitudinal direction of the member, wherein each end of each corner post is provided with a pair of longitudinally extending, mutually perpendicular mounting flanges, each mounting flange being parallel to and abutting one of the end flanges of the structural members. Preferably, each of the clamping means comprises at least one element penetrating each mounting flange and its abutting end flange and means for placing the element in tension, this last-mentioned means being engageable with the abutting mounting flange and end flange. In the preferred embodiment of the present invention, the element penetrating the abutting mounting flange and end flange is a bolt extending through aligned holes in the flanges, the holes having a diameter sufficient to prevent substantial perimetral engagement of the bolt by the abutting flanges, thereby preventing shear forces from being exerted on the bolt when the cabinet structure is racked, the bolt being substantially perpendicular to the abutting flanges.

Yet another object of the present invention is to provide such a cabinet structure wherein the structural members are inwardly opening channel members, wherein the corner posts are inwardly opening channel members, wherein each end of each corner post is received in one of the receptacles to provide a smooth, substantially square corner, and wherein all of the clamping means are carried within the flanges of the structural members and the corner posts.

It is still another object of the present invention to provide such a cabinet structure wherein the structural members of the lower frame are connected by gusset plates fastened to the upper flanges thereof, and wherein the cabinet structure further comprises a caster mounted on the lower side of each of the gusset plates of the lower frame, the wheels of the casters extending just below the bottom flanges of the structural members of the lower frame.

It is another object of the present invention, to provide a cabinet structure which is characterized by great strength, versatility and ease with which it may be assembled.

It is another object of the present invention to provide such a cabinet structure including removable side and rear wall panels.

To the accomplishment of the above and related objects, the present invention may be embodied in the form illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that change may be made in the specific construction illustrated and described, so long as the scope of the appended claims is not violated.

FIG. 1 is a perspective view of a typical electronic console embodying the cabinet structure of the present invention;

FIG. 2 is an exploded perspective view showing the frame elements of the cabinet structure of the present invention;

FIG. 3 is an exploded perspective view showing the frame elements of FIG. 2 assembled and the removable side and rear wall panels;

FIG. 4 is an exploded, fragmentary, perspective view showing the joint between the lower end of a corner post and the lower frame;

FIG. 5 is a horizontal sectional view taken generally along the lines 5—5 in FIG. 3 showing the shape of each corner post and the track element carried thereby;

FIG. 6 is a fragmentary, sectional view showing means whereby a wall panel is disengageably connected to the top of the cabinet structure;

FIG. 7 is a fragmentary, sectional view showing a latch mechanism for holding the bottom edge of a wall panel to the lower frame;

FIG. 8 is a fragmentary, sectional view showing one method for supporting the cabinet structure on casters;

FIG. 9 is a fragmentary, sectional view showing another method for supporting the cabinet structure on casters;

FIG. 10 is an exploded, fragmentary perspective view of a trim plate which is carried by the upper, front portion of the frame structure; and

FIG. 11 is a fragmentary horizontal section showing means for mounting a vertically adjustable platform on the cabinet structure.

Referring now to FIG. 1, it will be seen that the cabinet structure of the present invention, indicated generally by the reference number **10**, is used to contain a plurality of internally carried drawers **12** and to support an outside vertically adjustable platform, indicated generally by the reference number **14**. The drawers **12** may contain any type of equipment, such as electronic or electrical control equipment. The platform **14** is vertically adjustable in the direction of the arrow **16** and horizontally adjustable in the direction of the arrow **18**. A preferred structure for the adjustable platform **14** will be discussed farther along in this description.

The cabinet structure **10** comprises a frame assembly, shown in FIG. **2**, which includes an upper frame **20**, lower frame **22** and four corner posts **24**, **26**, **28** and **30**. In a preferred embodiment of the cabinet structure **10**, each corner post **24** through **30** carries a vertical track element **32** which serves to stiffen the corner post on which it is mounted. As seen in FIG. 1, the front track elements **32** support the adjustable platform **14** for movement in the direction of the arrow **16**. Preferably, each track element **32** is fastened to one of the corner posts **24**, **26**, **28** and **30** by means of screws, not shown, which penetrate holes indicated by the reference number **33** in FIG. 2.

The combined cross section of the corner post **24**, **26**, **28** and **30** and the track elements **32** carried on each of said corner posts is shown in FIG. 5. As seen in FIG. 5, each corner post **24**, **26**, **28** and **30** is provided with a longitudinally extending stiffening member **34** which is formed to have a hat-section. Each stiffening member **34** is welded or otherwise securely fastened to the web section **35** of the post **24** through **30** on which the stiffening member is carried. It will be seen, therefore, that the upper and lower frames **20** and **22** are connected by corner posts **24** through **30** which are extremely rigid, especially when a track element **32** is mounted on each corner post.

The upper frame **20** is preferably identical to the lower frame **22**. Thus, a description of either frame **20** or **22** will suffice as a description for both. It will be noted, however, that in FIG. 2, the frame **22** is inverted as compared to the frame **20**.

The frame **22** comprises front, back and side structural members **36**, **38**, **40** and **42**, respectively. Each of the structural members **36–42** is provided with an end flange **44** at each of its ends, the end flanges **44** being substantially perpendicular to the longitudinal direction of the structural member. (See FIGS. 2 and 4.)

The frame **22** further comprises four gusset plates **46** which rigidly connect the front, back and side structural members **36**, **38**, **40** and **42** as shown in FIG. 2. The gusset plates **46** are so proportioned and arranged that the structural members **36–42** connected thereby are held in a substantially rectangular relationship with the end flanges **44** of adjacent structural members being held mutually perpendicular to provide a receptacle for receiving one of the corner posts **24–30** as seen in FIG. 4.

The gusset plates **46** may be welded or otherwise securely fastened to the structural members **36–42**.

Since the corner posts **24–30** are identical and since the upper frame and lower frame **22** are identical, a description of the corner post **24** and the connection between the corner post **24** and the structural members **36** and **40** of the lower frame **22** will sufficiently describe all the corner posts **24**, **26**, **28** and **30** and the connections between each corner post and the upper frame **20** and lower frame **22**.

Referring to FIG. 4, it will be seen that the corner post **24** is provided with a pair of longitudinally extending, mutually perpendicular mounting flanges **48** and **50**, the flange **48** being arranged to abut the end flange **44** of the structural member **40** and the mounting flange **50** being arranged to abut the end flange **44** of the structural member **36**. The mounting flange **50** is preferably an L-shaped bracket welded or otherwise securely fastened to the post **24** to be at a right angle to the flange **48**. Of course, similar mounting flanges **48** and **50** are provided at the upper end of the corner post **24**. The end flange **44** of the structural member **40** is provided with a pair of holes **52** which is aligned with a similar pair of holes **54** in the mounting flange **48** and the end flange **44** of the structural member **36** is provided with a pair of holes **56** which is aligned with a similar pair of holes **58** in the mounting flange **50**. Screws **60** and nuts **62** are provided for securely clamping the mounting flange **48** to the end flange **44** of the structural member **40**, the screws **60** penetrating the holes **52** and **54**. Additional screws **60** and nuts **62** are provided for securely clamping the mounting flange **50** to the end flange **44** of the structural member **36**, the screws **60** penetrating the holes **56** and **58**.

In a preferred embodiment of the present invention, the holes **52**, **54**, **56** and **58** are significantly greater in diameter than the screws **60**. Thus, the screws **60** are easily inserted through the holes **52**, **54**, **56** and **58** and, more importantly, the screws **60** are not substantially perimetrally engaged by the edges of the holes through which the screws **60** penetrate. The last-mentioned feature prevents a screw **60** from being loaded in shear when the cabinet structure **10** is racked. That is, if the upper end of the corner post **24** is urged in the direction of the arrow **64** (FIG. 4), the screws **60** penetrating the end flange **44** of the structural member **36** and the mounting flange **50** will act in tension to resist the movement of the post **24** and the screws **60** penetrating the end flange **44** of the structural member **40** and the mounting flange **48** will, therefore, not be subjected to shear forces.

The structural members **36**, **38**, **40** and **42** are inwardly-opening channel members and the corner posts **24**, **26**, **28** and **30** are also inwardly-opening channel members. It will be seen, therefore, that all the screws **60** and nuts **62** are carried within the upper and lower flanges of the structural members **36–42** and the lateral flanges of the corner posts **24–30**. It will also be seen that, when the corner post **24** is received between the ends of the structural members **36** and **40**, the resulting corner structure is substantially square and smooth.

The frame assembly shown in FIG. 2 further comprises a horizontal track member **66** which is carried at the upper front portion of the cabinet structure **10**. The track member **66** will be described further as this description progresses.

When the upper and lower frames **20** and **22**, corner posts **24**, **26**, **28** and **30** and vertical track elements **32** are correctly assembled, the resulting frame assembly, which is shown in FIG. 3, will be quite rigid. Referring to FIG. 3, it will be seen that a top **68** having ventilation louvers **70** and an up-turned flange **72** extending along each of its four edges is mounted on the upper frame **20** by means of four screws indicated by the reference number **74**, the screws **74** penetrating the upper frame **20**. The top **68**

may be considered a part of the upper frame **20** after it is assembled.

As clearly seen in FIG. 3, the cabinet structure **10** comprises removable side wall panels **76** and **78** and a removable rear wall panel **80**, all indicated generally by their respective reference numbers in FIG. 3. Each of the removable wall panels **76**, **78** and **80** is provided, at its upper end, with a hook-shaped member **82** which disengageably connects the wall panel to the upper portion of the cabinet structure **10** so that the wall panel hangs vertically downwardly therefrom. Referring to FIG. 6, it will be seen that the hook-shaped member **82** on the wall panel **78** receivably engages the up-turned flange **72** of the top **68** to support the wall panel **78**. Thus, the wall panel **78** may be pivoted about the flange **72** in the direction of the arrow **84** and then lifted in the direction of the arrow **86** to disengage the member **82** from the up-turned flange **72**. Each of the wall panels **76**, **78** and **80** is provided, at its lower end, with a latch mechanism **88**, such as the latch mechanism shown in detail in FIG. 7, which secures the lower end of the wall panel to the lower frame **22**.

Referring to FIG. 7, it will be seen that the illustrative latch mechanism **88** comprises a member **90** mounted on the wall section **78** for sliding movement in the direction of the arrow **92**, the lower portion **94** of the member **90** being receivably engaged by a slot **96** in the lower frame **22**. The upper portion **98** of the member **90** is turned outwardly and downwardly as shown in FIG. 7 to provide a hand gripping means for lifting the lower portion **94** of the member **90** out of engagement with the slot **96**. The member **90** is slidably mounted on the wall panel **78** by means of a screw **100** and nut **102**, the screw **100** being slidably received in a vertically extending slot **104** in the member **90**.

Each of the wall panels **76**, **78** and **80** includes a center wall section **106** and a pair of outer wall sections **108** as shown in FIG. 3. The upper ends of the wall sections **106** and **108** of each wall panel **76**, **78** and **80** are rigidly fastened to the lower edge of the hook-shaped member **82** carried at the top of the wall panel. Specifically, each inner wall section **106** is riveted to a hook-shaped member **82**, as indicated by the reference number **110** in FIG. 6, and its mating outer wall sections **108** are riveted to the member **82**, as indicated by the reference number **112** in FIG. 6. Each of the wall panels **76**, **78** and **80** is provided, at its lower end, with a transverse member **114**, to which its inner wall section **106** and outer wall sections **108** are rigidly fastened. Referring to the illustrative structure of FIG. 7, it will be seen that the inner wall section **106** is riveted to the transverse member **114** as indicated at **116** and its mating outer wall sections **108** are riveted to the transverse member as indicated at **118**. The rivet-type connections **110**, **112**, **116** and **118** are well known and, therefore, do not need to be discussed, in detail, in this description.

To further strengthen the wall panels **76**, **78** and **80**, straps, such as those indicated by the reference number **120** in FIG. 3, are provided on each wall panel to secure its inner wall section **106** to its outer wall sections **108**.

As further seen in FIG. 3, the side wall sections **76** and **78** are provided with louvers **122** at their upper ends. The louvers **70** and **122** provide for ventilation of the electronic equipment and the like stored in the cabinet structure.

In some cases, it may be desirable to support the cabinet structure **10** on casters as shown in FIGS. 8 and 9. In the embodiment of FIG. 8, the caster, indicated generally by the reference number **124**, is mounted on the underneath side of the gusset plate **46** which is mounted on the lower, horizontal flanges of the structural members **36** and **40**. The caster **124** may be mounted to the gusset plate **46** by means such as the screws **126** and nuts **128**. It will be seen that the embodiment of FIG. 9 is the same as the embodiment of FIG. 8 except that the gusset plate **46** is fastened to the upper, horizontal flanges of the structural members **36** and **40**. In other words, in the embodiment of FIG. 9, the lower frame **22** is inverted from its position shown in FIGS. 2 and 8 and, consequently, in the embodiment of FIG. 9, the cabinet structure **10** is movably carried closer to the floor level, indicated by the reference number **130**.

The horizontal track element **66**, shown in FIGS. 2 and 10, is provided with upper and lower, horizontally extending grooves **132** which are arranged slidably to receive identification plates (not shown) and the like at the upper front portion of the cabinet structure **10**. The upper portion **134** of the track element **66** is proportioned and arranged to hook over the up-turned flange **72** which extends along the front of the top **68**. The back side of the track element **66** is provided with a longitudinally extending T-slot **136** which slidably receives screws **138** which extend through holes **140** (FIG. 2) in the upper frame **20**. In the illustrative embodiment of FIG. 10, each of the screws **138**, which is held in its hole **140** by a nut **142**, is provided with a head **144** having a spring-like appendage **146** which frictionally engages the T-slot **136** to hold the screw **138** in a desired position within the T-slot **136**. The head **144** is elongated in the direction of the T-slot **136** so that, when the head is moved into the T-slot and the appendage **146** is sprung back in the direction of the arrow **148**, the upper edge **150** of the head **144** is urged against the top of the T-slot **136** and the lower edge **152** of the head **144** is urged against the bottom of the T-slot **136**.

Referring now to FIG. 11, it will be seen that the vertically adjustable platform **14** is mounted on a pair of brackets **154** and **156** for sliding movement in the direction of the arrow **18**. The brackets **154** and **156** are supported for vertical movement in the track elements **32** carried by the corner posts **24** and **30**, respectively. As seen in FIG. 11, a headed bolt **158** and a slide member **160** are arranged for vertical movement in each track element **32**. A nut **162** is threadedly engaged with each bolt **158** so that when the nut is tightened on the bolt the slide member **160** is wedged into the track element **32** and, therefore, will not slide along the track element. As further seen in FIG. 11, one of the bolts **158** penetrates the rear flange **164** of the bracket **154** and another of the bolts **158** penetrates the flange **166** of the bracket **156**. Thus, by loosening the nuts **162**, the brackets **154** and **156** may be raised and lowered.

The platform **14** is provided with a track element **168**, similar to the track elements **32**, on each side thereof. A pair of headed bolts and sliding members, similar to the headed bolts **158** and sliding members **160**, are carried in each track element **168** and nuts **170**, similar to the nuts **162**, are threadedly engaged with the bolts. Thus, by loosening the nuts **170**, the platform **14** may be moved in the direction of the arrow **18**.

What is claimed is:

1. A cabinet structure comprising a pair of horizontally disposed, generally rectangular frames, one frame being congruently disposed above the other, said one frame being spaced a vertical distance above the other, four corner posts connected to and between said frames and supporting said one frame, removable side and rear wall panels, hook means for disengageably connecting each of said wall panels to said one frame to hang vertically downwardly therefrom, each of said wall panels being provided, at its lower end, with a latch mechanism, said latch mechanism being engageable with said other frame, thereby holding said wall panel against pivotal movement outwardly from said other frame.

2. A cabinet structure as in claim **1** further comprising a vertical track element carried by each of said corner posts, each of said track elements being effective to stiffen the corner post on which it is carried, and vertically adjustable platform means, the track elements carried on the front corner posts providing parallel guideways cooperatively for adjustably supporting said platform means.

3. A cabinet structure comprising a frame assembly comprising identical upper and lower, generally rectangular, horizontally disposed frames, said upper frame being superposed above said lower frame, four identical, vertically standing corner posts for connecting said upper and lower frames and supporting said upper frame, each of said frames comprising front, rear and side structural members, each of said structural members having a flange at each end which is substantially perpendicular to the longitudinal direction of said member, and gusset plates connecting said structural members so that a pair of said end flanges is provided in each corner of said frame, said pair of end flanges in each corner being held mutually perpendicular to provide a receptacle for one end of one of said corner posts, each end of each corner post being provided with a pair of longitudinally extending, mutually perpendicular mounting flanges, each mounting flange being parallel to and abutting one of said end flanges, means for clamping each mounting flange to its abutting end flange, each of said clamping means including at least one element penetrating the abutting mounting flange and end flange, and means for placing said element in tension, said last-mentioned means being engageable with said abutting mounting flange and end flange, a top for said cabinet structure, said top being mounted on said upper frame and having an up-turned flange extending alongside each of said structural members of said upper frame, removable rear and side wall panels, each of said wall panels being provided, at its upper end, with a hook-shaped element for receiving one of said flanges of said top, thereby permitting said wall panel to hang vertically downwardly from said top, each of said wall panels being provided, at its lower end, with latch means for engaging said lower frame, thereby securing the lower end of said wall panel against movement outwardly from said lower frame.

4. A cabinet structure as in claim 3 further comprising a vertical track element carried on each of said corner posts, each of said track elements acting as an additional stiffening member for the post on which it is carried, a vertically adjustable platform, said platform being supported on the track elements carried on the front corner posts.

5. A cabinet structure as in claim 3 wherein said element penetrating said abutting mounting flange and end flange in a bolt extending through aligned holes in said flanges, said holes having a diameter sufficient to prevent substantial perimetral engagement of said bolt by said abutting flanges, thereby preventing shear forces from being exerted on said bolt when cabinet structure is racked, said bolt being substantially perpendicular to said abutting flanges.

6. A cabinet structure as in claim 5 wherein said structural members are inwardly opening channel members, wherein said corner posts are inwardly opening channel members, wherein each end of said corner posts

is received in one of said receptacles to provide a smooth, substantially square corner, wherein all of said clamping means are carried within the flanges of said structural members and said corner posts.

7. A cabinet structure as in claim 6 wherein said gusset plates of said lower frame are connected to the upper flanges of said structural members, and wherein said cabinet structure further comprises casters, one of said casters being mounted on the underneath side of each of said gusset plates of said lower frame, the wheels of said casters extending just slightly below the bottom flanges of said structural members.

8. A cabinet structure including a frame structure comprising a pair of horizontally disposed polygonal frames, one frame being congruently disposed above the other, said one frame being spaced a vertical distance above the other, and a corner post connected to and between each of the vertically aligned pairs of corners of said frames, said corner posts being arranged rigidly to support said one frame above said other frame, removable wall panels, means for pivotally and disengageably connecting each of said wall panels to one side of said one frame to suspend said wall panels, and each of said wall panels being provided with a latch mechanism, said latching mechanism being engageable with said frame structure thereby releasably to hold said wall panel against pivotal movement outwardly therefrom.

9. A cabinet structure as in claim 8 wherein said frames are generally rectangular, each of said frames comprising front, rear and side structural members and means for connecting said members so that, at each corner of said frame, the adjacent ends of said members define a receptacle for one of said corner posts, and means for clamping each end of each corner post in one of said receptacles.

10. A cabinet structure as in claim 9 wherein each of said members has a flange at each end which is substantially perpendicular to the longitudinal direction of said member, wherein each end of each corner post is provided with a pair of longitudinally extending, mutually perpendicular mounting flanges, each mounting flange being parallel to and abutting one of said end flanges, and wherein each clamping means comprises at least one element penetrating each mounting flange and its abutting end flange and means for placing said element in tension, said last-mentioned means being engageable with said abutting mounting flange and end flange.

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