June 23, 1953 C. A. COMMET ET AL 2,642,645

FORM FOR CONCRETE CONSTRUCTIONS

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Fig. 2.

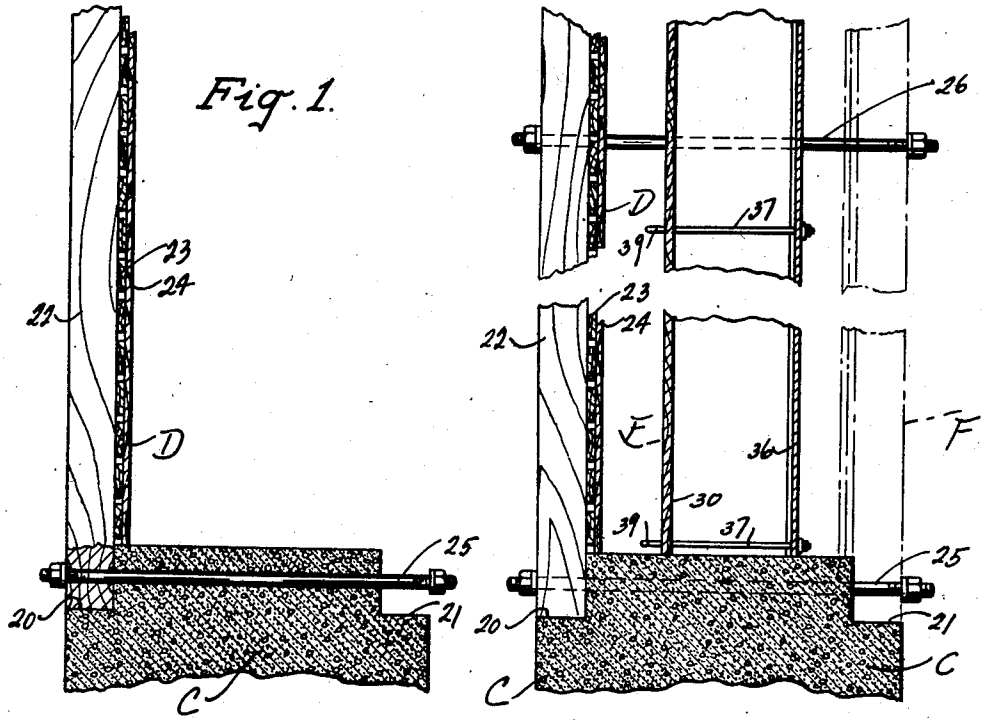
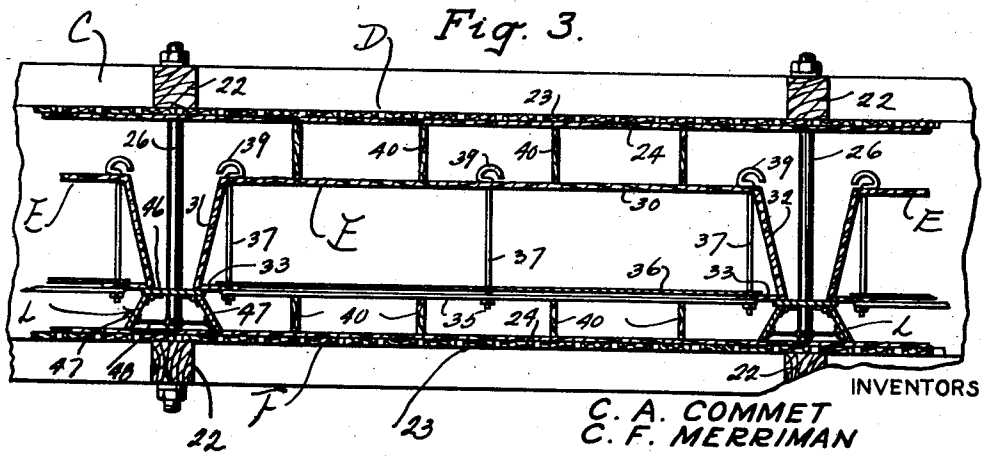


Fig. 1.

Fig. 3.



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Fig. 4.

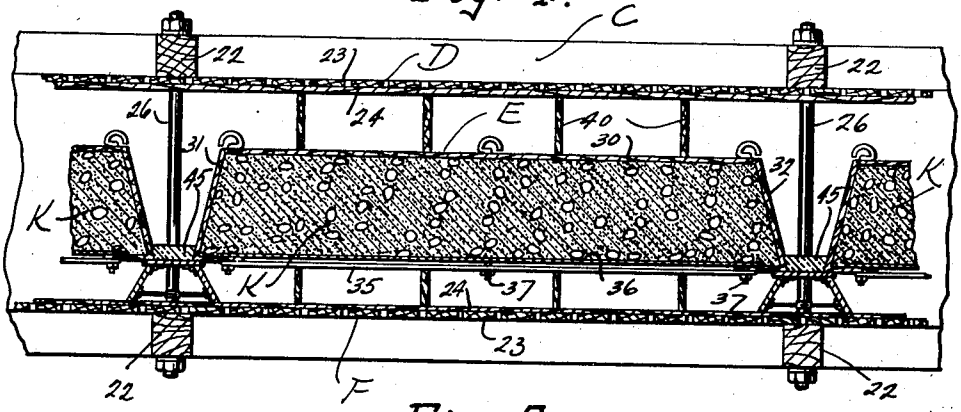


Fig. 5.

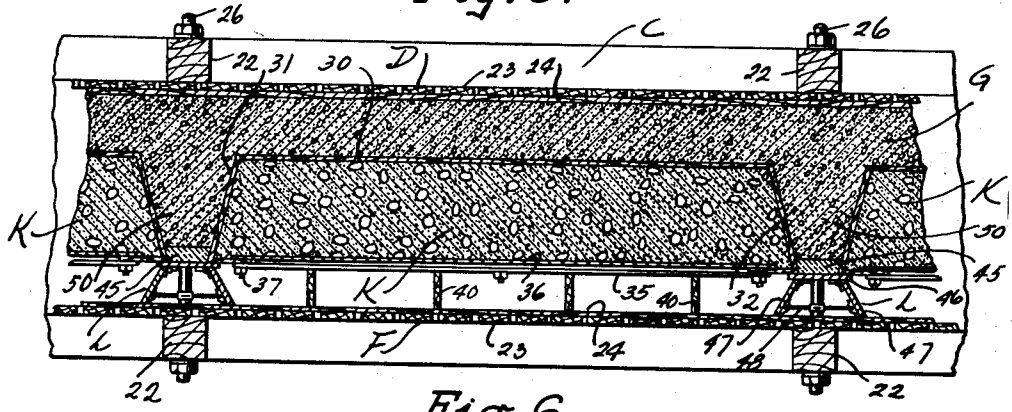
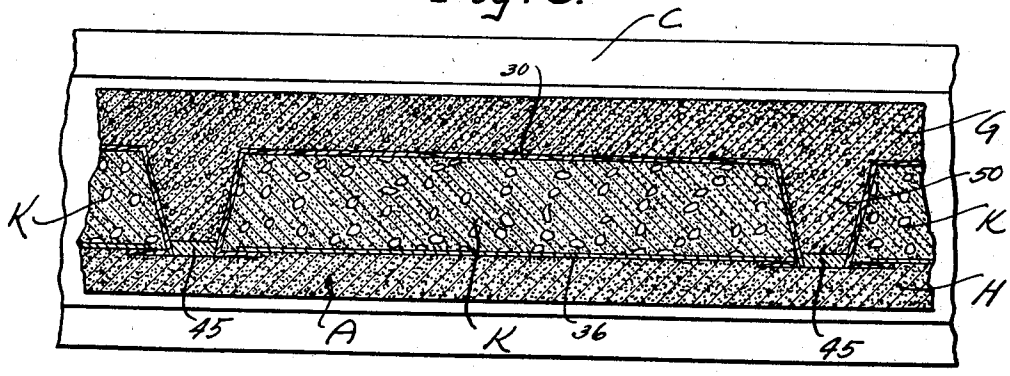


Fig. 6.



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Fig. 7.

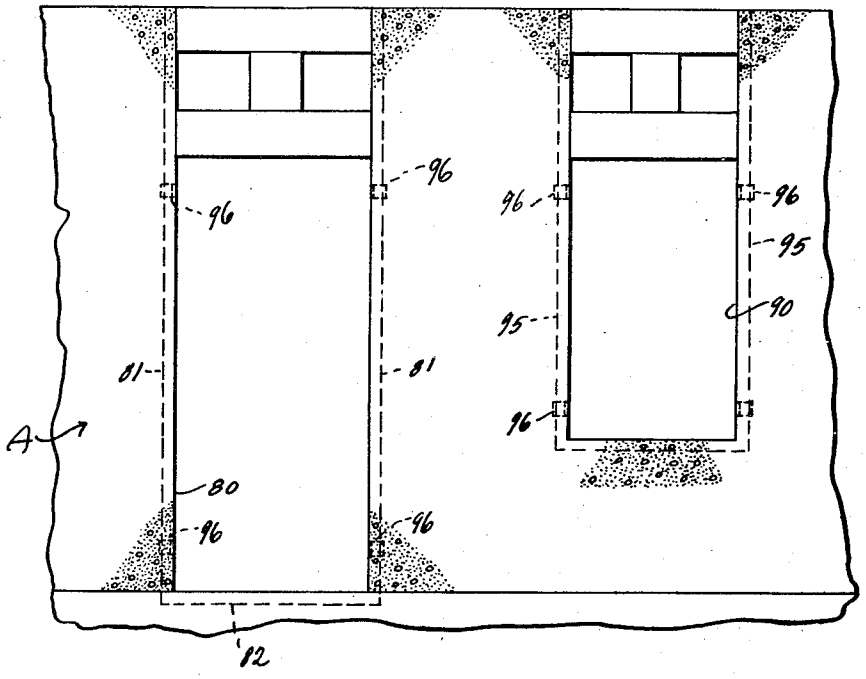
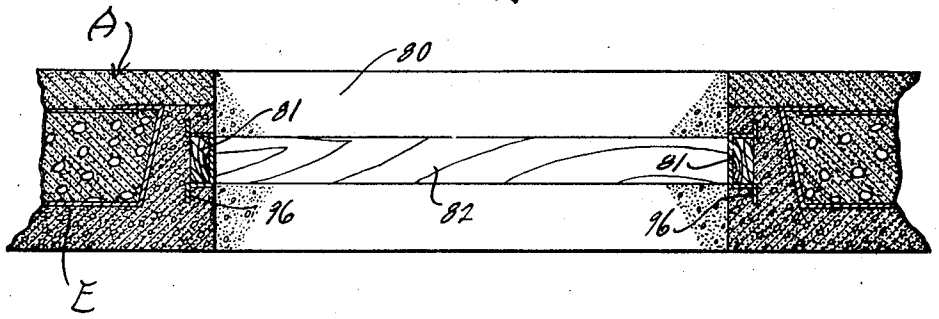


Fig. 8.



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FORM FOR CONCRETE CONSTRUCTIONS

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Fig. 11.

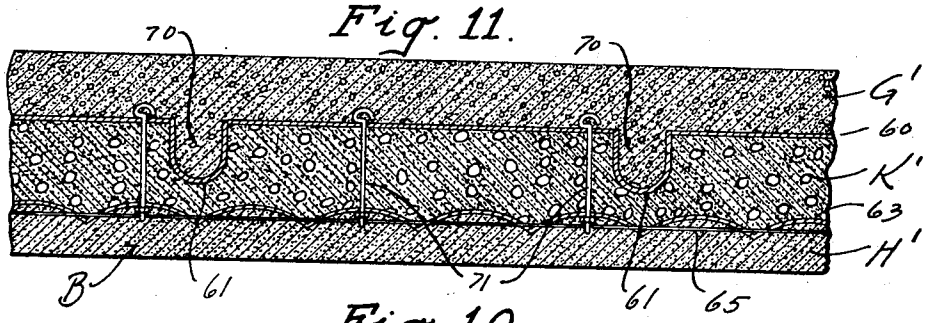


Fig. 10.

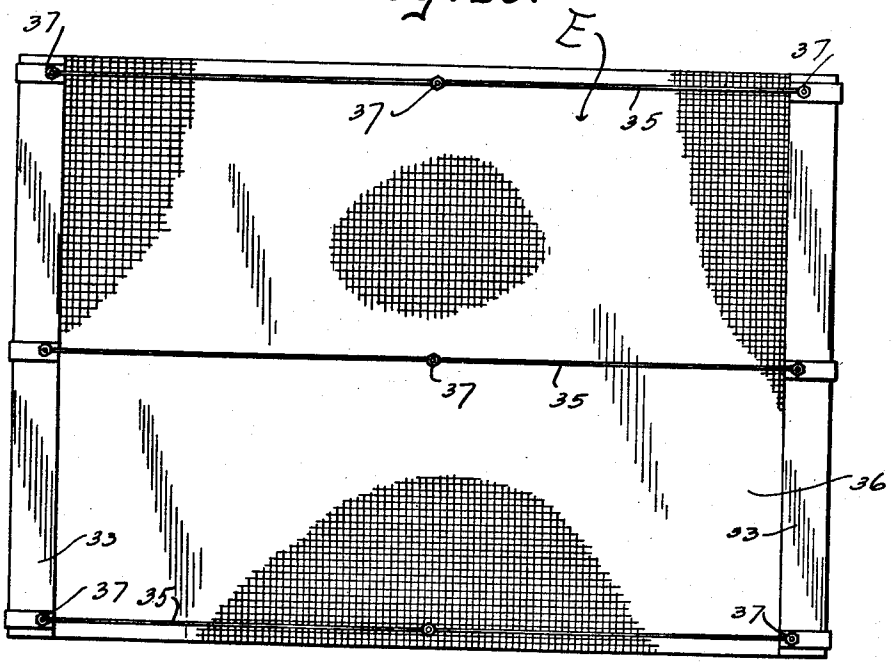
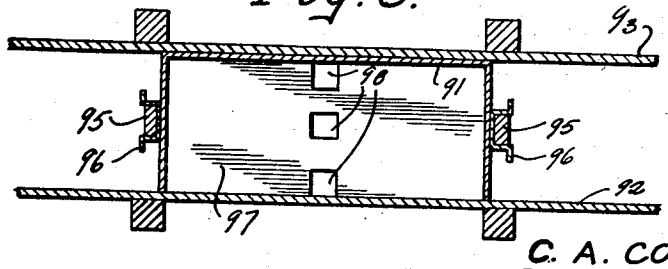


Fig. 9.



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2,642,645

FORM FOR CONCRETE CONSTRUCTIONS

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Application September 13, 1948, Serial No. 48,986

9 Claims. (Cl. 25—131)

1

This invention relates to improved means for the construction of buildings, etc.

The primary object of this invention is the provision of improved form work for concrete wall construction.

A further object of this invention is the provision of improved inner and outer form work for the fabrication of monolithic wall construction.

Other objects and advantages of this invention will be apparent from the following detailed description.

In the accompanying drawings, forming a part of this specification and wherein similar reference characters designate corresponding parts throughout the several views—

Figure 1 is a fragmentary vertical sectional view showing an initial step in the fabrication of a wall structure.

Figure 2 is a view similar to Figure 1 with additional form work added in a succeeding step.

Figure 3 is a horizontal cross sectional view taken through the form work necessary to produce the multi-layer bonded type of monolithic structure.

Figure 4 is a horizontal cross sectional view taken through a portion of the form work and wall structure showing a core form poured or filled with insulation material such as aeroconcrete.

Figure 5 is a cross sectional view similar to Figure 4 showing the form work in an additional step wherein structural concrete is poured in the form work at the weather side of the wall structure.

Figure 6 is a fragmentary horizontal cross sectional view taken through the completed monolithic wall structure.

Figure 7 is a fragmentary view showing the application of certain openings in a wall structure formed according to this invention, such as for doors, windows and the like.

Figure 8 is a horizontal cross sectional view taken through a door opening of the wall structure showing associated details.

Figure 9 is a fragmentary cross sectional view showing certain form work which is essential in providing window openings where it is necessary to pour concrete beneath the window opening to form part of the monolithic wall structure.

Figure 10 is a side elevation of a type of core form which may be used for providing the central insulated wall section.

Figure 11 is a fragmentary horizontal cross sectional view showing a modified form of monolithic wall structure which differs somewhat from the wall structure of Figure 6.

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This application is a division out of our copending application Serial Number 761,832, filed July 18, 1947.

In the drawings, wherein for the purpose of illustration are shown different types of wall structures and various forms for the production thereof, the letter A may generally designate a preferred type of monolithic wall structure shown in Figure 6. A modified form of wall structure B is shown in Figure 11. For the formation of either of these wall structures a foundation C is provided. Upon it is then set up a weather side form structure D, as shown in Figure 1. Thereafter, the core form structure E is set up upon the foundation C, and finally the room side form structure F is placed. Of course it may be optional as to the initial placing of the weather side form structure D and the room side form structure F. Either one may be placed first, but succeeding the initial placing of either the room or weather side form structure, the core form structure E must be placed.

The monolithic masonry structure for the form of invention A contemplates a structural concrete zone or section G at the weather side of the wall, a light-weight concrete zone or section H at the room side of the masonry structure, and the intermediate insulation wall portion K of aeroconcrete or other insulation material.

The foundation C is preferably of the nature shown in fragmentary sectional views of Figures 1 and 2 and includes along the upper, outer and inner perimeters or edges thereof footings or recesses **20** and **21**.

It is the intention to provide the weather side and room side forms D and F in sections which, for conventional building work, may be 9′ in height and 8′ to 16′ long. Having preformed panels of this size enables their use for successive wall structure. In the main, these forms are made up of 4″ x 4″ vertical studding **22** to which diagonal sheathing **23** is suitably connected. A layer of cheap composition board or plywood **24** is appropriately secured upon the inner surface of the sheathing **23**, for the purpose of providing a smooth surface upon the exposed sides of the wall structure when completed. The weather side and room side form work panel may be initially supported in any approved manner until the core form E has been placed. Subsequently the panels of the form work D and F are connected by foundation secured bolts **25** and other cross bolt structures **26** thereabove. One of these

may be placed one-third the way up from the foundation and another adjacent the top of the wall, or they may be provided in any desired number consistent with the height of the wall structure. These cross or tie bolt structures need not be of the form shown in the drawings since they can be made with removable ends after a structure well known in this art so as to eliminate any metallic bolt or tie rod connections after the wall is completed and the forms have been removed.

The core form E may be of a shape and structure to suit the type of masonry wall which is being constructed and also to suit the type of insulation material which it receives to provide the insulating core of the wall. One approved type is that shown in Figures 3 to 6 inclusive. It is intended to run this core for the height of the wall and individual core forms may be placed between adjacently disposed tie rods lengthwise of the wall, as shown in Figure 3. As will be subsequently described the core form may be extended the full length of the wall, as for the type of structure shown in Figure 11.

In the core form E, we provide an outer vertically disposed wall portion **30** having end wall portions **31** and **32**. These parts may be integral and preferably they are of creosote treated wallboard or other cheap fibreboard construction, possessing sufficient rigidity to withstand the pressure exerted by the core which is being formed. The end walls **31** and **32** may be flanged at **33** and to these flanges are suitably connected steel tie rods **35**. At the inner sides of the flanges **33** is connected steel wire mesh or metallic lathing **36** for the entire length and width of the core form E. As a connecting means for the various form parts we provide cross rods or bolts **37** which in the space where the structural wall section is to be formed are provided with anchoring heads **39** to bond the structural wall section to the other wall sections. Of course there would be no objection to providing the wall **30** of the core form of open work, such as steel mesh, in order to bond the structural concrete wall with the aeroconcrete wall portion. Therefore, wherever the term "bond" is used, it is to be sufficiently broadly construed to include also an anchoring bond.

Removable spacing strips or members **40** are provided between the outer or weather side panel form D and the core form, and also between the room side form F and the core form, as is shown in the drawings.

In cold climates where frost is apt to creep through the wall structure, it is preferred to insulate the structural concrete wall section G from the room side light-weight concrete section H. To that end, insulation strips **45** are provided and they are held in position by collapsible A frames, designated at L in the drawings. These frames are vertically positioned at the end spacing of the core forms F where the cross rods between the weather side and room side forms are placed, and they consist of a core form abutting panel **46** having legs **47** hingedly connected thereto and cross turnbuckles **48** for contracting the legs to fill the space between the core forms and the room side panel work F, as shown in Figures 3, 4 and 5 of the drawings. In the space between the ends of the core forms and against the panel **46** is disposed the insulation strip **45** which may be placed before pouring begins or after the core forms have been filled and just before the pouring of the structural concrete to form the wall section G. This insulation strip **45** can be omitted in warm climates, if so desired, and it is of the common type of commercial insulation strip.

The assemblage of the various form works upon the foundation is shown in Figure 3. In the core form E may be placed material having desired insulating qualities. We may use suitable earth material in dry condition, or sawdust, clay, insect killing composition in pellet or granular form, or comminuted straw or cornstalks. Preferably, we use a commercial type of aeroconcrete which is a sponge-like material having only a fraction of the relative density of structural concrete. It is fabricated of sand, water and a fluffing chemical well known to those skilled in the art relating to masonry construction. This provides a cellular type wall section having high insulation qualities as is designated by the letter K in the drawings showing the form of invention A. The material forming the core or wall section K may be pumped from the top of the wall structure into the form by conventional concrete pumping mechanism, and in the case of other materials which do not bond similar to aeroconcrete, such may be tamped to the desired degree. The wall in this stage is shown in Figure 4.

Succeeding the placement of the insulation core of the monolithic wall structure, the outer wall section G may be poured. The material is of high quality concrete of a nature which may approximate three thousand to four thousand pounds per square inch after setting for twenty-eight days. This is not intended to be a limitation but is merely cited to show a structural relation with respect to the other wall zones or sections. If desired, we can use steel rod or other reinforcing expedients in the wall section G.

At this point it is to be noted that the structural wall section G includes cross extensions designated at **50** in the drawings projecting in the direction of the room wall section H and located between the ends of the cores formed by the type of form E. These transverse walls **50** may be suitably reinforced if desired, and if the insulation strips **45** are not used, the cross walls **50** may be bonded with the material of the room side light-weight concrete wall section H.

Subsequent to placement of the structural concrete wall section or zone G, the inner wall section H is poured. All of the pouring steps may be accomplished by means of conventional concrete pump guns from the top of the wall form. The interior wall section H is of light-weight concrete consisting of cement, sand, water and a vermiculite type of aggregate which, as is conventionally known, expands when the sand and water become active. Vermiculite aggregate, as is well known, is obtained from vermucilite ore expanded or exfoliated from nine to sixteen times normal size, and it weighs from six to ten pounds per cubic foot after exfoliation. Vermiculite ore is a micaceous, non-metallic mineral which possesses millions of cells in expanded condition. It has high insulating qualities and is sound proof. Its nature will enable the facile driving of nails or other securing expedients thereinto.

The wall section or zone H is directly bonded with the core section K and because of the use of wire mesh or metal lathing **36**. If desired, we may hang a curtain of some fabric inside

of the metal lathing sprayed with hot asphalt.

It is to be understood that before pouring the structural concrete section G the spacing forms 40 are removed and that is also true prior to pouring the wall section H, and in the latter case the collapsible frames L are also removed. A horizontal cross section of the completed wall A is shown in Figure 6 and it is noted that the cross rods 35 may also be removed so that the only portion of the form work which is lost is the relatively cheap parts 30—33. The metal lathing adds appreciably to the structural characteristics of the wall.

In the modified type of wall structure B, the weather side and room side forms are used similar to that above described, but the core form is construed differently so as to provide a continuous section of aero concrete. To that end fibreboard forms are provided which include an outer fibreboard form wall 60 having cross wall providing sections 61 of a U-shaped cross section, at the desired intervals where it is intended to provide cross walls or ribs upon the structural wall section G'. The inner fibreboard wall 63 may present a horizontally corrugated appearance, to give added strength to the light-weight concrete section H' of the wall structure B, and this form of the fibreboard wall 63 is maintained through the provision of steel rods 65, as shown in Figure 11.

The wall sections G', K' and H' are formed in a sequence of steps such as above described for the monolithic wall structure A, and portions 61 of the wall form 60 provide cross wall portions 70 which reinforce the wall structure. Also it is to be noted that the aeroconcrete wall section or zone K' is continuous and, of course, that is also true of the structural concrete wall section or zone G' and the light-weight concrete wall section or zone H'. Suitable cross rods 71 may be provided, having the same anchoring expedients as those above described for the form of wall A.

Referring to fabrication of the monolithic wall structure so as to provide door and window openings, as shown in Figures 7 and 8, along the sides of the door opening designated at 80 in the drawings and also on the sill, we provide creosoted strips, preferably 2'' x 4'' in size. The strips 81 are positioned along the sides of the opening 80 and a sill piece 82 is provided. These are centrally positioned and may be used for attaching suitable jambs, stiles, door casings, etc. For a window structure 90 and the like, we utilize a box type form shown at 91 in Figure 9, which may be cooperatively disposed with respect to the conventional inner and outer forms designated at 92 and 93. Of course side strips 95 may be used for attaching window sashes thereto, which are similar to the pieces 81 above described. The strips 81 and 95 may be suitably anchored in the structural concrete wall section by means of metallic clips 96 shown throughout the different views. The box 91 may have a floor 97, shown in Figure 9, provided with suitable openings 98 through which the nozzles of concrete pumping guns may be extended for pouring the concrete of the various wall sections into the wall below the normal window space being formed.

It will be noted from the drawings that when the outer side and room side forms are removed, the marginal edge of the top surface of the foundation will be exposed inwardly of the footing recesses 20 and 21. This may be used for any finish desired, such as plastering, molding or the like.

Various changes in the shape, size and arrangement of the forms, as well as the panels or wall sections formed may be used, as well as variations from the specific steps of the method above enumerated without departing from the spirit of this invention or the scope of the claims.

We claim:

1. In a form structure for the fabrication of concrete walls, the combination of a weather side wall form, a room side wall form in spaced relation with respect to the weather side wall form, both of said wall forms extending thruout the height of the concrete wall to be formed, a plurality of individual compartment providing core forms located in the space between the removable weather and room side wall forms and in spaced relation with the latter and extending thruout the height of the wall to be formed, removable means in the spaces between said core forms and the weather side and room side wall forms for holding the proper spacing thereof, said core forms being relatively spaced from each other, and removable forms located at the room side form wall covering the spaces between the spaced core forms at the ends thereof.

2. In a form structure for the fabrication of concrete walls, the combination of a removable weather side wall form, a removable side wall form in spaced relation with respect to the weather side wall form, both of said wall forms extending thruout the height of the concrete wall to be formed, a plurality of relatively end spaced individual compartment providing core forms located in the space between the removable weather and room side wall forms and in spaced relation with the latter and extending thruout the height of the wall to be formed, removable means in the spaces between said core forms and the weather side and room side wall forms for holding the proper spacing thereof, removable forms located at the room side form wall covering the spaces between the spaced core forms at the ends thereof, and tie means extending thru the spaces between the end spaced core forms and removably anchored to said weather side and room side wall forms.

3. In a form construction for the fabrication of masonry walls, the combination of weather side and room side relatively spaced removable wall forms, core forms each providing compartments therein for receiving a masonry core, said core forms being located in the spaces between the first mentioned wall forms and in spaced relation therewith, the core forms at the sides thereof facing the room side wall form being constructed of foraminous material to enable the same to bond directly with cementitious material adapted to be placed in the space between the same and the removable room side wall form.

4. In a form construction for the fabrication of cementitious walls the combination of removable weather side and room side wall forms adapted to extend thruout the height of the wall to be formed, a plurality of relatively spaced compartment providing core forms located in the space between the weather side and room side wall forms and in spaced relation with the latter, removable means to hold said core forms in spaced relation with respect to the weather side and room side wall forms, removable forms at the room side wall form closing the spaces between the ends of the core forms, and an insulation strip in each of said end spaces between the

ends of the core forms disposed at the last mentioned removable forms in position to close off said spaces in facing relation with the weather side wall form.

5. A form structure for the fabrication of cementitious walls comprising removable weather side and room side wall forms disposed in spaced relation to define the thickness of the wall, vertically disposed cross form walls in the space between the first mentioned wall forms to define wall openings, and nailing strips in spaced relation in the spaces between the weather side and room side wall forms and immediately adjacent to the cross wall forms and directly at the inner sides thereof.

6. A form structure for the fabrication of cementitious walls comprising a foundation, removable weather side and room side wall forms upon said foundation disposed in spaced relation to define the thickness of the wall, vertically disposed removable cross form walls in the space between the first mentioned wall forms to define a window opening, nailing strips in spaced relation in the spaces between the weather side and room side wall forms and immediately adjacent to the cross wall forms and directly at the inner sides thereof, and a bottom wall form for the window opening disposed in the space between the cross wall forms and spaced above the foundation and defining the bottom of said opening and having openings therethru for disposition of cementitious material into the space below said bottom wall upon said foundation.

7. In a form construction for the fabrication of a concrete masonry wall having a weather side structural concrete section, a light weight concrete room side section, and a core section of insulation concrete, the combination of a core form construction for receiving insulation concrete having spaced side walls and relatively spaced end walls at intervals along its length, a room side wall form spaced from the facing side wall of the core form, a weather side wall form spaced from the facing side of the core form, said core form end wall spaces directly opening into the space between the weather side wall form and the core form to permit structural concrete when poured to also enter between said core form end walls.

8. In a form construction for the fabrication of a concrete masonry wall having a weather side structural concrete section, a light weight concrete room side section, and a core section of insulation concrete, the combination of a core form construction for receiving insulation concrete having spaced side walls and relatively spaced end walls at intervals along its length, a room side wall form spaced from the facing side wall of the core form, a weather side wall form spaced from the facing side of the core form,

said core form end wall spaces directly opening into the space between the weather side wall form and the core form to permit structural concrete when poured to also enter between said core form end walls, and collapsible and removable forms in the space between the core form and the room side wall form at the location of said spaced end walls of the core form to block off access of the space between said core form end walls to the space between the core form and room side wall form.

9. In a form construction for the fabrication of a concrete masonry wall having a weather side structural concrete section, a light weight concrete room side section, and a core section of insulation concrete, the combination of a core form construction for receiving insulation concrete having spaced side walls and relatively spaced end walls at intervals along its length, a room side wall form spaced from the facing side wall of the core form, a weather side wall form spaced from the facing side of the core form, said core form end wall spaces directly opening into the space between the weather side wall form and the core form to permit structural concrete when poured to also enter between said core form end walls, and collapsible and removable forms in the space between the core form and the room side wall form at the location of said spaced end walls of the core form to block off access of the space between said core form end walls to the space between the core form and room side wall form, the side of the core form construction facing the room side form being of foraminous metallic material to permit the bonding of the light weight concrete room side section and the insulation concrete section of the core form construction.

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