Jan. 10, 1967 L. J. FAY 3,297,383

CORNER CONSTRUCTION FOR A CABINET

Filed April 29, 1965 4 Sheets-Sheet 1

FIG. 2

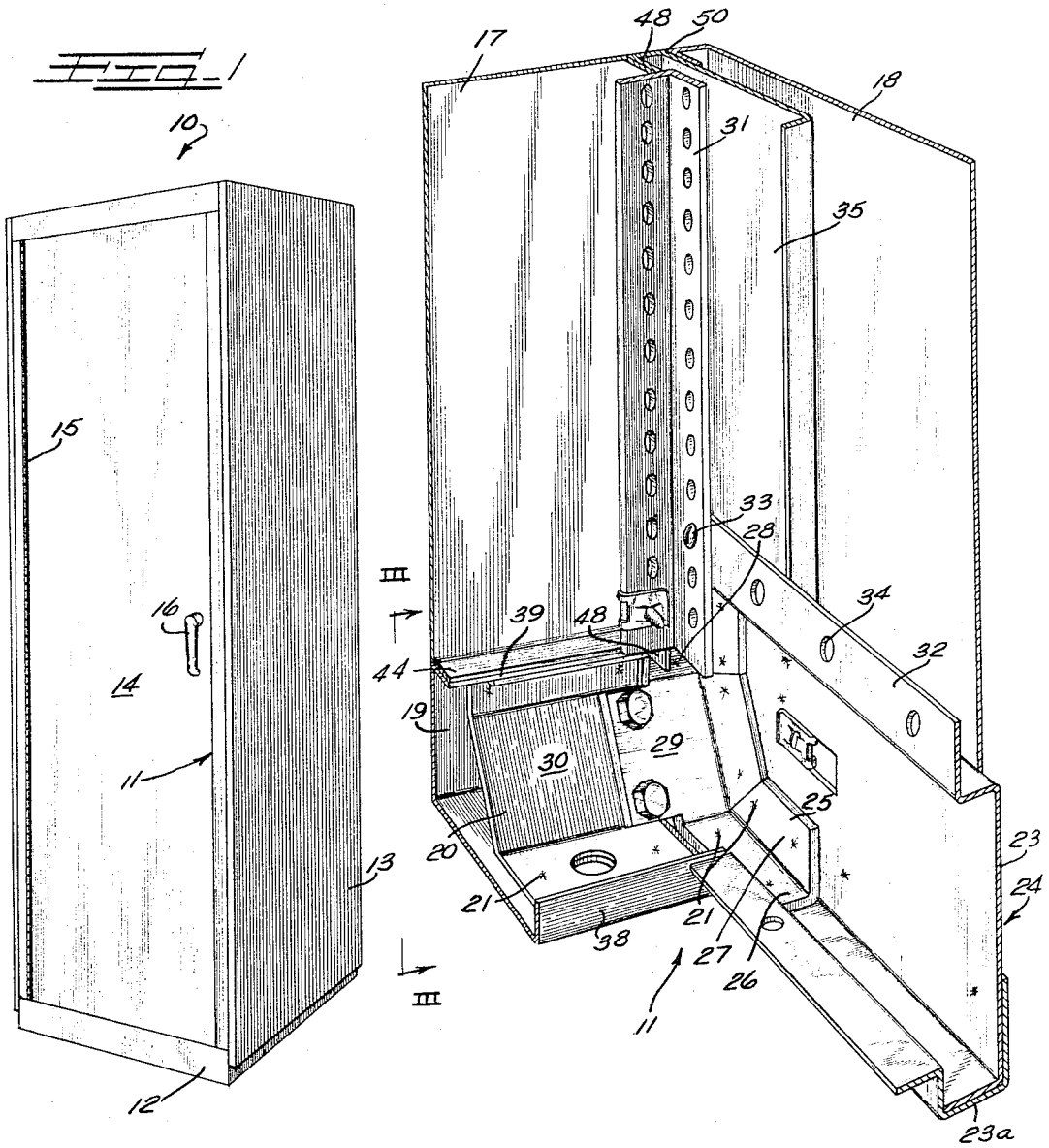


FIG. 1

INVENTOR.
Lawrence J. Fay

BY Hill Sherman Meroni Gross & Simpson ATTORNEYS

Jan. 10, 1967 L. J. FAY 3,297,383

CORNER CONSTRUCTION FOR A CABINET

Filed April 29, 1965 4 Sheets-Sheet 2

FIG. 4

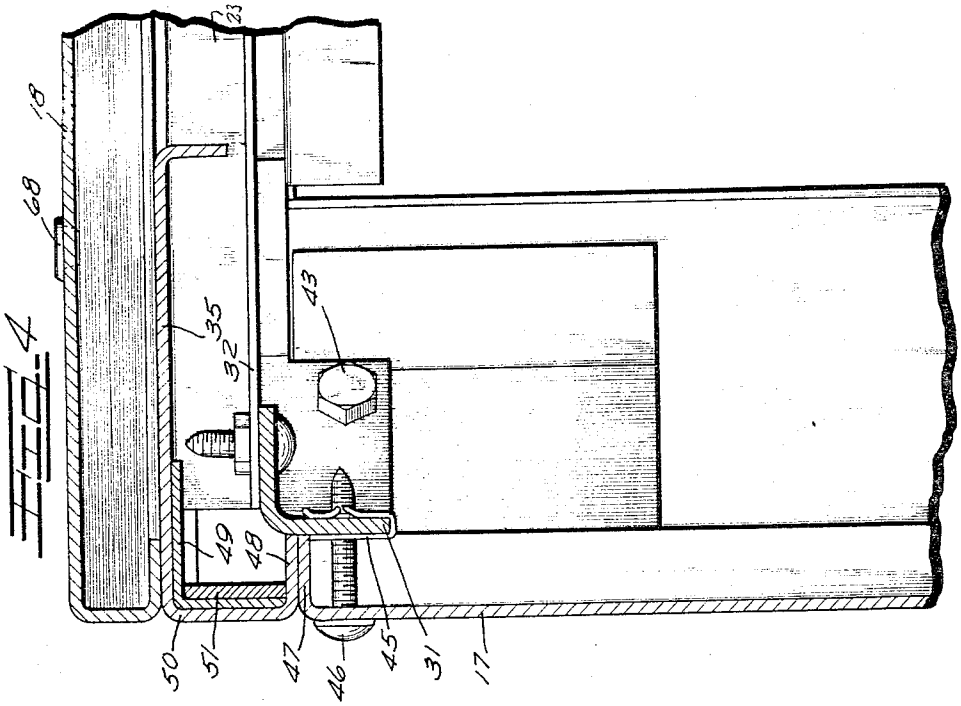
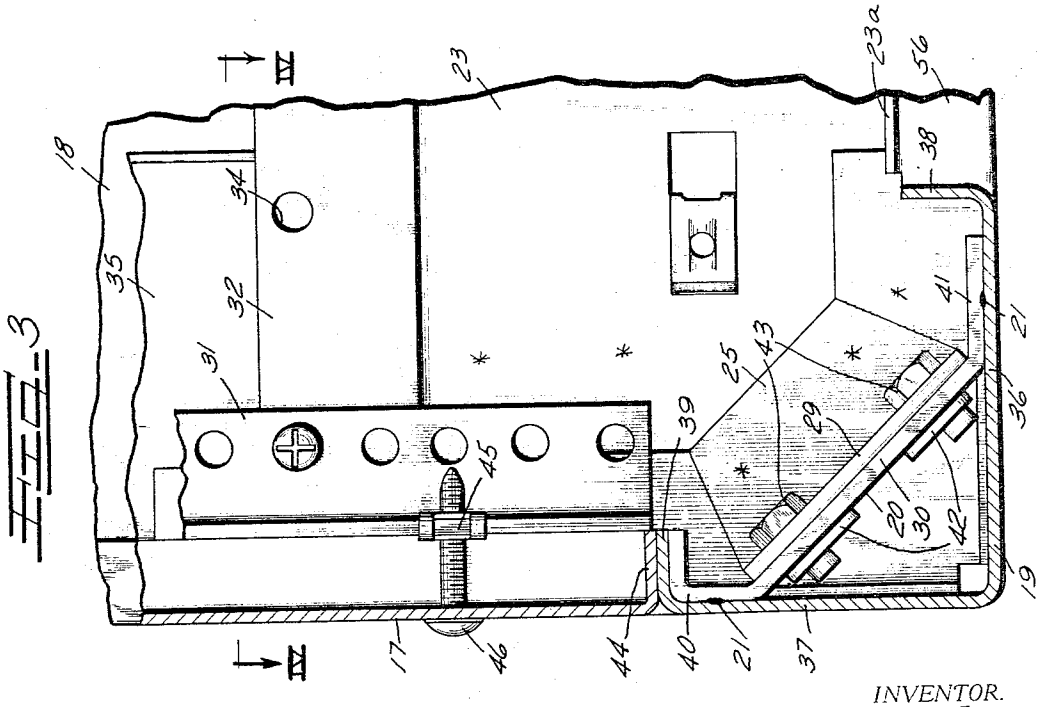


FIG. 3



INVENTOR.
Lawrence J. Fay

BY Hill, Sherman, Meroni, Gross & Simpson ATTORNEYS

Jan. 10, 1967 L. J. FAY 3,297,383

CORNER CONSTRUCTION FOR A CABINET

Filed April 29, 1965 4 Sheets-Sheet 3

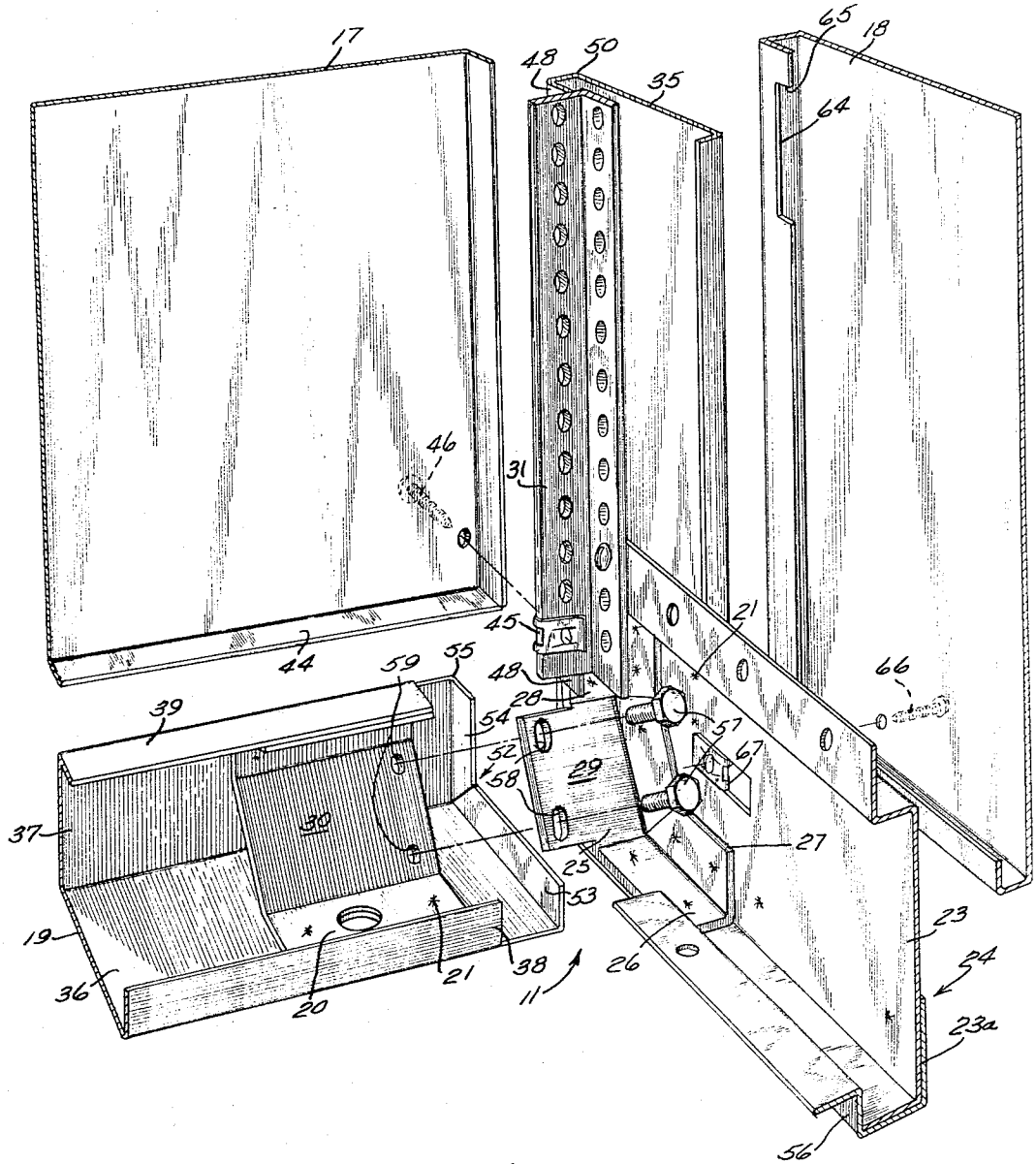


FIG. 5

INVENTOR.
Lawrence J. Fay

BY Hill, Sherman, Meroni, Gross & Simpson ATTORNEYS

Jan. 10, 1967 L. J. FAY 3,297,383

CORNER CONSTRUCTION FOR A CABINET

Filed April 29, 1965 4 Sheets-Sheet 4

FIG. 6

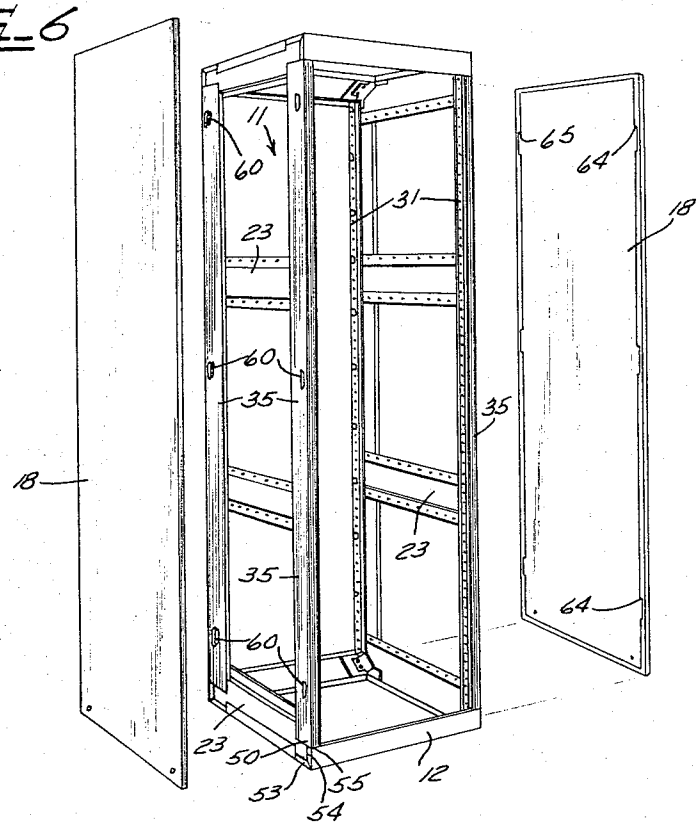
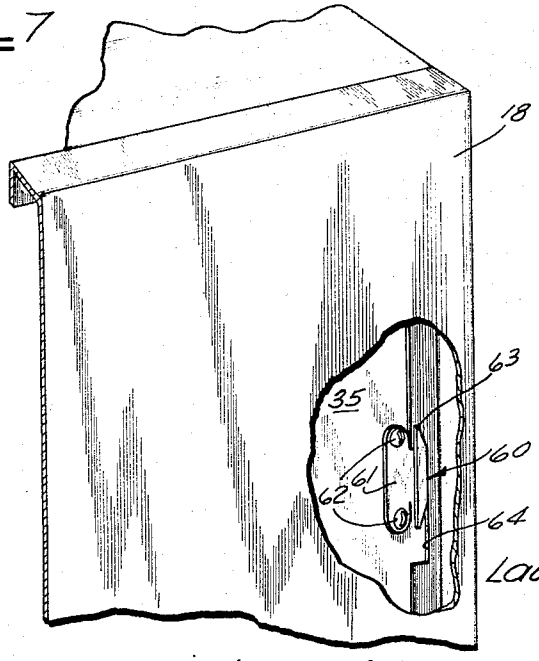


FIG. 7



INVENTOR.
Lawrence J. Fay

BY Hill, Sherman, Meroni, Gross & Simpson ATTORNEYS

United States Patent Office 3,297,383 Patented Jan. 10, 1967

3,297,383

CORNER CONSTRUCTION FOR A CABINET

Lawrence J. Fay, Elgin, Ill., assignor to Equipto Electronics Corporation, Aurora, Ill., a corporation of Illinois

Filed Apr. 29, 1965, Ser. No. 451,796
13 Claims. (Cl. 312—257)

This invention relates generally to a new and improved enclosure or cabinet and more particularly to a cabinet frame construction which resists distortion.

Various types of enclosures or cabinets have been used in the past for housing electronic and instrumentation equipment. In general, when it was desired to house relatively light units, it was possible to mount such light units within a simple and easily constructed cabinet which was of the modular construction type. These types of cabinets are usually quickly and readily assembled, since in most cases the individual elements are held together by nut and bolt or similar fastening arrangements. However, because of the various forces which occur under loading, the use of such cabinets is restricted to the housing of only lightweight units. If relatively heavier units were housed in this lightweight, modular constructed cabinet, pronounced swaying and twisting of the cabinet structure would occur.

To provide for the housing of relatively heavy equipment there is available at the present time numerous types of cabinets or enclosures which utilize welded joints instead of nut and bolt fastening as in the lightweight cabinets. The welded joint type of structure provides a very rigid cabinet capable of withstanding substantial loading. However, in providing such a rugged structure, a sacrifice has been made in terms of economy and flexibility. That is, the rigid welded types of cabinets generally do not permit a wide degree of flexibility which is required to meet the specific needs of a particular user in the mounting of certain equipment within the cabinet.

It is, therefore, an object of the present invention to provide a new and improved enclosure frame which is better able to resist undesired movement of the frame when equipment is mounted in the enclosure.

It is another object of this invention to provide a rigid enclosure which is capable of easy assembly.

A further object of this invention is to provide an economical and rigid enclosure which lends itself to modular construction and a high degree of flexibility.

A still further object of the present invention is to provide a rigid corner construction for the stiffening of cabinet frames.

In accordance with the general features of the present invention, there is provided an enclosure frame with a corner construction having a pair of flanged corner brackets which rigidly prevent the enclosure from swaying or twisting under loaded conditions. The enclosure frame also provides rigid side struts to restrict a deflecting force tending to deflect the cabinet frame from front to back. Cooperating with the side strut are a number of mounting angles used to mount equipment within the cabinet, the mounting angles being recessibly mounted on the side struts to provide an easily adjustable mounting assembly, able to accommodate a variety of uses. Angled support brackets on the enclosure frame permit the assembled enclosure frame to be entirely free of visible assembly screws or other fastening means.

Other objects and advantages of this invention and a fuller understanding of the nature thereof may be had by referring to the claims and to the following detailed description taken in conjunction with the accompanying drawings.

FIGURE 1 is a perspective view showing a basic unit or enclosure incorporating the features of the present invention;

FIGURE 2 is an enlarged fragmentary perspective view of an enclosure frame portion of the enclosure shown in FIGURE 1, illustrating a corner and two sides;

FIGURE 3 is an enlarged fragmentary view of the corner construction shown in FIGURE 2 as seen when looking in the direction indicated by the line and arrows III—III in FIGURE 2;

FIGURE 4 is an enlarged fragmentary cross-sectional view taken along the section line IV—IV in FIGURE 3;

FIGURE 5 is an exploded fragmentary perspective view of the enclosure frame portion shown in FIGURE 2;

FIGURE 6 is an exploded perspective view of the enclosure frame and side panels; and

FIGURE 7 is a cutaway view of the enclosure frame showing the mounting of a side panel on the enclosure frame.

Referring now to FIGURE 1, there is shown an enclosure or cabinet **10** which embodies the principles of this invention. Forming the basic components of the enclosure **10** is an enclosure frame **11** and a bottom portion **12**. A pair of side panels **13** are mounted on the enclosure frame **11** in such a manner that the fastening means required for such a mounting are not visible on the outer portion of the enclosure **10**. Between the side panels **13** there is a front panel or door **14** mounted by means of a hinge **15** which extends substantially the full length of the front portion of enclosure **10** so as to permit ready access to the inside of enclosure **10**. A handle **16** is provided on the door **14** in the usual manner.

In FIGURE 2 there is indicated a portion of the enclosure frame **11** including a back panel **17** and a side panel **18**. A back channel member **19** has a generally C-shaped bracket **20** securely mounted thereto by means of welds **21**. A bottom hole **22** in the channel **19** and bracket **20** may be used to securely mount the enclosure **10** in a relatively permanent position, or the hole **22** may be used for mounting a base or casters to the enclosure frame **11**.

A side strut **23** is securely attached to a U piece **23***a* by means of welds **21** to form a rigid side channel member **24**. A side bracket **25** has a bottom flange **26**, a side flange **27**, and a back flange **28** securely attached to the side strut **23** by welds **21**. A diagonal flange portion **29** of the side bracket **25** overlies and is in close relation to a diagonal portion **30** of the C-shaped bracket **20**.

For mounting equipment within the enclosure **10** there is indicated a panel mounting angle **31** which is fastened to an arm **32** of the side strut **23** by means of a fastener **33**. It may be noted that additional apertures **34** are provided at several positions on the arm **32** to accommodate the installation of additional panel mounting angles **31** so as to easily accommodate the mounting of sub-chassis equipment within the enclosure **10**. The panel mounting angle **31** is readily accessible from within the enclosure **10** and can simply and easily be moved from one position to the other on the arm **32** of the side strut **23**. A vertical frame member **35** is welded to the side strut **23** and extends substantially the full height of enclosure **10** to form the major vertical support therefor.

It is to be understood that FIGURE 2 illustrates the detail of one corner construction of the enclosure frame **11**, a similar construction being situated at each corner of the enclosure **10**.

FIGURE 3 illustrates the mounting of the C-shaped bracket **20**, the back channel member **19**, and the securing of bracket **20** to side bracket **25**. The back channel member **19** has an integral bottom leg **36**, a back leg **37** and upturned edges or flanges **38** and **39**. An L-shaped flange **40** extends from one side of the diagonal portion

30 of the C-shaped bracket 20. This L-flange 40 is immediately adjacent the upturned edge 39 and a portion of the back leg 37, the bracket 20 being securely attached to the back channel member 19 by means of welds 21. A bottom flange 41 extends from the lower end of the diagonal portion 30 and is welded to the bottom leg 36. A pair of threaded members 42 are securely attached to diagonal portion 30 to receive the bolts 43 which rigidly connect the diagonal flange portion 29 to the C-shaped bracket diagonal portion 30.

FIGURE 3 also illustrates the mounting of back panel 17 to the enclosure frame 11. As is most clearly shown in FIGURE 3 a leg 44 is immediately adjacent the upturned edge 39 of back channel member 19. A fastener 45 is mounted on the panel mounting angle 31 to receive a screw 46 which is first passed through an aperture in the back panel 17. It may be noted that this arrangement allows one to simply remove the back panel 17 from the enclosure frame 11 to gain access to the back portion of enclosure 10 if it is desired to service equipment contained therein, or to either add a new panel mounting angle 31 or change the position of the existing panel mounting 31 to another aperture 34 on the arm 32.

In FIGURE 4 there is shown the back panel 17 with a vertical leg 47 which is in contact with a side 48 of vertical frame member 35. It is understood, of course, that the back panel 17 extends to a second corner construction of the enclosure frame 11 and a similar vertical leg 47 would rest against a similar side 48 to position the back panel 17 within the enclosure frame 11. As has been noted, the back panel 17 is maintatined in this position by means of the fastener 45 and the screw 46. A vertical extension 49 of side strut 23 is secured by means of welds to a corner 50 of the vertical frame member 35. A reinforcing bar 51 is welded to the vertical extension 49 to prevent the extension 49 from moving in relation to the side strut 23, and to stiffen up the enclosure frame 11 so as to minimize front to back deflections.

The exploded view of FIGURE 5 very clearly shows the cooperation and interconnection of the parts forming one corner of the enclosure frame 11 as shown in the assembled view of FIGURE 2. As is clearly shown in FIGURE 5, the side strut 23 with side bracket 25 rigidly attached thereto fits within a pocket 52 formed in the back channel member 19. To form the pocket 52 the bottom leg 36 extends beyond the edge 38 and terminates in a wall 53. Similarly, the back leg 37 extends beyond the edge 39 and terminates in a wall 54. The pocket 52 within the channel 19 is thus formed by the walls 53 and 54, the edge 39, the C-shaped bracket 20, and the edge 38.

Placing of the side strut 23 in the pocket 52 provides a rigid and free standing corner formed by the back channel member 19 and the side channel member 24. To insure this tight fit the bottom portion of corner 50 of the vertical frame member 35 seats on a corner edge 55 formed by the back leg 37 and the side wall 54. This is most clearly shown in the exploded view of FIGURE 5. It may also be noted from FIGURE 1 that side 48 of the vertical frame member 35 extends into the pocket 52 immediately adjacent the upturned edge 39 of channel 19. Also, as most clearly shown in FIGURE 3, the wall 56 of side channel member 24 extends slightly into the pocket 52 to slightly overlap the upturned edge 38 of the back channel member 19.

To prevent the enclosure frame 11 from unwanted side sway and twisting, there is provided as shown in FIGURE 5 the C-shaped bracket 20 and the side bracket 25 which are securely welded to the back channel member 19 and the side channel member 24, respectively. The brackets 20 and 25 are securely and firmly fastened to each other by means of a pair of bolts 57 which pass through holes 58 in the flange portion 29 and holes 59 in the diagonal portion 30 to engage the threaded members 42 welded to the bottom side of bracket 20. Fully tightening the bolts 57 firmly locks the side bracket 25 to the C-shaped bracket 20. Thus, by providing the brackets 20 and 25 and pocket 52 the enclosure frame corner construction shown in FIGURE 5 locks equally in all directions to provide an economical and easily assembled cabinet or enclosure 10 which has the stability normally found in welded units.

In FIGURE 6 there is shown the means for attaching the side panels 18 to the enclosure frame 11 without the use of visible fasteners. The enclosure frame 11 is shown with the four vertical frame members 35 and the panel mounting angles 31. A number of angled support brackets 60 are secured at appropriate intervals to the vertical frame members 35. In the cutaway view of FIGURE 7, each of the angled support brackets 60 is shown as having a base 61 securely attached to the vertical member 35 by means of appropriate screws or fasteners 62. An upturned end 63 accommodates cutouts 64 on the side panel 18. The cutout 64 and angled support bracket 60 arrangement provides for the rather simple installation or removal of the side panels 18. To install the side panel 18, it is only necessary to lift the panel 18 until the top edge 65 of the cutout 64 is placed over the upturned end 63 of the angle brackets 60. In the seated position shown in FIGURE 7 the side panel 18 is supported on the enclosure frame 11 by means of the top edge 65 of cutout 64 seating on the upturned end 63. Removal of the side panel 18 to gain ready access to the interior of the enclosure 10 is, of course, accomplished by the reverse procedure.

To prevent the side panel 18 from being disengaged from the enclosure frame 11 during shipment of the enclosure 10, FIGURE 5 shows a locking screw 66 and a fastener 67 arrangement which fastens the side panel 18 to the side struct 23. After shipment and the enclosure frame 11 has been properly assembled with the side panel 18 mounted thereon, the locking screw 66 may be removed and, as illustrated in FIGURE 4, a plug 68 can be inserted into the side panel 18 to provide an enclosure 10 with no visible fastening means appearing on the outside surface thereof. The locking screw 66 not being needed, of course, because of the cutout 64 and angled support bracket 60 arrangement.

Referring again to FIGURE 6, it may be seen that there are a number of side struts 23 attached to the enclosure frame 11. These side struts 23 stiffen up the enclosure frame 11 and tend to minimize deflection of the enclosure 10 from a front to back direction. It can also be seen from FIGURE 6 that the panel mounting angles 31 are readily accessible within the enclosure 10, and can be moved and adjusted or an additional one can simply be added to accommodate various sub-chassis mounting requirements.

Although the drawings and specification present a detailed disclosure of preferred embodiments of the present invention, it is to be understood that the invention is not limited to the specific forms disclosed, but covers all modifications, changes and alternative constructions falling within the scope of the principles taught by the invention.

I claim as my invention:

1. In an equipment enclosure having a rectangular frame defining corners.

(a) said frame including at each of said corners a first channel member defining a pocket at one end thereof,

(b) a second channel member inserted into said pocket transverse to said first channel member,

(c) a first flanged bracket secured to said first member, and

(d) a second flanged bracket secured to said second channel member and having an integral flange portion rigidly secured to said first bracket forming an interlocking corner joint to substantially minimize distortion of said enclosure frame.

2. In an equipment enclosure having a rectangular frame defining corners,
(a) said frame including at each of said corners a first channel member having upturned edges,
(b) a first flanged bracket diagonally mounted within said first channel member and having an integral L-shaped flange at one end thereof, said L-shaped flange nestled within one of said upturned edges and rigidly secured thereto, and also having an integral bottom flange rigidly secured to said first channel member,
(c) a second channel member transverse to said first channel member, and
(d) a second flanged bracket secured to said second channel member and having an integral diagonal flange portion rigidly secured to said first bracket forming an interlocking corner joint to substantially minimize distortion of said enclosure frame.

3. In an equipment enclosure having a rectangular frame defining corners,
(a) said frame including at each of said corners a first channel member,
(b) a first flanged bracket secured to said first member,
(c) a second channel member forming back, bottom and side portions of said enclosure frame, and
(d) a second flanged bracket diagonally mounted within said second channel member and having integral back, bottom and side flanges secured to said second channel member, said second flanged bracket also having a diagonal flange portion securely attached to said first bracket forming an interlocking corner joint to substantially minimize distortion of said enclosure frame.

4. In an equipment enclosure having a rectangular frame defining corners,
(a) said frame including at each of said corners a first channel member having upturned edges,
(b) a first flanged bracket diagonally mounted within said first channel member and having an integral L-shaped flange at one end thereof, said L-shaped flange nestled within one of said upturned edges and rigidly secured thereto, and also having an integral bottom flange rigidly secured to said first channel member,
(c) a second channel member forming back, bottom and side portions of said enclosure frame, and
(d) a second flanged bracket diagonally mounted within said second channel member and having integral back, bottom and side flanges secured to said second channel member, said second flanged bracket also having a diagonal flange portion securely attached to said first bracket forming an interlocking corner joint to substantially minimize distortion of said enclosure frame.

5. In an equipment enclosure having a rectangular frame defining corners,
(a) said frame including at each of said corners a first channel member having upturned edges and defining a pocket at one end thereof,
(b) a first flanged bracket diagonally mounted within said first channel member and having an integral L-shaped flange at one end thereof, said L-shaped flange nestled within one of said upturned edges and rigidly secured thereto, and also having an integral bottom flange rigidly secured to said first channel member,
(c) a second channel member forming back, bottom and side portions of said enclosure frame, and inserted into said pocket transverse to said first channel member, and
(d) a second flanged bracket diagonally mounted within said second channel member and having integral back, bottom and side flanges secured to said second channel member, said second flanged bracket also having a diagonal flange portion securely attached to said first bracket forming an interlocking corner joint to substantially minimize distortion of said enclosure frame.

6. In an equipment enclosure having a rectangular frame defining corners,
(a) said frame including at each of said corners a first channel member forming integral back, bottom and side channel portions of said enclosure frame, said back and bottom portions terminating in upturned edges transverse respectively to said enclosure frame back and bottom, and defining a pocket with said side portion,
(b) a first flanged bracket mounted within said first channel member integrally including a diagonal portion extending from said back channel portion to said bottom channel portion adjacent said pocket, an L-shaped flange at one end of said diagonal portion secured to said back and upturned edge portions of said first channel members and a bottom flange at the other end of said diagonal portion secured to the first channel member bottom portion,
(c) a second channel member forming back, bottom and side channel portions of said enclosure frame and inserted into said pocket to form an interlocking engagement with respective portions of said first channel member, and
(d) a second flanged bracket within said second channel member and having integral back, bottom and side flanges secured to the corresponding respective portions of said second channel member, said second bracket also having a diagonal flange portion transverse to said side portion and securely attached to said first bracket diagonal portion so as to form a rigid interlocking corner joint to substantially minimize distortion of said enclosure frame.

7. In a knockdown equipment enclosure having a parallel sided frame defining at least one interlocking corner joint,
(a) said frame including a first channel member having means defining a pocket at one end thereof,
(b) a second channel member insertable into said pocket transverse to said first channel member,
(c) a first bracket permanently secured to said first channel member at one side of said pocket and having a diagonal portion extending diagonally of said first channel member,
(d) a second bracket permanently secured at one end to said second channel member and having an integral diagonal flange portion spanning said pocket and engageable in face-to-face relation to said diagonal portion on said first bracket, and
(e) detachable fastener means for securing said diagonal portion and said integral diagonal flange on said first and second channel members in face-to-face assembly to substantailly minimize distortion of said enclosure frame.

8. In a knockdown equipment enclosure having a parallel sided frame defining at least one interlocking corner joint,
(a) said frame including a first channel member comprising angular bottom and back legs terminating in turned flanges and with said bottom and back legs terminating in end walls spaced from ends of said turned flanges providing a pocket at one end of said first channel member,
(b) a second channel member insertable into said pocket transverse to said first channel member,
(c) a first bracket permanently secured to said first channel member at one side of said pocket and having a diagonal portion extending diagonally of said first channel member,
(d) a second bracket permanently secured at one end to said second channel member and having an integral diagonal flange portion spanning said pocket and engageable in face-to-face relation to said diagonal portion on said first bracket, and

(e) detachable fastener means for securing said diagonal portion and said integral diagonal flange on said first and second channel members in face-to-face assembly to substantially minimize distortion of said enclosure frame.

9. A knockdown corner joint for a knockdown equipment enclosure of the type having a parallel sided frame,

(a) the joint including a first channel member,

(b) a second channel member disposable at one end of said first channel member,

(c) a first bracket secured to said first channel member and having a diagonal portion extending diagonally of said first channel member,

(d) a second bracket secured to said second channel member and having a diagonal flange portion engageable in face-to-face relation with said diagonal portion on said first bracket, and

(e) knockdown fastener means securing said diagonal portion and said diagonal flange on said first and second channel members in face-to-face assembly to minimize distortion of said channel members upon loading.

10. In a knockdown equipment enclosure having a parallel sided frame defining at least one interlocking corner joint,

(a) said frame including a first channel member having means defining a pocket at one end thereof,

(b) a second channel member insertable into said pocket transverse to said first channel member,

(c) a first bracket permanently secured to said first channel member at one side of said pocket and having a diagonal portion extending diagonally of said first channel member,

(d) a second bracket permanently secured at one end to said second channel member and having an integral diagonal flange portion spanning said pocket and engageable in face-to-face relation to said diagonal portion on said first bracket, and

(e) detachable fastener means for compressively engaging said diagonal portion and said integral diagonal flange on said first and second channel members in face-to-face assembly to substantailly minimize distortion of said enclosure frame.

11. In an equipment enclosure having a rectangular frame defining corners,

(a) said frame including at each of said corners a first channel member,

(b) a second channel member transverse thereto,

(c) a first flanged bracket secured to said first member,

(d) a second flanged bracket secured to said second channel member and having an integral flange portion rigidly secured to said first bracket forming an interlocking corner joint to substantially minimize distortion of said enclosure frame,

(e) removable side panels having a locked position and a removable position on said frame, said panels including mounting apertures,

(f) locking means employed in said mounting apertures for rigidly locking said panels in said locked position, and

(g) removable plug means for engaging said mounting apertures in said removable position.

12. In an equipment enclosure having vertical frame members and panels for enclosing said frame members, the improvement comprising:

(a) said panels having an exterior surface with apertures and an interior edge with cutouts,

(b) locking means in said apertures to rigidly attach said panels to said frame members,

(c) supporting means mounted on said vertical frame members and engaging said interior cutouts for removably supporting said panels on said frame members in a supporting position, and

(d) removable plug means for engaging said panel apertures in said supporting position, and removable from said apertures when said locking means are utilized.

13. In a knockdown equipment enclosure having a parallel sided frame defining at least one interlocking corner joint,

(a) said frame including a first channel member having means defining a pocket at one end thereof,

(b) a second channel member insertable into said pocket transverse to said first channel member,

(c) a first bracket permanently secured to said first channel member at one side of said pocket and having a diagonal portion extending diagonally of said first channel member,

(d) a second bracket permanently secured at one end to said second channel member and having an integral diagonal flange portion spanning said pocket and engageable in face-to-face relation to said diagonal portion on said first bracket,

(e) detachable fastener means for securing said diagonal portion and said integral diagonal flange on said first and second channel members in face-to-face assembly to substantially minimize distortion of said enclosure frame, and

(f) a plurality of mounting arms positionably mounted in said frame to provide selective mounting for various sizes of equipment.

References Cited by the Examiner

UNITED STATES PATENTS

1,886,296	11/1932	Neir et al.	179—91
2,380,379	7/1945	Attwood	312—257 X
3,087,768	4/1963	Anderson et al.	312—263

CHANCELLOR E. HARRIS, *Acting Primary Examiner*

F. DOMOTOR, *Assistant Examiner.*