May 15, 1962 H. C. LYNCH 3,034,610

SHEET METAL STRUCTURES

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FIG. 2

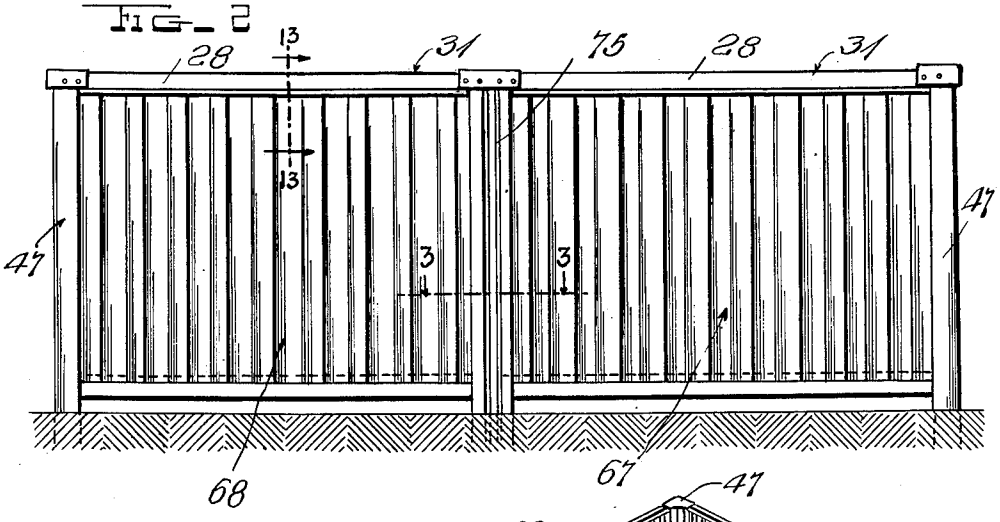


FIG. 1

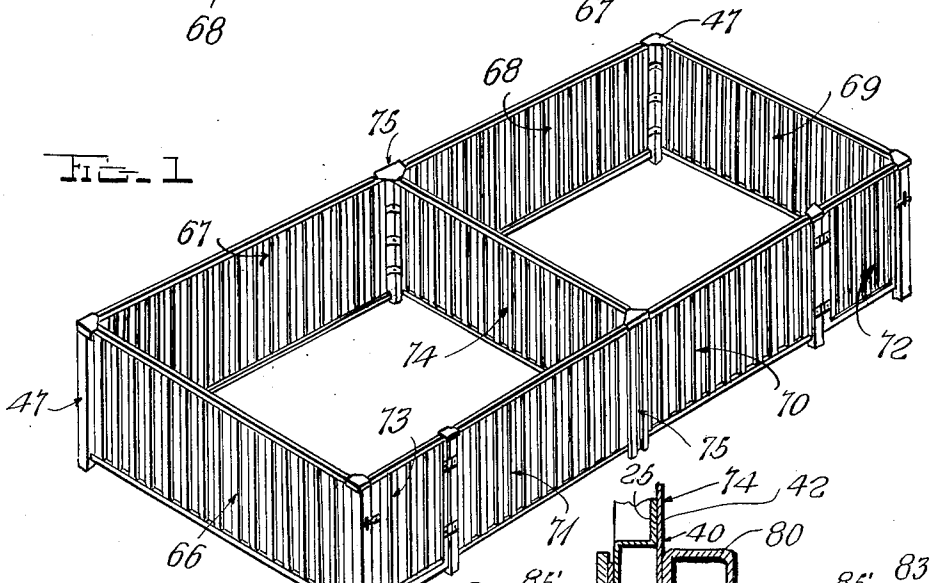


FIG. 4

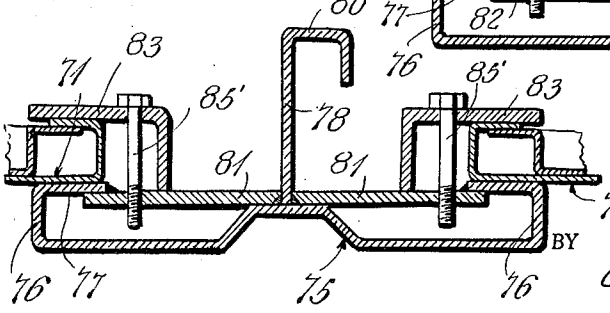
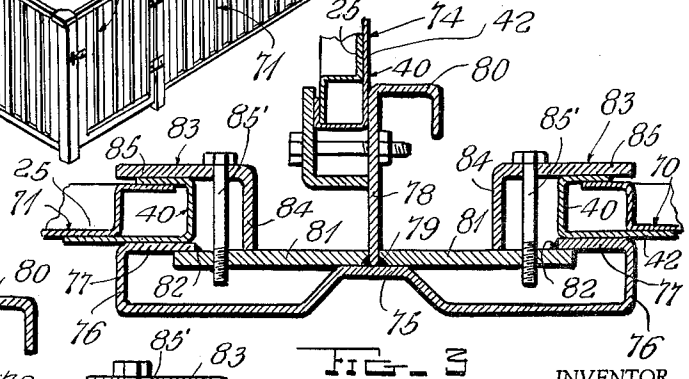


FIG. 3



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SHEET METAL STRUCTURES

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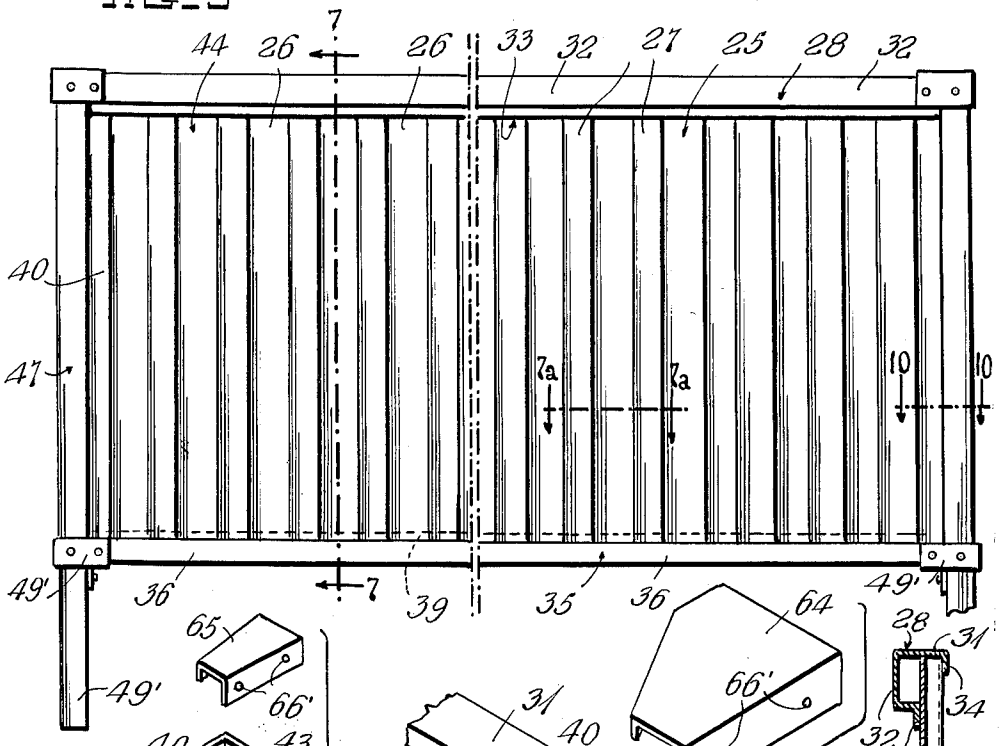
FIG. 5



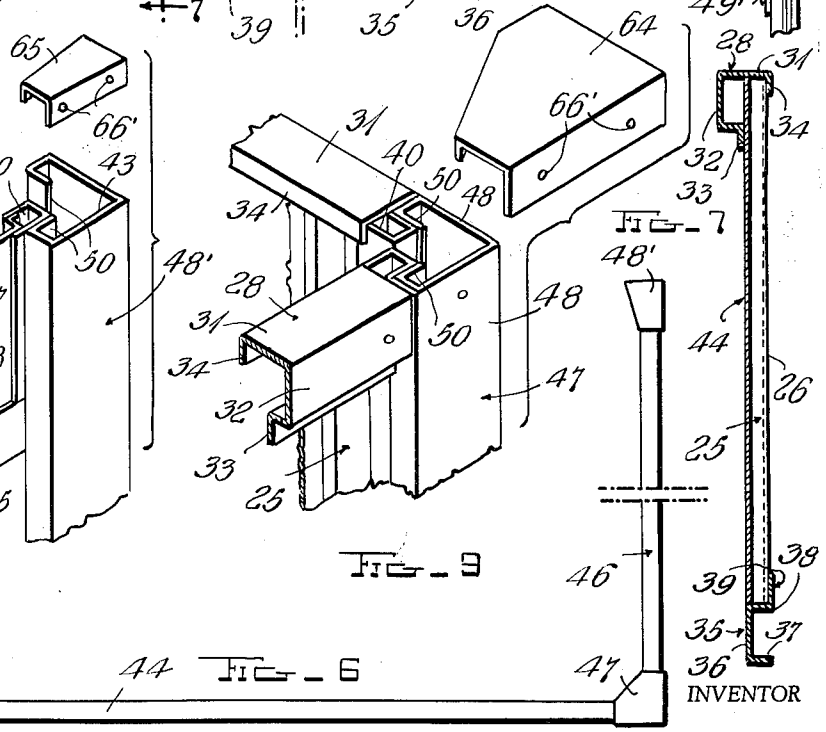


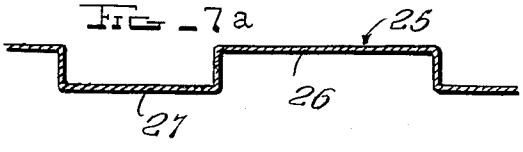
FIG. 8

FIG. 9

FIG. 7

FIG. 6

FIG. 7a



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SHEET METAL STRUCTURES

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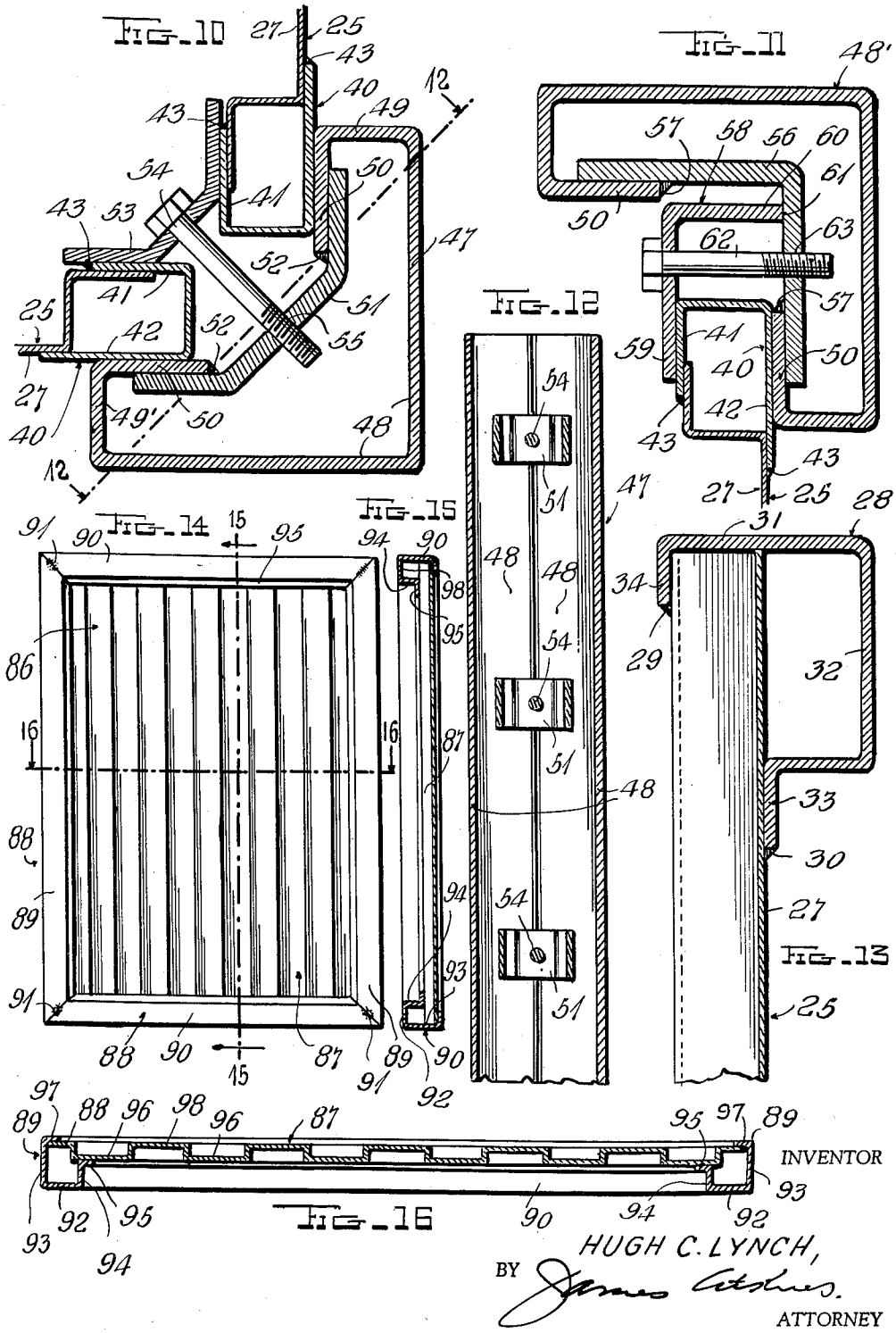

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SHEET METAL STRUCTURES

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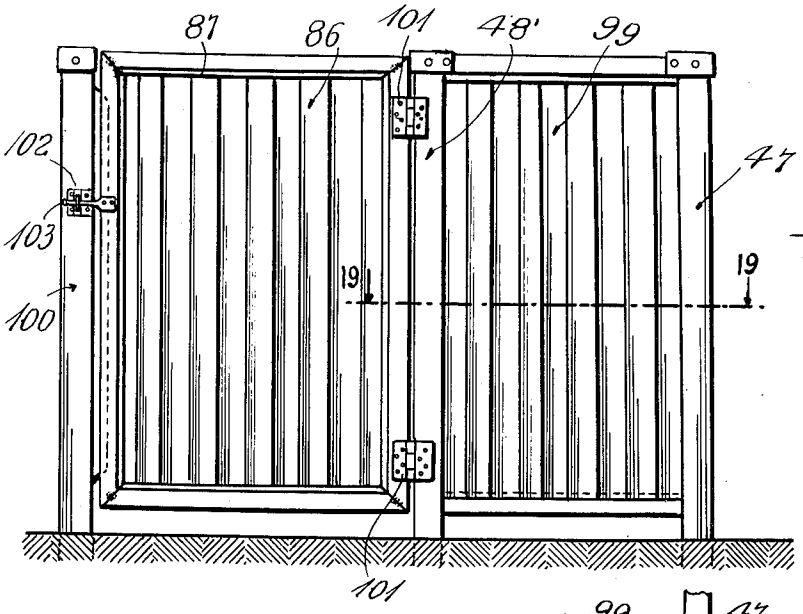


FIG. 17

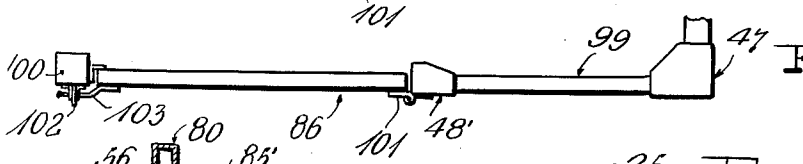


FIG. 18

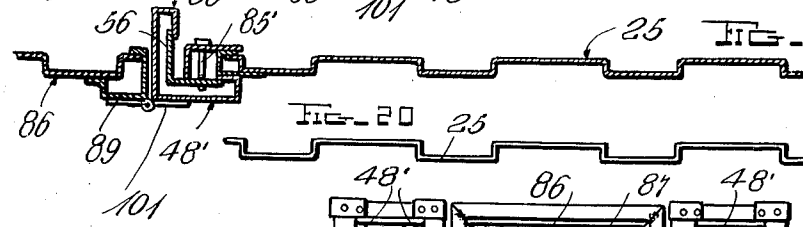


FIG. 19

FIG. 20

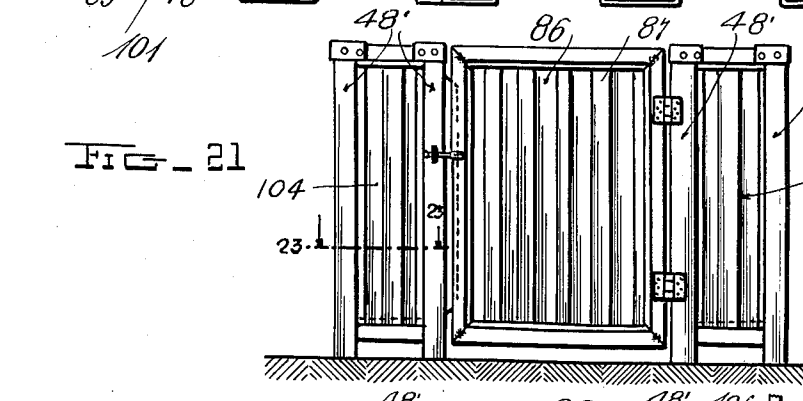
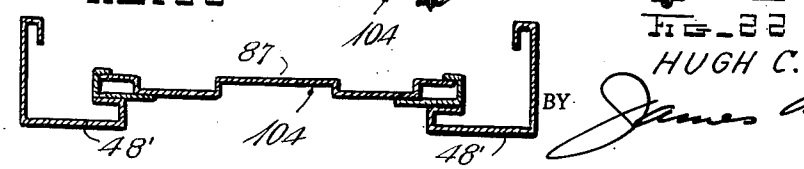


FIG. 21

FIG. 22

FIG. 23



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United States Patent Office 3,034,610 Patented May 15, 1962

3,034,610

SHEET METAL STRUCTURES

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Filed Jan. 20, 1960, Ser. No. 3,682
5 Claims. (Cl. 189—36)

The invention relates broadly to sheet metal structures, and more particularly to framed corrugated sheet metal panels and to posts and connecting means utilized with the panels and posts for erecting fence-like enclosures, building walls and the like.

An object of the invention is to provide a prefabricated relatively lightweight corrugated sheet metal panel, including a rigid marginal frame, permanently secured thereto, the panel being adapted for use in conjunction with novel connecting means in the erection of fences, industrial fence type enclosures, building walls, doors, gates and the like.

A further object of the invention is to provide sheet metal posts and friction type clamp elements for use in conjunction with the prefabricated framed sheet metal panels for building fence type enclosures and the like, the construction being such that the posts need not be set with extreme accuracy, and the necessity for drilling holes for fastening elements in the panels and posts is entirely eliminated.

Another object of the invention is to provide structural assemblies of the above-mentioned character, wherein the prefabricated framed panels are readily adjustable relative to their supporting posts and also bodily removable or replaceable without disturbing the posts when required.

Still another object is to provide sheet metal structural means of the above-mentioned character, capable of a rather wide variety of uses, the structural means being extremely sturdy and durable, easy to erect and disassemble, readily transportable and economical to manufacture.

Other objects and advantages of the invention will become apparent during the course of the following detailed description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same.

FIGURE 1 is a perspective view of an enclosure constructed with the prefabricated panels, posts and associated elements in accordance with the invention.

FIGURE 2 is a side elevation, somewhat enlarged, of the enclosure shown in FIGURE 1.

FIGURE 3 is an enlarged fragmentary horizontal section taken on line 3—3 of FIGURE 2.

FIGURE 4 is a sectional view similar to FIGURE 3 with the central panel or partition shown in FIGURE 1 omitted.

FIGURE 5 is a side elevation of a modified three sided enclosure constructed in accordance with the invention.

FIGURE 6 is a plan view of the same.

FIGURE 7 is a vertical section taken on line 7—7 of FIGURE 5.

FIGURE 7*a* is an enlarged fragmentary horizontal section taken on line 7*a*—7*a* of FIGURE 5.

FIGURE 8 is an exploded fragmentary perspective view of an end post and associated elements employed in the enclosure of FIGURES 5 and 6.

FIGURE 9 is a similar view of a corner post and associated elements employed in the enclosure shown in FIGURES 5 and 6.

FIGURE 10 is an enlarged horizontal fragmentary section taken on line 10—10 of FIGURE 5.

FIGURE 11 is a similar section through one of the end posts and associated elements in FIGURE 6.

FIGURE 12 is a fragmentary vertical section taken on line 12—12 of FIGURE 10.

FIGURE 13 is an enlarged fragmentary vertical section taken on line 13—13 of FIGURE 2 and being typical of the construction in both forms of enclosures shown in FIGURES 1 and 6.

FIGURE 14 is a side elevation of a prefabricated framed corrugated sheet metal panel according to the invention, adapted to be used as a wall panel, gate, fence panel or the like.

FIGURE 15 is a vertical section taken on line 15—15 of FIGURE 14.

FIGURE 16 is a horizontal section taken on line 16—16 of FIGURE 14.

FIGURE 17 is a side elevation of an enclosure constructed according ot the invention and embodying an access gate.

FIGURE 18 is a plan view of the enclosure shown in FIGURE 17.

FIGURE 19 is an enlarged horizontal section taken on line 19—19 of FIGURE 17.

FIGURE 20 is an edge elevation of a corrugated sheet metal section employed in the panel illustrated in FIGURES 17 and 19.

FIGURE 21 is a side elevation of a further modified type of enclosure embodying a gate in accordance with the invention.

FIGURE 22 is a plan view of the same.

FIGURE 23 is an enlarged horizontal section taken on line 23—23 of FIGURE 21.

Referring to the drawings in more detail, particularly FIGURES 5 through 13, the numeral 25 designates a relatively light gage sheet metal panel element which is disposed vertically in use and corrugated throughout its length preferably in the manner shown in FIGURES 5 and 7*a*. The particular shape of the corrugations 26 and 27 may be varied as found desirable, but the corrugations are uniform throughout the length of the panel element 25, so that the same is of uniform overall thickness throughout its length. The panel element 25 may be formed in any desired length and height so that it may be utilized in fabricating any preferred multisided enclosure or wall structure, such as the three-sided partial enclosure shown in FIGURE 6.

As shown in typical FIGURES 8 through 13, the vertically corrugated panel element 25 for any side of the enclosure shown in FIGURE 6 carries a top rail 28 or frame member, permanently rigidly secured thereto by welding at 29 and 30. This top rail 28 is formed of relatively heavy gage sheet metal, and is quite rigid and extends continuously throughout the horizontal length of the particular panel element 25. The top rail 28 embodies an upper wall 31 which rests upon the top edge of the corrugated panel element 25, and an outer vertical wall 32 which is forwardly offset or spaced from the panel element 25, as shown. The top rail 28 has an integral depending vertical flange 33, welded to the corrugations 27 at 30. The top rail also includes an inner depending vertical flange 34 welded to the corrugations 26 at 29.

Each corrugated panel element 25 further embodies a rigid bottom rail or frame member 35, permanently rigidly secured thereto by welding. The bottom rail 35, FIGURE 8, is likewise formed of relatively heavy gage sheet metal and is coextensive with the top rail 28 and corrugated panel element. It comprises an outer vertical web 36, preferably flush with the outer corrugations 27, a bottom inwardly directed horizontal web 37, an upper horizontal web 38, upon which the lower edge of the corrugated panel element 25 rests, and an integral inner upstanding longitudinal flange 39, secured by welding to the inner corrugations 26.

With reference to FIGURES 10 and 11, each cor-

rugated panel element 25 further embodies end vertical rails or frame members 40 of generally U-shaped configuration and extending for the entire vertical height of the corrugated panel element and permanently rigidly secured thereto by welding. The end rails 40 are likewise formed of relatively heavy gage metal and are quite stiff or rigid. The opposite sides 41 and 42 of the end rails 40 are permanently rigidly secured by welding to the corrugated panel element 25, as at 43.

It may thus be seen that each side or section of the three-sided partial enclosure illustrated in FIGURES 5 and 6 embodies one of the corrugated panel elements 25 of the proper length, and such panel element is bounded at its marginal edges by the top and bottom rails 28 and 35 and by the end rails 40. These rails thus form a continuous marginal rectangular rigid frame for each panel element 25 of the enclosure or like structure.

The enclosure panels thus described are entirely unitary and prefabricated and can be made in any desired length, height or thickness, as should be obvious. These prefabricated panel sections are capable of a wide variety of uses, one such use being illustrated in FIGURES 5 and 6 for forming a three-side partial enclosure for industrial use or the like.

The partial enclosure of FIGURES 5 and 6 embodies front and side panel sections 44, 45 and 46, and each of these panel sections is constructed from one of the panel elements 25 and the associated rails 28, 35 and 40, previously described.

The partial enclosure of FIGURES 5 and 6 embodies a pair of corner posts 47 and a pair of end posts 48', which may be set in the ground as at 49' without the necessity for extreme accuracy in setting the posts.

With reference to FIGURE 10, each corner post 47 embodies a pair of main vertically extending webs 48, arranged at right angles and forming the outer finished corners of the enclosure shown in FIGURE 6. Each corner post 47 has inwardly directed vertical flanges 49, at right angles to the webs 48 and coextensive vertically therewith and with the panels 44, 45 and 46. Inner flange extensions 50, parallel to the webs 48 and at right angles to the flanges 49, are arranged for abutting engagement with the outer sides 42 of the vertical end rails 40 of the panels.

As best shown in FIGURE 12, a plurality of vertically equidistantly spaced brackets 51 are secured by welding at 52 to the flange extensions 50. The brackets 51 extend diagonally between the welds 52 as shown in FIGURE 10. A corresponding number of readily detachable diagonal friction clamp brackets 53 of a shape similar to the brackets 51 abut the inner sides 41 of end rails 40. The clamping brackets 53 are apertured for the reception of bolts 54, which have screw-threaded engagement at 55 within screw-threaded openings of the permanently attached brackets 51.

By means of the construction shown for the corner posts and clamping means in FIGURE 10, it should now be apparent that the prefabricated panels 44, 45 and 46 may be readily adjusted horizontally or endwise and also vertically somewhat with respect to the corner posts 47 before the panels are rigidly clamped in place by tightening of the bolts 54. With this arrangement, it is unnecessary that the various posts be set in the ground with extreme accuracy, and consequently, the enclosure may be erected by unskilled labor at a great saving of money.

With reference to FIGURE 11, each end post 48 may be identical in cross sectional shape with the corner posts 47, and need not therefore be described in further detail. An L-shaped bar 56, coextensive in length with the end post 48 is welded at 57 to the flange extensions 50, as shown. A plurality of separable L-shaped frictional clamping brackets 58, preferably corresponding in number and spacing to the brackets 53, are provided at the end posts, and one leg 59 of each such bracket clampingly engages the inner side 41 of end rail 40 of the adjacent

enclosure panel 45 or 46. The other leg 60 of each clamping bracket 48 engages the L-shaped bar 56 at 61. Each bracket 58 has its leg 59 apertured for the reception of a horizontal bolt 62, the latter having screw-threaded engagement at 63 within a screw-threaded opening formed through the L-shaped bar 56.

Prior to tightening the clamping bolts 62 of each end post 48, the enclosure panels 45 and 46 may be adjusted relative to the end posts 48 in generally the same manner described in connection with the adjustment of the panels relative to the corner posts 47.

With reference to FIGURES 8 and 9, sheet metal finishing caps 64 and 65 for the corner and end posts 47 and 48 are preferably provided. These finishing caps have outer vertical flanges 65, apertured at 66' for the reception of sheet metal screws or the like, used to attach the finishing caps to the respective corner and end posts. The finishing caps are also shown in FIGURES 5 and 6 of the drawings.

In connection with the invention thus far described, it should be understood that the prefabricated panels and associated corner and end posts and their frictional clamping means may be utilized to form fence-like enclosures of any desired size and shape, as well as partial enclosures of the type illustrated in FIGURE 6.

With reference to FIGURES 1 through 4, a modified type of industrial enclosure or the like has been shown, utilizing the same basic type of panel, post and frictional clamping means, described in detail in connection with FIGURES 5 through 13.

The enclosure shown in FIGURE 1 embodies panels 66, 67, 68, 69, 70 and 71, all constructed in the same manner as previously described in connection with FIGURES 5 through 13. The enclosure of FIGURE 1 also embodies a plurality of the corner posts 47 and associated elements, all previously described. Additionally, the enclosure of FIGURE 1 embodies a pair of gates 72 and 73, the detailed construction of which will be described hereinafter. The enclosure of FIGURE 1 also embodies a central or dividing panel 74, likewise identical in construction with any of the previously described panels 44, 45 or 46.

The employment of the panel 74 requires however the use of the enclosure of a pair of partition posts 75. With reference to FIGURE 3, each partition post 75 is formed of heavy gage sheet metal and includes vertically extending portions 76, generally U-shaped in cross section and having inner sides 77 to abut the sides 42 of panel end rails 40. An inwardly directed vertically extending post web 78 is welded to the post body portion 75 at 79. The web 78 carries a U-shaped extension 80, the side of which is adapted to abut the adjacent end rail 40 of partition panel 74. A plurality of vertically equidistantly spaced bracket plates 81 corresponding generally to the brackets 51 in number and spacing are welded to the post 75, centrally thereof, and at 82, as shown. Readily detachable L-shaped clamp brackets 83 having corresponding legs 84 engaging the rigid plate elements 81, and the other legs 85 of these clamp brackets clampingly engage the inner sides of the end rails 40 of the panels 70 and 71 or 67 and 68 to adjustably secure the same against post flanges 77. Bolts 85' engage through apertures in the clamp bracket legs 85 and have screw-threaded engagement with the plate elements 81 as shown in FIGURE 3.

In the light of the previous description in connection with FIGURES 5 through 13, it is believed that the construction in FIGURES 1 through 4 will be obvious without further discussion.

FIGURE 4 illustrates the same intermediate post 75 described in connection with FIGURES 1 and 3, but wherein the central dividing partition 74 has been omitted from the enclosure. All other parts are identical with those shown and described in connection with FIGURES 1 through 3.

In FIGURES 14 through 16 of the drawings, there is shown a preassembled sheet metal panel **86**, adapted to serve as a door or gate, such as the gates **72** and **73** shown in the enclosure of FIGURE 1, and the gate illustrated in FIGURES 17 through 23 to be described. The gate panel **86** is rectangular, as shown, and embodies a unitary relatively thin gage corrugated sheet metal panel element **87** substantially similar to the previously described panel element **25**. As shown in FIGURES 14 through 16, the corrugated panel element **87** has a rigid marginal frame **88**, including side frame members **89** and top and bottom frame members **90**, mitered and welded at **91**. The frame members **89** and **90** are identical in cross sectional shape, FIGURES 15 and 16, and comprise forwardly offset walls **92** and side or marginal walls **93**, integral therewith, and arranged at right angles to the walls **92**. Inwardly directed flanges **94** of the walls **92** carry flange extensions **95**, at right angles thereto, and abutting the forwardly projecting corrugations **96** of the panel element **87**, around all four sides of the prefabricated panel. The flange extensions **95** are secured to the corrugations **96** by skip welding or the like. Rear flange extensions **97** integral with the walls **93** overlap and abut the rear corrugations **98** of panel element **87** and are welded thereto around all sides of the panel **86**. The frame sides **89** and **90**, thus welded to the corrugated panel element **87**, render the prefabricated panel **86** extremely strong and durable, yet relatively lightweight.

FIGURES 17 through 20 illustrate a partial enclosure utilizing the prefabricated panel **86** as a horizontally swinging gate, in conjunction with another prefabricated pael **99**, made exactly in accordance with the prior description in connection with FIGURES 5 through 13. The embodiment of FIGURES 17–20 may also include one of the corner posts **47** and associated elements, previously described, one of the end posts **48'** and associated elements, and a suitable gate post **100**.

The gate panel **86** is hung from the forward face of the end post **48** by conventional hinges **101**, as shown in FIGURES 17 and 19. Conventional latch means **102** on the forward side of gate post **100** coacts with a suitable keeper **103** carried by the forward side and adjacent edge of the gate panel **86**.

In view of the detailed description relative to FIGURES 5 through 13, and FIGURES 14 through 16, no further description should be necessary in connection with FIGURES 17 to 20, which merely illustrate the utility of the prefabricated gate panel **86** in conjunction with the other prefabricated panels, posts and attaching means, all previously described.

FIGURES 21 through 23, like FIGURES 17–20, show a further embodiment of the invention, wherein the same gate panel **86** is utilized in conjunction with prefabricated panels **104** and **105**, made in accordance with the description relative to FIGURES 5 through 13. The same corner post **47** and associated elements and end posts **48** and associated elements are employed, and no further detailed description is believed to be necessary in connection with FIGURES 21–23, which merely show a further use of the gate panel **86**, generally in accordance with the description in FIGURES 17 through 20.

Referring once again to the constructions in FIGURES 5 through 13, which are basic to the invention, except for the modifications of FIGURES 14 through 16 and 1–4, it is desired to point out and emphasize that only certain preferred uses of the prefabricated panels and their supporting posts and clamping or attaching means have been illustrated in the drawings and described in the specification. It is also contemplated to use the prefabricated panels, such as panels **44**, **45** or **46**, in conjunction with the post and attaching or clamp means shown in FIGURES 5 through 13 for erecting the walls of readily dismantlable buildings of various types.

Toward this end, it is desired to point out in connection with FIGURES 5 through 13 that a plurality of the prefabricated panels **44**, **45** or **46** may be stacked vertically in edge-to-edge and side-by-side vertical relation, in conjunction with the same post and clamping or attaching means, shown in detail in FIGURES 10–12, for making the side walls of a building. To effect this, the posts **47** and **48** need only be made long enough to accommodate a plurality of the prefabricated panels stacked on edge vertically, and a correspondingly increased number of the clamping or attaching means shown in FIGURES 10 through 12 are also employed.

While I have shown and described sheet metal panel elements **25** provided with oppositely offset rectangular corrugations and being formed of a single section of sheet metal within a rigid frame, I wish to point out that it is within the scope of the invention to make the panel elements flat or uncorrugated and in one piece with suitable flanges formed at their opposite ends for attachment to the metal posts. I also contemplate making the panel elements **25** from a plurality of separately formed interconnected panel sections which may be either flat or corrugated and designed for attachment to the posts.

It is to be understood that the forms of the invention herewith shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A structural connection for posts and panels of a metallic enclosure comprising an upright member adapted to be anchored at its lower end and being generally T-shaped in cross section, said upright member including a frontal vertical web having a rearwardly offset rib portion at its transverse center extending longitudinally thereof, said upright member including vertical side substantially U-shaped channel portions extending longitudinally of said member in opposed relation and being inwardly open and having rear flanges spaced rearwardly of said offset rib portion and parallel thereto, said upright member having a rearwardly extending longitudinal vertical web secured to the back of said rib portion at right angles thereto and between the U-shaped channel portions, a plurality of vertically spaced flat bracket plates rigidly secured to the back of said rib portion and projecting laterally upon opposite sides of the rib portion and rigidly secured to said rear flanges of said side channel portions, prefabricated metallic panel elements including end vertically extending U-shaped frame members, said frame members abutting the backs of the rear flanges of the channel portions and one side of said rearwardly extending vertical web, a corresponding number of L-shaped clamp brackets disposed in vertically spaced relation adjacent said bracket plates and having corresponding legs thereof clampingly engaging said U-shaped frame members and having other corresponding legs engaging said bracket plates and said rearwardly extending web edgewise, and bolts detachably interconnecting said clamp brackets, bracket plates and said rearwardly extending web, whereby the upright member is detachably rigidly secured to said prefabricated panel elements with a pair of said elements parallel to the frontal vertical web of the upright member and rearwardly offset therefrom and another of the panel elements extending at right angles to said frontal vertical web and rearwardly thereof.

2. A structural connection for posts and panels of a metallic enclosure comprising an upright member adapted to be anchored at its lower end and having a frontal vertical web and a side vertical U-shaped channel portion coextensive with the vertical web and having a rear flange spaced rearwardly of the front vertical web, a plurality of vertically spaced flat bracket plates welded to the forward face of said rear flange and parallel to said frontal web and spaced therefrom, a prefabricated metallic panel element including an end vertically extending rigid U-

shaped frame member, said frame member abutting said rear flange of said U-shaped channel portion and coextensive therewith, a plurality of vertically spaced L-shaped clamp brackets corresponding in number to said bracket plates and arranged adjacent thereto and having corresponding legs clampingly engaging the rear sides of said U-shaped frame member and other corresponding legs abutting said bracket plates edgewise near and spaced from said frame member, and bolts detachably rigidly interconnecting said clamp brackets and said bracket plates between the second-named legs of the clamp brackets and said frame member of said panel elements.

3. A structural connection for posts and panels of a metallic enclosure comprising an upright member adapted to be anchored at its lower end and including a frontal vertical web having a rearwardly offset rib portion at its transverse center extending longitudinally thereof, said upright member having side vertical longitudinal U-shaped channel portions in opposed relation and being inwardly open and having rear flanges spaced rearwardly of said offset rib portion and parallel thereto, a plurality of vertically spaced flat bracket plates welded to the back of said rib portion and welded to the forward faces of said rear flanges of the side channel portions, prefabricated metallic panel elements including end vertical U-shaped frame members, said frame members abutting the backs of said rear flanges of said channel portions, a plurality of L-shaped clamp brackets disposed in vertically spaced relation adjacent said bracket plates and rearwardly thereof and having corresponding legs clampingly overlapping the rear sides of said frame members and having other corresponding legs engaging the backs of said bracket plates edgewise and spaced inwardly of said frame members, and a corresponding number of bolts detachably interconnecting said clamp brackets and bracket plates between the second-named legs of the clamp brackets and said frame members and being at right angles to the bracket plates and said frontal web and concealed rearwardly of said frontal web.

4. A structural connection for a post and panels of a metallic enclosure comprising an upright member generally L-shaped in cross section adapted to be anchored at its lower end and including vertical webs disposed at right angles and side channel portions carried by said webs and coextensive therewith, said channel portions having rear vertical flanges spaced inwardly of said webs and disposed at right angles to each other and spaced apart diagonally across the L-shaped upright member, a plurality of vertically spaced diagonal brackets welded to said rear flanges and having screw-threaded openings midway between said flanges and having terminal portions overlapping the forward sides of said rear flanges, a pair of prefabricated metallic panel elements including end vertical rigid U-shaped frame members, said frame members abutting the backs of said rear flanges and coextensive vertically therewith, said panel elements extending at right angles to each other, diagonal clamp brackets disposed adjacent to and rearwardly of the first-named brackets and having openings alignable with said screw-threaded openings and side terminal portions abutting the rear sides of said frame members clampingly and disposed at right angles to each other and parallell to said rear flanges, and a corresponding number of bolts extending through the openings of the clamp brackets and having screw-threaded engagement within said screw-threaded openings of the first-named brackets.

5. A structural connection for a post and panel comprising an upright member generally L-shaped in cross section adapted to be anchored at its lower end and including vertical webs arranged at right angles and side U-shaped channel portions carried by said webs and coextensive therewith, said channel portions having rear vertical flanges spaced inwardly of said webs and coextensive vertically therewith and disposed at right angle to each other and spaced apart diagonally across the L-shaped upright member upon the inner side thereof, a vertically extending L-shaped bar having webs overlapping the forward faces of said rear flanges and welded thereto and coextensive vertically therewith, a prefabricated metallic panel element including an end vertically extending U-shaped frame member, said frame member abutting the rear face of one of said rear flanges and coextensive vertically therewith, a plurality of vertically spaced L-shaped clamp brackets having corresponding legs clampingly engaging the rear side of said frame member and other corresponding legs abutting said L-shaped bar edgewise and spaced from said frame member, and a corresponding number of bolts detachably rigidly interconnecting the first-named legs of said clamp brackets with said L-shaped bar between said other legs of the brackets and said frame member.

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