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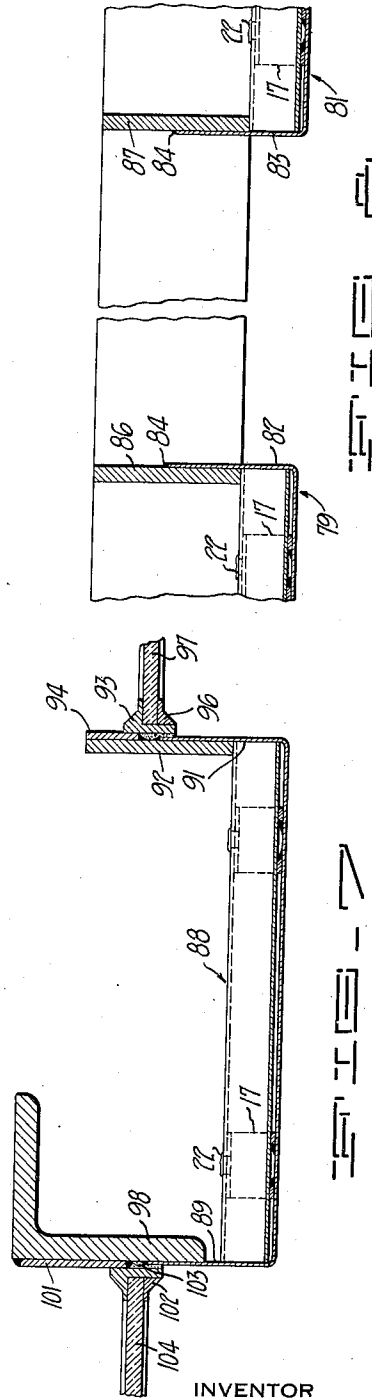
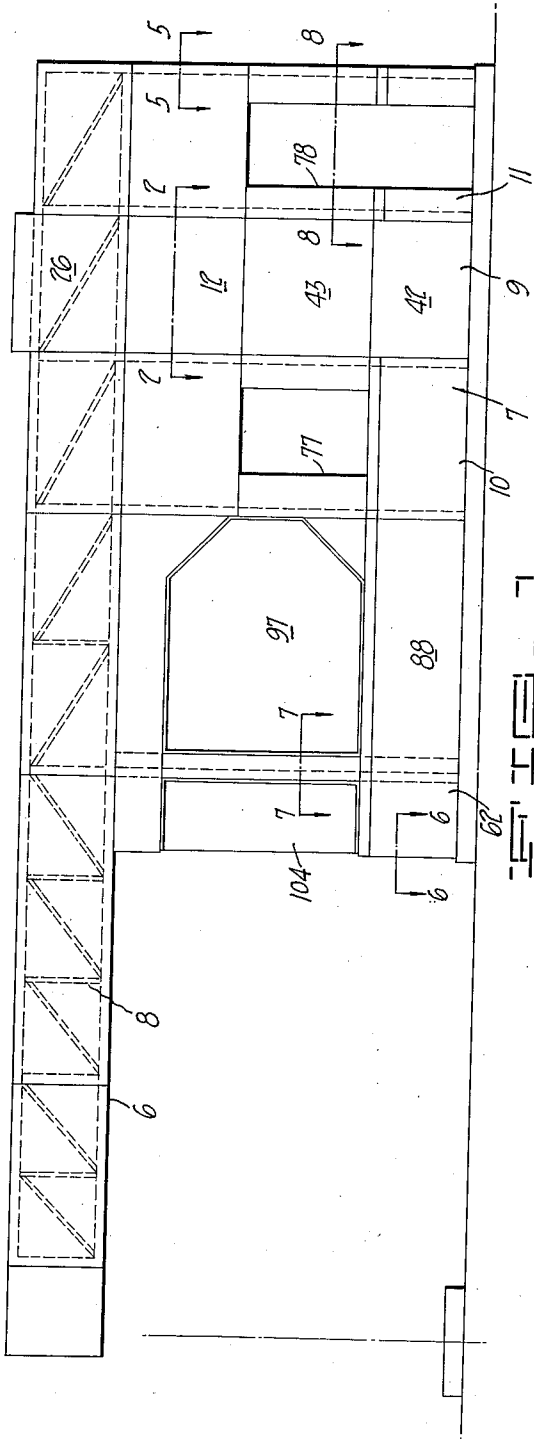
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2,195,655

BUILDING UNIT AND CONSTRUCTION

Filed June 5, 1939

3 Sheets-Sheet 1



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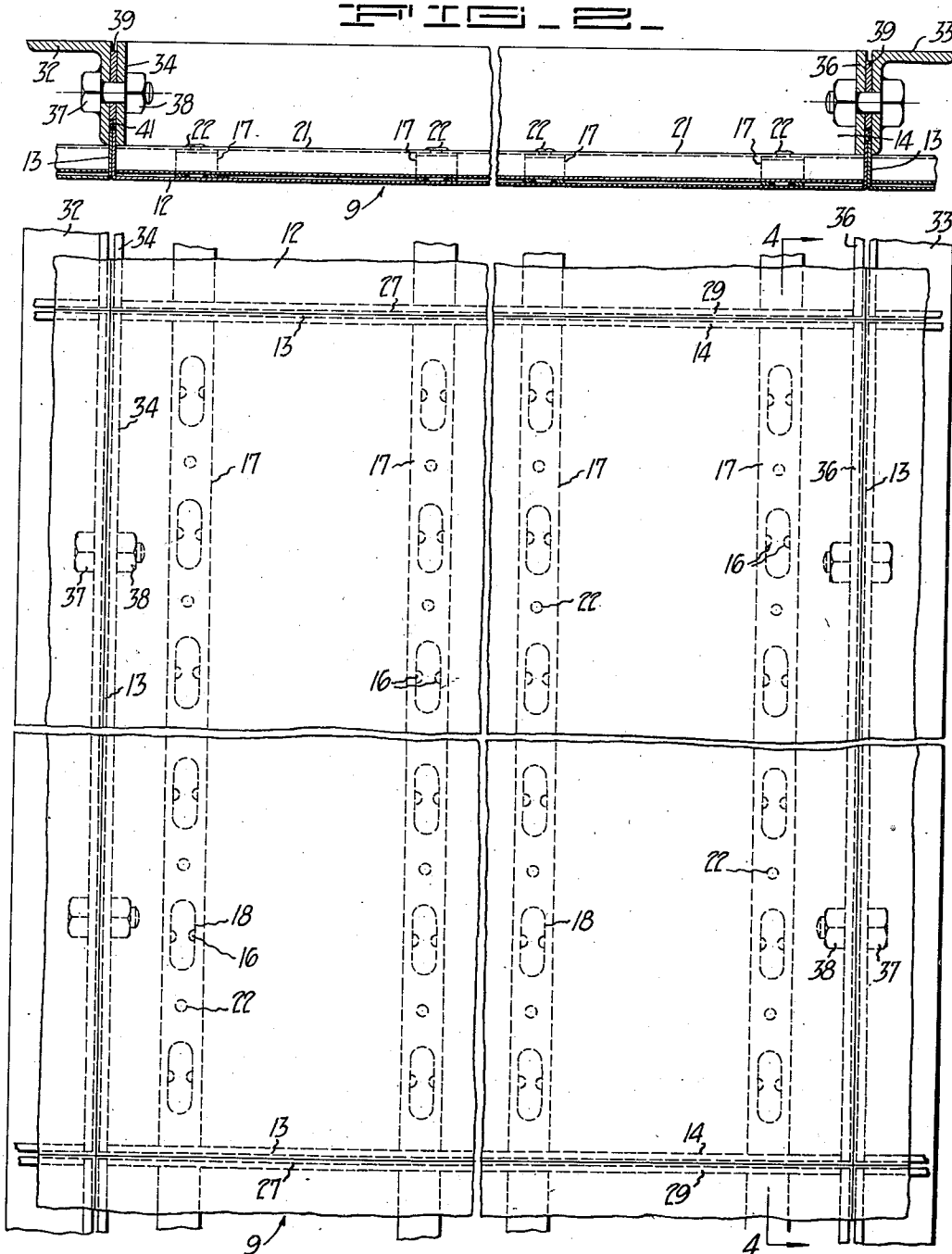
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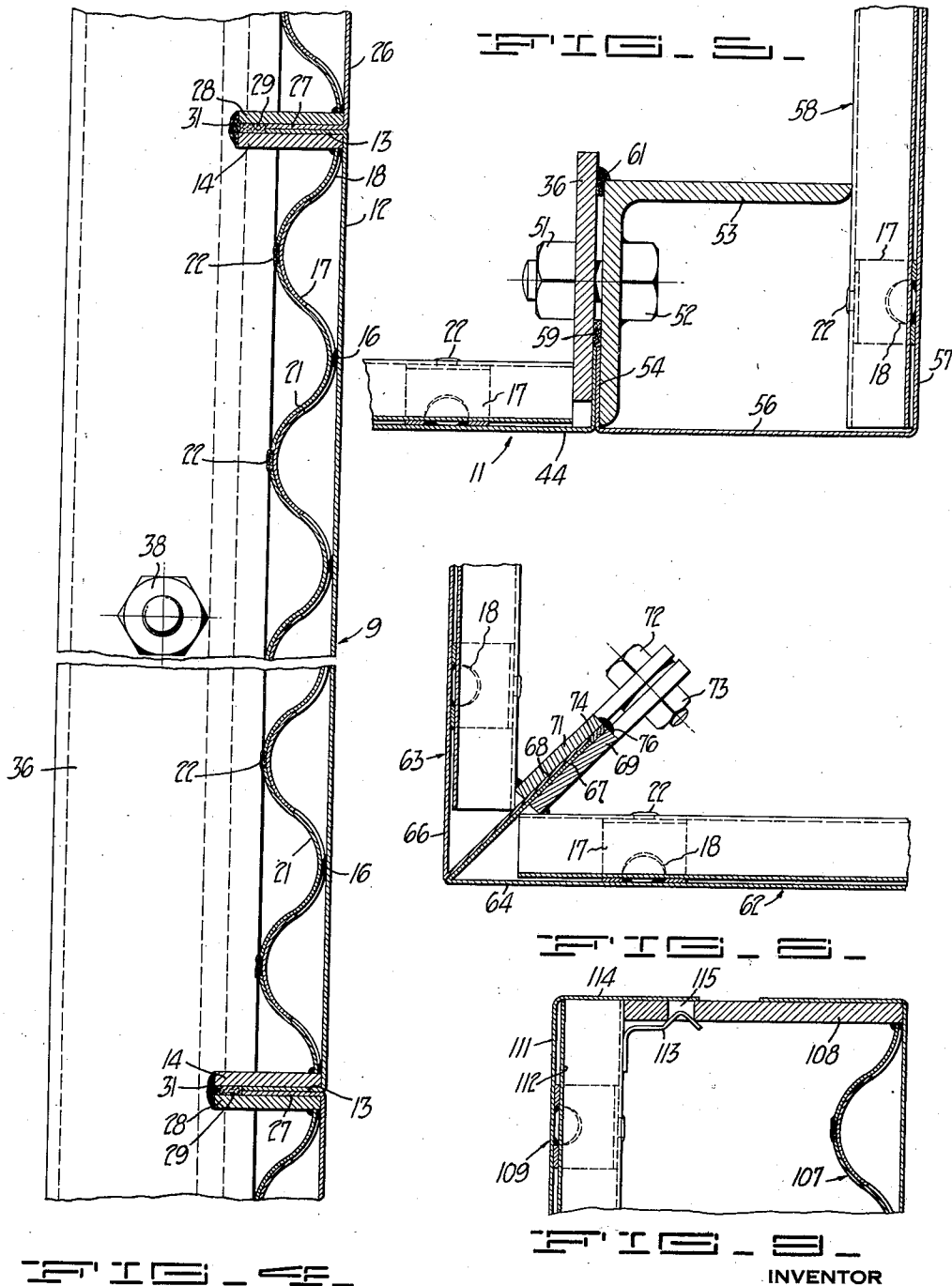
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3 Sheets-Sheet 3



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## UNITED STATES PATENT OFFICE

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## BUILDING UNIT AND CONSTRUCTION

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Application June 5, 1939, Serial No. 277,404

7 Claims. (Cl. 189—85)

My invention relates to means for erecting building structures, preferably from a plurality of prefabricated or partially prefabricated units.

5 It is an object of my invention to provide a building unit which is exteriorly and interiorly finished prior to erection.

Another object of my invention is to provide a building unit having a porcelain enamel surface finish, yet which is fabricated by welding.

10 Another object of my invention is to provide a building unit which has a great deal of inherent strength and stiffness for its weight.

15 A further object of my invention is to provide a building unit of substantially standard characteristics, a plurality of which can be assembled to provide a building construction.

20 An additional object of my invention is to provide a building construction made up of a plurality of substantially standardized, prefabricated panels.

The foregoing and other objects are attained in the embodiment of the invention illustrated in the drawings, in which

25 Fig. 1 is a side elevation of a building constructed in accordance with my invention;

Fig. 2 is a cross-section to an enlarged scale, the plane of which is indicated by the line 2—2 of Fig. 1;

30 Fig. 3 is a side elevation of the structure shown in Fig. 2;

Fig. 4 is a cross-section the plane of which is indicated by the line 4—4 of Fig. 3;

35 Fig. 5 is a cross-section the plane of which is indicated by the line 5—5 of Fig. 1;

Fig. 6 is a cross-section the plane of which is indicated by the line 6—6 of Fig. 1;

Fig. 7 is a cross-section the plane of which is indicated by the line 7—7 of Fig. 1; and

40 Fig. 8 is a cross-section the plane of which is indicated by the line 8—8 of Fig. 1.

Fig. 9 is a cross section showing a means of fastening an interior finishing panel to the structure.

45 In its preferred form, the building construction of my invention includes an enclosure made up of a plurality of building units, each of the units comprising a panel generally having a frame of metal shapes to which an external porcelain-enameled sheet and an internal corrugated sheet are welded, the two sheets being themselves interconnected by a sinuous strip spot-welded to the sheets.

55 Although the building unit and construction of my invention can be utilized to provide struc-

tures of numerous and varied forms, they have found successful utilization in a service station building substantially of the design shown in the drawings, which is provided with an overhanging roof 6 and the usual walls including side walls 7. While, because of the cantilever or overhanging characteristics of the roof portion 6, it is advisable to provide a supporting truss structure 8 constituting a plurality of structural shapes suitably arranged and fastened, the side wall 7 shows a typical arrangement of building units in accordance with my invention which require no particular additional structural-shape reinforcements but are in themselves sufficiently rigid and strong to support the weight of the superposed structure.

The wall 7 includes a window panel 10, a plain panel 9 and a door panel 11, each of which is fabricated substantially in accordance with the general scheme but which has individual variations. A basic arrangement is that of the panel 9 which is shown in horizontal cross-section in Fig. 2 and in vertical cross-section in Fig. 4. This panel is constituted by an exterior surface pan 12 which is preferably of rectangular shape having inturned flanges 13 on all four edges thereof. The material of the pan 12 is enameling iron, since, in accordance with my invention, I provide porcelain enamel on the major exterior surfaces of the building construction.

30 Into one or more of the flanges 13 there are nested structural iron shapes 14, such as straps or angles, which may be tack-welded in position and to each other. To the enameling iron pan 12 I preferably affix, by spot-welding 16, a sinuous strip 17 of metal which is in effect a ribbon having a plurality of elongated perforations 18 therein. The perforations afford means for providing one or more of the welds 16 at substantially each of the pair of contacting zones between the undulatory strip and the outer pan 12. Because of the undulatory character of the strip, when the pan 12 is subsequently treated to provide the porcelain enamel surfaces, including a baking operation at high temperature, the mass of the undulatory strip is so slight as not to cause warping of the surface of the pan 12.

50 In order to impart to the structure a great deal more strength than can be obtained from the pan 12 by itself, I position substantially adjacent the pan a corrugated sheet 21 and I arrange the corrugations in whichever direction will be of the greatest assistance in resisting the stresses which are to be imposed upon the sheet. That is to say, the corrugations 21 can run either hori-

zontally or vertically, depending upon the conditions to be imposed upon the composite building unit. The sheet 21 is of a contour to nest substantially exactly with the undulatory strip 17 and is provided with a plurality of perforations at appropriate points on the peaks of the corrugations so that spot welds 22 can be provided to fasten together the corrugations of the sheet 21 and of the undulatory strip 17. The welds 22 are materially spaced from the welds 16 so that movement of the various masses during an enamel baking operation is permitted without introducing permanent superficial irregularities into the external pan 12.

As a final closure and added stiffening member, I can, if desired, introduce a planar sheet between the shapes 14 and tack-weld it to the corrugated sheet 21 in order to provide a smooth interior surface, but this is not essential for most installations and can readily be omitted if desired.

The building unit fabricated of the corrugated sheets 21 welded to the enameled sheets 12 through the medium of sinuous strips 17 and reinforced on the edges by structural shapes 14 is incorporated with other units of like character to provide the building. Thus, as shown in Fig. 4, adjacent the pan 12 is a comparable pan 26 the flanges 27 of which abut the flanges 13 or substantially so. Space intervening the structural shape 14 of the pan 12 and the corresponding structural shape 28 of the pan 26 may be filled with a water-proof filler, such as plastic cement 29, whereas the edges of the structural shapes 14 and 28 are connected together into a permanent structure by welding 31. While the building panels themselves are prefabricated and are merely assembled at the site of the finished structure, the introduction of plastic cement and the performance of the operation to produce welds may be wholly or in part conducted as the units are erected.

To facilitate the erection operation, some of the units may be provided on some of their edges not with relatively light straps 14 or 23 but rather with relatively heavy angle-irons 32 and 33, or can be provided with relatively heavy straps 34 and 36. If the angle-irons 32 and 33 are utilized, preferably there is welded to each of them at an appropriate interval a standard bolt 37 adapted to pierce an aperture in the adjacent strap 34 or 36 so that when a nut 38 of standard variety is tightened upon the bolt the panels are held in closely adjacent position. A washer 39 can be interposed between the angles and the straps in order to prevent twisting strains thereupon as the fastening is tightened; and the same type of waterproof plastic cement 41 can be introduced into the joint to keep out moisture.

The bolted joint especially disclosed in Fig. 2 is utilized wherever the panels are sufficiently large as to be substantially of maximum size for handling, whereas the welded joint, as shown in Fig. 4, is utilized either for permanently assembling such relatively large panels in the field or, where a plurality of smaller pans such as 12 and 26 are to be factory assembled, the welding is utilized to constitute a plurality of such pans into a panel large enough for field welding or bolting. This latter variation is shown particularly in the center panel 9 in which a plurality of pans are utilized, each of them being, for example, a different color. That is, the lowermost pan 42 may be one color, the intermediate pan 43 may be another color, the pan

12 still another color, and the uppermost pan 26 still a different color. The four pans 12, 26, 43 and 42 together are factory welded with joints such as shown in Fig. 4, to constitute a single panel which is held in place on the job and is permanently connected by the bolted arrangement as shown in Fig. 2.

Adjacent a corner of the building, for example the rear corner, a somewhat different form of connection may be provided, since in most instances the rear wall of the structure is of cheaper character than the remaining part, and the exterior surface may not be porcelain enamel but may be paint or a comparable finish. Under such conditions (see Fig. 5), a panel 11, which as to this portion is substantially a duplicate of the panel 9 in that it terminates in a strap 36, is fastened by a nut 51 to a bolt 52 connected by welding to an angle 53 included in a corner structure. This angle clamps in position the intumed member 54 of an elongated flange 56 extending from the outer plate 57 of the rear panel 58. The panel 58 is illustrated as of the corrugated, reinforced porcelain-enameled type, but if desired the exterior sheet 57 may be not enameled but simply painted. In either case it is but necessary to position the panel 58 with the angle 53 in juxtaposition with the strap 36 in the panel 11 and to tighten the nut 51, plastic cement 59 being interposed in the joint and the final connection being made by welding 61.

As an alternative corner arrangement, there may be provided the construction shown in Fig. 6 in which a panel 62 on the side of the structure is connected to a comparable panel 63 on the front thereof. These panels are constructed of exterior enameled pans 64 and 66, respectively, which have elongated, intumed flanges 67 and 68 thereon reinforced by straps 69 and 71, respectively. These straps are suitably secured together by a bolt 72 and a nut 73 and include water-proof plastic cement 74 and a final weld 76 to secure the union.

Adjacent openings, such as a window 77 or a door 78, the construction is preferably that illustrated in Fig. 8, in which the pans 79 and 81 included in the panels 7 or 11 are provided with elongated intumed flanges 82 and 83, respectively, which are secured as by welding 84 to elongated straps 85 and 87, preferably entirely surrounding the opening for reinforcement purposes.

Where such an opening is glazed, the construction is substantially that illustrated in Fig. 7 wherein the panels 62 and 68 are abutted. The panel 68 for the most part is of substantially standard fabrication, but adjacent its edges is provided with elongated, intumed flanges 89 and 91. The flange 91 is reinforced by a strap 92 comparable to the straps 36 and 37 but carries a glass support 93 secured thereto against a spacer 94 with waterproof plastic cement 96 interposed in the spacer therebetween. A glass panel 97 is mounted in the holder 93.

Adjacent the flange 89 a reinforcing shape 98, such as an angle iron, is secured and is provided with a spacing strap 101. To the strap is secured a glass holder 102 held in place against the spacer 101 with waterproof plastic cement 103 in the intervening space. A plate of glass 104 is mounted in the holder 102.

As a way of finishing the interior of the structure, especially a structure in which an exterior wall 107 has an intumed horizontal strap 108

thereon, I preferably provide the detachable panel 109 which is inclusive of a flanged outer sheet 111 having a corrugated inner sheet 112 secured thereto. Fastened to the inner sheet 112 particularly by welding is a spring clip 113 representative of a plurality of such spring clips, each of which is effective to enter into an aperture 115 piercing the strap 108, so that while the weight of the panel 109 is borne by the flanges 114 on the strap 108, the position of the panel is secured by the spring clips 113. The panel is readily assembled by simply positioning it adjacent its location and then forcing it toward the exterior panel 107. Similarly, the interior panel 109 is readily removed if desired or can be permanently anchored in place.

With the arrangement described, a building such as is illustrated can be constructed of a plurality of individual panels, the panels being assembled at the side of the structure and being either permanently bolted or bolted and welded into assembled position with the interstices therebetween filled with a plastic waterproof cement so that the structure is permanently weather-tight. Each of the panels is preferably constituted of a plurality of units, such particularly as is illustrated in Figs. 2 and 3. Each of these constitutes an exterior pan capable of receiving a porcelain-enamel exterior coating and including a corrugated sheet attached thereto by the medium of a sinuous strip so that the panel itself is adequately strong for all structural purposes yet the construction is such that the enameling operation does not unduly warp the various masses of metal. After the enameling operation, the cooling of the parts leaves the enameled surface planar and free of unsightly ripples and irregularities.

Since the building as constructed in accordance with my invention is itself adequately strong without material additional bracing or structural reinforcement, it can be very quickly and readily erected at the site following factory assembly of the major components thereof. The attractiveness and durability are exceedingly high, yet the cost of the panels and their erection expense are relatively low.

I claim:

1. A building unit comprising a generally

planar exterior pan having inturned edges and adapted to receive a baked enamel finish, a sinuous perforated strip spot-welded to said pan, and a corrugated sheet disposed within said pan and spot-welded to said strip.

2. A building unit comprising a pan having a baked enamel finish, a corrugated sheet adjacent said pan, and a sinuous strip interposed between said corrugated sheet and said pan and welded to each of them.

3. A building unit comprising a rectangular flanged pan, a corrugated sheet disposed within said pan, a sinuous strip interposed between said sheet and said pan, and welded connections between said strip and said sheet and between said sheet and said pan.

4. A building unit comprising a flanged pan, structural shapes welded to and constituting a frame for said pan, a corrugated sheet disposed within said pan, and means including an interposed sinuous strip for connecting said sheet and said pan.

5. A building unit comprising a panel constituted of a plurality of flanged pans, structural shapes constituting frames for said pans, welded connections between said shapes, corrugated sheets in said pans, and means including interposed strips for affording welded connections between said pans and said sheets.

6. A building unit comprising a panel constituted of a plurality of flanged pans, structural shapes constituting frames for said pans, welded connections between said shapes, waterproof material between said shapes, reinforcing sheets within said pans, connecting strips between said reinforcing sheets and said pans, and welded connections between said strips and said sheets and said pans.

7. A building unit comprising a panel constituted of a plurality of flanged pans, structural shapes constituting frames for said pans, secondary structural shapes included in said panel, reinforcing sheets for said pans, means for indirectly welding said sheets and said pans together, and fastening means engaging said secondary structural shapes for engagement with a similar panel.

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