Dec. 7, 1948. P. B. WEST 2,455,455

PREFABRICATED CONCRETE FORM

Filed Dec. 12, 1946 2 Sheets-Sheet 1

Fig. 6

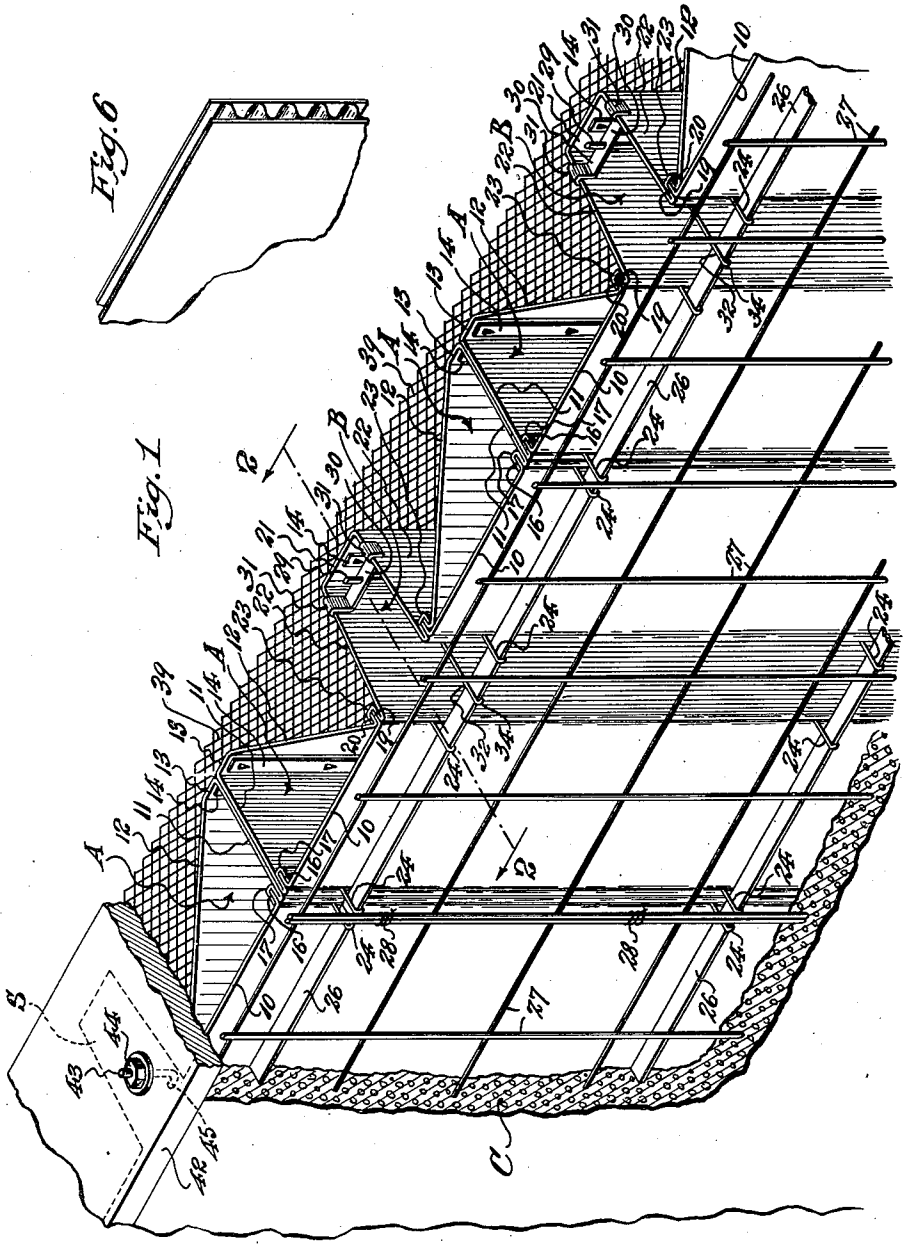


Fig. 1

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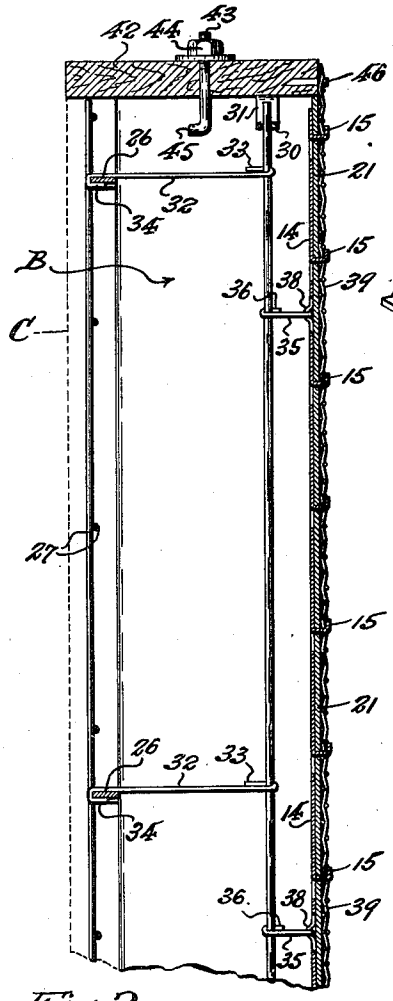


Fig. 2

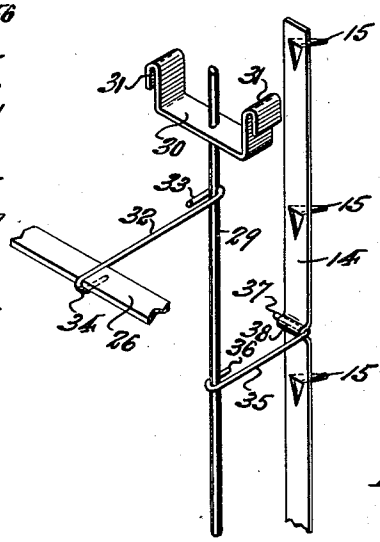


Fig. 3

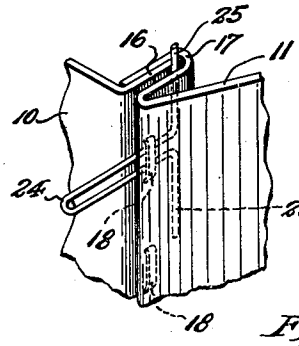


Fig. 4

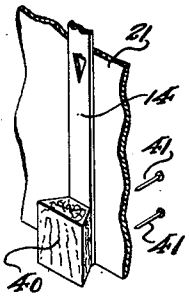


Fig. 5

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PREFABRICATED CONCRETE FORM

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Application December 12, 1946, Serial No. 715,839

12 Claims. (Cl. 72—48)

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This invention relates to improvements in form structures adapted for use in the production of concrete walls, roofs, floors and other parts of concrete building erections; and the invention has reference, more particularly, to a novel construction of prefabricated form structure ready to be transported to and set up at a building site.

This invention has for its primary object to provide novel form unit structures of such design that the same may be prefabricated in a shop, whereby to provide complete unitary form units ready to be transported to a building site, and there set up preparatory to application thereto of concrete or like moldable mixture for the production of a desired building wall, floor, roof or other part of a building construction, each form unit including form walls for shaping the applied concrete into monolithic wall and stud or like formations, together with properly positioned and related elements adapted to reenforce the concrete formations, as well as lathing for supporting plaster facings at interior sides of the finished wall or other concrete formation.

The invention has for another object to provide a novel prefabricated form structure of the kind stated wherein the form walls comprise relatively inexpensive sheet material, such, e. g., as corrugated paperboard or the like, which may be left in the finished concrete formation; said sheet material being so folded upon itself as to provide a strong and substantially rigid self-trussed form wall assembly, well able to withstand and support the stresses and pressure of the concrete applied thereto, especially when the application is made by a gunning method, while at the same time, providing for suitably shaped stud or like molding cavities, whereby the finished concrete formation is provided with stud or like portions which are unitary therewith; the sheet material being also arranged so as to provide insulating air cells within the wall or other finished concrete formation.

The invention has for a further object to provide a prefabricated form structure, the form wall portions of which comprise folded sections of sheet material, such as corrugated paperboard or the like, which are completed by joining marginal portions thereof by novel interlocking joint formations; said joint formations being, in turn, secured against separation or disruption by easily applied wire stapling.

The invention has for a still further object to provide novel means for both tying its form wall sections together in aligned relation, while, at the same time, providing means for supporting con-

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crete reenforcing elements in fixed spaced relation to the outer face wall of the form to which the concrete is to be applied.

The invention has for another object to provide a novel prefabricated form structure as above characterized which is especially well adapted to receive gunned application of concrete thereto.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

An illustrative embodiment of the invention is shown in the accompanying drawings, in which—

Fig. 1 is a perspective view of the novel, prefabricated form structure according to this invention, with parts broken away and in part section; and Fig. 2 is a vertical cross sectional view of the form structure, taken on line 2—2 in Fig. 1.

Fig. 3 is a fragmentary skeletal perspective view of an assembly of parts of the form structure omitting the form wall sections.

Fig. 4 is a fragmentary perspective view of a joint formation of the form wall sections.

Fig. 5 is a fragmentary perspective view showing a base or ground nailing block at the foot of a form wall section.

Fig. 6 is a fragmentary perspective view of corrugated paper board which constitutes the preferred sheet material from which the form wall sections are produced.

Similar characters of reference are employed in the hereinabove described views, to indicate corresponding parts.

The novel form structure according to this invention comprises a plurality of preformed form wall sections made by folding and assembling sheet material, preferably corrugated paperboard of the kind shown in Fig. 6, whereby to produce substantially right triangular units A and inverted U-shaped units B.

The right triangular units A each comprise a face or front panel 10 and end panel 11 extending right angularly from one perpendicular side of said front panel, and an angular rear panel 12 which extends from the rear perpendicular side of said end panel to converge upon the opposite perpendicular side of said front panel. Said end panel and rear panel are preferably unitary, and their adjoining portions are scored to provide perpendicular fold lines, whereby, when relatively folded into ultimate angular relation, to provide at the juncture thereof a comparatively narrow rear face portion 13 disposed to lie in a plane

parallel to that of the front panel 10. Mounted on the inner surface of said rear face portion 13, to extend perpendicularly therealong from bottom to top thereof, is a sheet metal strip 14, from which is outwardly struck a series of longitudinally spaced prongs 15. Said prongs 15 project through the body of said rear face portion 13 so as to project from the outer surface thereof, whereby to serve as means for attaching lathing or plasterboard to the rear face of the form structure, as will subsequently appear. Formed by folded portions of the perpendicular meeting sides of the front panel 10 and end panel 11 is a joint structure by which said panels are united. Said joint structure comprises an inturned male joint member 16 which extends from the front panel 10, and an inverted, outwardly open U-shaped female joint member 17 which extends from the end panel 11. Said joint structure is assembled by inserting the male joint member 16 into and within the embrace of the female joint member 17, and thereupon securing these parts together by engaging wire staples 18 therethrough at suitably spaced intervals along the length thereof. The adjoining convergent perpendicular sides of the front panel 10 and rear panel 12 are respectively provided with an inturned male joint member 19 and an out-turned male joint member 20 which are disposed in lapped contiguous relation, and which form parts of a joint structure whereby a right triangular form wall unit A is joined to an adjacent inverted U-shaped form wall unit B, as will subsequently appear.

The outwardly open, inverted U-shaped units B each comprise a rear panel 21 of suitable width, from the respective perpendicular sides of which extend outwardly projecting side panels 22. Said side panels 22 are unitary with the rear panel 21, intermediate fold defining scores being provided whereby the former may be folded relative to the latter into the described outward extension therefrom. Mounted on the inner surface of said rear panel 21, to extend perpendicularly therealong intermediate its sides and from top to bottom thereof, is another sheet metal strip 14, the prongs 15 of which project through and exteriorly of the body of said rear panel 21, whereby to likewise serve for attaching lathing or plasterboard to the rear face of the form structure. Formed by folded parts of the respective forward marginal portions of the side panels 22 are outwardly open U-shaped female joint members 23.

To arrange the form wall units A and B in operative assembled relation, pairs of the units A are adjoined with their end panels 11 opposed and abutted, whereupon units B are interposed between thus related pairs of units A, and joined thereto; such assembling relation being continued until a desired length of form structure is obtained. The meeting sides of the units A and B are joined together by inserting the contiguous male joint members 19 and 20 of a unit A into and within the embrace of the female joint member 23 at the side of an adjoining unit B, and thereupon securing these parts together by wire staples, similar to the above mentioned wire staples 18, and similarly applied along the thus formed joint structure at desirably spaced intervals.

The form wall units are provided with suitably located coupler loops 24 arranged to project exteriorly from the forward face or front of the assembly thereof. These coupler loops, in one satisfactory form thereof, comprise wire formations made of doubling a length of wire upon itself into a loop, the legs of which terminate in angularly and oppositely extending foot pieces 25. The foot piece ends of said coupler are inserted within the female joint members 17 and 23, and then the coupler loops are secured to the joint formations by certain of the staples 18 which are disposed to bridge the coupler loop legs (see Fig. 4). The coupler loops 24 are positioned in connection with the respective form wall units A and B so as to be laterally aligned in a plurality of horizontally spaced rows extending across the front of the assembly of said units, said rows being arranged in suitably vertically spaced apart relation.

When a desired member of form wall units A and B have been assembled in the mutual relation above described, a rigid steel lock bar or strip 26 of suitable width, thickness and length is threaded through each horizontal row of coupler loops 24. Said lock bars or strips not only tie the assembled form wall units together, but also serve to align the fronts thereof in common and uniform plane, whereby to hold the same both against distortion and relative displacement. Said lock bars or strips 26 additionally serve as means for supporting metallic bars, grids or mesh in outwardly spaced parallel plane relation to the front of the form wall unit assembly, whereby to be positioned so as to be imbedded in the concrete, when the latter is applied to the form structure, and thus so as to provide a strong reenforcing means for the wall mass which is formed by the applied concrete.

One illustrative form of the reenforcing means last referred to, as shown, comprises suitably sized panels or grids 27 formed by suitably interconnected perpendicular and horizontal metallic bars, the perpendicular bars being affixed to the outer edges of the lock bars or strips 26 in any suitable manner, as by tack welding the same to the latter. Adjoining ends of the thus applied reenforcing panels or grids 27, may be tied together by wire ties 28 if so desired.

It will be observed that the U-shaped form wall units B, which are spaced at selected intervals along the form wall structure by the intervening units A, being outwardly open form mold cavities in which the concrete, when applied to the form structure, may enter, whereby to produce suitably spaced stud or like formations S, which are unitary with the wall formed by applied concrete, and which are disposed to extend rearwardly from the wall mass. Means is provided for supporting reenforcing elements within said mold cavities provided by the form wall units B, so that said elements will be imbedded in the applied concrete. To this end, each form wall unit B is provided with a rod hanger means adapted to support and position a metallic reenforcing rod 29 for perpendicular extension through the interior of the wall form unit B. In an illustrative form thereof, as shown, said rod hanger means comprises a bridge piece 30, having suspension hook portions 31 upstanding from its respective ends; said bridge piece having at least one opening through which the reenforcing rod 29 may be engaged. The suspension hook portions 31 are respectively engaged over the top marginal portions of the side panels 22 of a unit B, so that the bridge piece 30 spans the interior of said unit.

Additional means is provided for holding the reenforcing rods 29 in desired perpendicular extension and position within the interior of the

form wall units B. Said means comprise forwardly extending tie-members 32 for interconnection between the reenforcing rods 29 and the lock bars or strips 26. Said tie-members 32 preferably comprise wire formations each provided with a rear hook portion 33 to engage around a reenforcing rod 29 and a forward hook portion 34 to engage around a lock bar or strip 26. Said tie-members 32 serve to retain the reenforcing rods 29 against lateral and rearward displacement. The rod holding means further includes rearwardly extending tie-members 35 for interconnection between the reenforcing rods 29 and an adjacent metallic strip 14 with which each form wall unit B is provided. Preferably, said tie-members 35 also comprise wire formations each provided with a forward hook portion 36 to engage around a reenforcing rod 29 and a rearward lateral arm 37 to engage in a retaining knuckle or bearing 38 with which the adjacent metallic strip 14 is provided. Said tie-members 35 serve to retain the reenforcing rods 29 against lateral and forward displacement.

To complete the prefabricated form structure, lathing, plasterboard or like inner wall face means or component, is secured to and in covering relation to the rear side of the assembled form wall units A and B, the same being secured in place by the penetration therethrough of the prongs 15 of the sheet metal strips 14 with which said units are provided, the free ends of said prongs being thereupon clinched over and in holding relation to the applied lathing, plasterboard or the like (see Fig. 2). For example, as shown, panels 39 of wire mesh, expanded metal lath or the like, are thus secured to the rear face of the form structure, whereby, after a concrete wall or the like is produced by aid of the form structure, the same serves to receive and hold an interior finishing coating or plaster or the like (not shown).

In making up the wall form units A and B from the preferred corrugated paperboard, said paperboard is so disposed that the corrugations thereof extend horizontally or transverse to the perpendicular height of the form units. As thus disposed, the corrugations are best arranged to stiffen the units so that they efficiently resist the stresses and pressures of the applied concrete, both during application and thereafter, while at the same time enhancing the self trussing efficiency of said units due to the shape thereof.

The corrugated paperboard or other similar sheet material from which the form wall units A and B are produced, should generally be impregnated or coated inside and outside with a suitable waterproofing material, whereby said units provide, with respect to the finished wall or the like, a very efficient barrier between outer and inner sides of the latter, against penetration of the wall or the like by moisture.

The described form wall structure may be made up in advance of use in a shop or erection plant as complete fabricated sections of suitable length and of one storey height, ready to be transported to the site of the building in connection with which use thereof is to be made. When delivered at the building site, the prefabricated form structure sections can be quickly stood up and assembled on the foundation or other footing therefor ready to receive application of concrete thereto. If desired, the lower ends of the form wall units may be provided with nailing blocks 40 for footing the same on the foundation or other support or ground, the units being fastened to said blocks 40 by passing nails 41 through the unit material and contiguous sheet metal strips 14 and driving said nails into the blocks.

A plate 42 is superposed upon the top of the erected form wall structure, and is provided with stud bolts 43 and fastening nuts 44. Said stud bolts are provided with suitably enlarged lower end portions 45 which are positioned to depend into interiors of mold cavities provided by the form wall units B, so that the same will be imbedded and anchored in the concrete, when the latter is filled into said cavities.

The upper margins of the mesh panels 39 are preferably dimensioned to extend somewhat beyond the top of the form structure, so that the upper marginal portions of said panels may lap the plate 42, and then be secured thereto by suitable fastening means, such as by staples 46 (see Fig. 2).

It will be noted that by reason of the provision of the coupler loops 24, which receive the lock bar or strip 26, at the joint structures of the form wall units A and B, in addition to the firmly secured connection of the lathing 39 to the rear portions of said units A and B, and the inter-tying of the lathing 39 and lock bar or strips 26 by the tie-members 32 and 35, a form structure of great strength and rigidity is assured, wherein all said parts mutually cooperate to sustain the stresses and pressures of the applied concrete.

After the form structure is in place, the concrete C may be applied to the front side thereof so as to be shaped thereby, while at the same time imbedding the reenforcing material 27 and 29 in the applied concrete mass. Due to the character and qualities of the form wall structure, the same is especially well adapted to receive application of the concrete by a gunning method; although by use of a retaining wall erected in front of the form structure, the concrete may, if desired, be applied by a casting or pouring method. Since the form structure remains in the wall or other concrete formation it will be seen that the hollow form wall units A will provide insulating air cells within the finished wall or other formation.

Owing to the character of the form wall units A and B, it will be obvious that form structure sections may be relatively spaced and arranged, or parts thereof easily cut away and shaped at desired points for provision of window, door, or other desired building openings.

I am aware that changes could be made in the above described prefabricated form wall structure without departing from the scope of this invention as defined in the herefollowing claims. It is therefore intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A prefabricated form structure for the purposes described comprising an assembly of hollow form wall units made of folded sheet material, certain of said units being of substantially right triangular cross section and other of said units being of substantially U-shaped cross section, said right triangular units being arranged in pairs with their oblique panels rearwardly presented and their end panels abutted whereby to forwardly present their remaining or front panels in a common plane, a U-shaped unit being disposed intermediate adjacent pairs of thus arranged right triangular units with its open face disposed in the plane of said front panels of the latter units, marginal portions of said thus ad-

joining units being folded, interengaged and secured together to provide uniting joint structures, lock bars extending across the front of the thus assembled units, said units having means to couple the same to said lock bars, an inner wall medium disposed across the rear of the thus assembled units, and said units having means for securing said inner wall medium thereto.

2. A prefabricated form structure as defined in claim 1 wherein the sheet material from which the form wall units are made comprises waterproofed paperboard.

3. A prefabricated form structure as defined in claim 1 wherein the sheet material from which the form wall units are made comprises corrugated paperboard, said paperboard being so disposed that the corrugations thereof extend transversely across the panels comprising said units.

4. A prefabricated form structure as defined in claim 1 wherein the sheet material from which the form wall units are made comprises waterproofed corrugated paperboard, said paperboard being so disposed that the corrugations thereof extend transversely across the panels comprising said units.

5. A prefabricated form structure for the purposes described comprising an assembly of hollow form wall units made of folded sheet material, certain of said units being of substantially right triangular cross section and other of said units being of substantially U-shaped cross section, said right triangular units being arranged in pairs with their oblique panels rearwardly presented and their end panels abutted whereby to forwardly present their remaining or front panels in a common plane, a U-shaped unit being disposed intermediate adjacent pairs of thus arranged right triangular units with its open face disposed in the plane of said front panels of the latter units, marginal portions of said thus adjoined units being folded and interengaged to provide uniting joint structures, wire staples extending through said joint structures to secure together the components thereof, lock bars disposed across the front of the thus assembled units, coupler loops rooted in said unit joint structures and secured thereto by certain of said wire staples, said coupler loops projecting from the front face of said assembled units so as to receive the lock bars and thus secure the units thereto, metallic mesh for concrete reenforcement secured to the outer edges of said lock bars to extend across the front of the assembled units in outwardly spaced relation thereto, an inner wall medium disposed across the rear of the assembled units, and said units having means for securing said inner wall medium thereto.

6. A prefabricated form structure for the purposes described comprising an assembly of hollow form wall units made of folded sheet material, certain of said units being of substantially right triangular cross sections and other said units being of substantially U-shaped cross section, said right triangular units being arranged in pairs with their oblique panels rearwardly presented and their end panels abutted whereby to forwardly present their remaining or front panels in a common plane, a U-shaped unit being disposed intermediate adjacent pairs of thus arranged right triangular units with its open face disposed in the plane of said front panels of the latter units, marginal portions of said thus adjoined units being folded and interengaged to provide uniting joint structures, wire staples extending through said joint structure to secure together the components thereof, lock bars disposed across the front of the thus assembled units, coupler loops rooted in said unit joint structures and secured thereto by certain of said wire staples, said coupler loops projecting from the front face of said assembled units so as to receive the lock bars and thus secure the units thereto, metallic mesh for concrete reenforcement secured to the outer edges of said lock bars to extend across the front of the assembled units in outwardly spaced relation thereto, plaster supporting lathing disposed across the rear of the assembled units, each said unit having a perpendicular sheet metal strip contiguous to an inner surface of a rear face portion thereof, and said strip having prongs struck out therefrom to project through and exteriorly of the unit material, said prongs being clinched over into holding relation to said lathing.

7. A prefabricated form structure as defined in claim 6 wherein the sheet material from which the form wall units are made comprises waterproofed corrugated paperboard, said paperboard being so disposed that the corrugations thereof extend transversely across the panels comprising said units.

8. A prefabricated form structure as defined in claim 1 wherein at least one reenforcing rod is disposed to extend perpendicularly within the interior of each U-shaped unit, and means to support said rod in such position.

9. In a prefabricated form structure as defined in claim 5 wherein at least one reenforcing rod is disposed to extend perpendicularly within the interior of each U-shaped unit, and means to support said rod in such position.

10. In a prefabricated form structure as defined in claim 5 wherein at least one reenforcing rod is disposed to extend perpendicularly within the interior of each U-shaped unit, each said U-shaped unit having hanger means to support the contained rod, and tie-members interconnected respectively between said rod and the lock bars and between said rod and a rear side portion of the U-shaped unit.

11. In a prefabricated form structure as defined in claim 6 wherein at least one reenforcing rod is disposed to extend perpendicularly within the interior of each U-shaped unit, each said U-shaped unit having hanger means to support the contained rod, and tie-members interconnected respectively between said rod and the lock bars and between said rod and the sheet metal strip of the U-shaped unit.

12. A prefabricated form structure for the purposes described comprising an assembly of hollow form wall units made of folded waterproofed corrugated paperboard with the corrugations thereof disposed transverse to the vertical axes of said units, certain of said units being of substantially right triangular cross section and other said units being of substantially U-shaped cross section, said right triangular units being arranged in pairs with their oblique panels rearwardly presented and their end panels abutted whereby to forwardly present their remaining or front panels in a common plane, a U-shaped unit being disposed intermediate adjacent pairs of thus arranged right triangular units with its open face disposed in the plane of the front panels of the latter units, marginal portions of said thus adjoined units being folded and interengaged to provide uniting joint structures, wire staples extending through said joint structures to secure together the components thereof, lock bars disposed across the

front of said thus assembled units, coupler loops rooted in said joint structures and secured thereto by certain of said wire staples, said coupler loops projecting from the front face of said assembled units so as to receive the lock bars and thus secure the units thereto, metallic mesh for concrete reenforcement secured to the outer edges of said lock bars to extend across the front of the assembled units in outwardly spaced relation thereto, plaster supporting lathing disposed across the rear of the assembled units, each said unit having a perpendicular sheet metal strip contiguous to an inner surface of a rear face portion thereof, said strip having prongs struck out therefrom to project through and exteriorly of the unit material, said prongs being clinched over into holding relation to said lathing, at least one reenforcing rod disposed to extend perpendicularly within the interior of each U-shaped unit, each said U-shaped unit having hanger means to support

the contained rod, and tie-members interconnected respectively between said rod and the lock bars and between said rod and the sheet metal strip of the U-shaped unit.

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