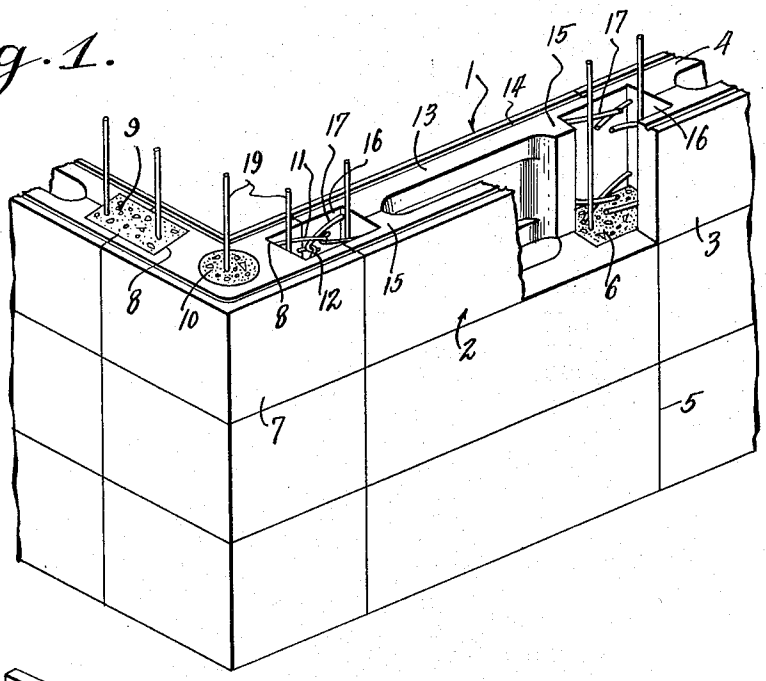
April 28, 1936. D. G. UNDERDOWN 2,038,615

ART OF CONSTRUCTION

Filed July 28, 1933

Fig. 1.



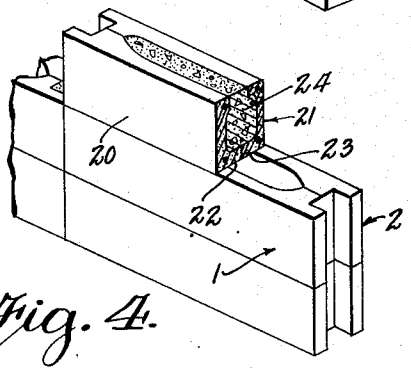
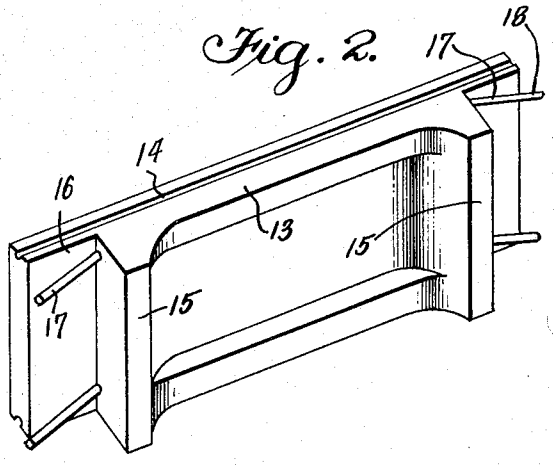


Fig. 4.

Fig. 2.



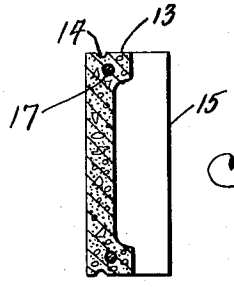


Fig. 3.

INVENTOR.

Donald G. Underdown

BY Lyon & Lyon

ATTORNEYS

Patented Apr. 28, 1936 2,038,615

UNITED STATES PATENT OFFICE

2,038,615

ART OF CONSTRUCTION

Donald G. Underdown, Los Angeles, Calif.

Application July 28, 1933, Serial No. 682,607

4 Claims. (Cl. 72—1)

This invention relates to the art of constructing structures such as dwellings, lofts, storehouses, walls, enclosures, etc. The invention is particularly directed toward a method of and means for constructing enclosures which is rapid and requires a minimum amount of skilled labor. The art of construction contemplated by this invention is inexpensive from the standpoint of materials as well as labor; it is adaptable to all forms, sizes and styles of buildings; it substantially eliminates the use of wooden forms or other removable forms in which concrete structures or parts thereof are poured in place.

The method of construction embraced by this invention gives rise to a structure which is of ample strength and resistant to earthquake. The resultant structure is braced and connected by a substantially monolithic concrete reinforcing. The structures resulting from the application of this invention are capable of being kept at optimum temperature and humidity conditions without the necessity of installing expensive air-washing, heating, cooling, humidifying and circulating systems.

In general, the method of construction embraced by this invention utilizes precast or formed structural units which may be and are of varying shapes, sizes and designs. Such precast structural units include wall slabs or units containing metallic reinforcing which may extend beyond the surfaces of the tile or units so as to permit the various precast units to be tied together or to the reinforcements employed in other portions of the finished structure.

It is acknowledged that heretofore precast building units have been made but such precast building units of the prior art have generally been of the nature of partition blocks and tile and were self-supporting but were incapable of becoming load-bearing portions of the finished structure. Furthermore, in the utilization of the building blocks or hollow tile of the prior art in a structure, the girders and beams were first erected and the precast building units were then suitably arranged between the beams and girders to form walls which did not support upper portions of the structure but merely acted as fillers. Moreover, prior methods of construction do not effectively connect and tie the tile or other precast units with the beams, girders, studs and joists of a building.

The mode of construction embraced by this invention, however, distinguishes from the prior methods and means in that precast structural units are arranged in a desired position with relation to one another and to the configuration of the ultimate structure and thereafter monolithic concrete columns, beams and girders are cast around or through portions of such precast units, thereby joining units together and to the monolithic columns, girders, etc. Preferably, in accordance with this invention, the precast units themselves act as forms for the monolithic columns and the like, thereby obviating the necessity of employing expensive, inaccurate, temporary and troublesome removable wooden or metallic forms.

It is an object of this invention, therefore, to disclose an improved mode of construction whereby preformed structural units are used and become intimate and integral portions of the finished structure.

Another object is to disclose a method of construction which employs precast structural units, said units acting, in part at least, as forms in which monolithic cementitious columns, girders and beams may be formed.

These and other objects, uses and advantages of the invention will be more readily understood from the following detailed description.

In order to facilitate understanding, reference will be had to the appended drawing, illustrating a few forms and modifications which the invention contemplates.

In the drawing:

Fig. 1 is a perspective view of a portion of a wall structure constructed with my form of units;

Fig. 2 is a perspective view of a wall slab unit constructed in accordance with my invention;

Fig. 3 is a vertical sectional view taken through the center of the wall slab unit shown in Fig. 2; and

Fig. 4 is a perspective view of a wall section illustrating a modified form of wall slab unit constructed in accordance with my invention.

In describing the invention, reference will repeatedly be made to "structural units" or "formed structural units". By such terms, reference will be made to preformed tile, slabs, blocks, etc., of varying shape and size which have been made before being installed or placed into desired position as elements of a structure. Such formed structural units may be either cast, molded or otherwise shaped and may be made from a number of different materials such as, for example, cementitious compositions, clay or terra cotta, etc. The term "cementitious com-

position" as used herein refers to compositions which are relatively plastic and mobile but which have the ability of setting or hardening. Such cementitious compositions generally include hydraulic cements such as Portland cement, and the like, but the term also embraces gypsum bodies and magnesium oxychloride cements.

As stated hereinbefore, the mode of construction embraced by this invention contemplates the use of precast units which are arranged and held in a desired position relative to one another and then connected together by means of monolithic members made from a cementitious material.

As shown in Fig. 1, for example, the wall is composed of inner and outer precast wall tile 1 and 2 which are identical in shape and configuration. These units are arranged one on top of another and during erection are seated upon a mortar or grout containing lime, Portland cement, or other cementing materials. These wall units are placed in abutting relation with other similar units such as the units 3 and 4, the joints, indicated at 5, forming vertical lines. After a wall composed of such units has been erected, a column 6 of concrete is poured through the channel formed by the end sections of abutting wall units 1, 2, 3 and 4. The column 6 is therefore a monolithic member tying the wall together.

A corner block is indicated at 7, such corner block being in abutting relation with the ends of wall tile. The corner block may be provided with a recess, indicated at 8, facing the ends of the wall units so as to form a channel, conduit or passageway into which cementitious material may be poured so as to form the corner column 9. In addition, the corner blocks 7 may be provided with apertures which are in alignment when the corner blocks are laid one upon the other, and a vertical series of such corner blocks may then be securely tied together by pouring concrete into such apertures so as to form the monolithic corner post 10.

The end portions of the corner block 7 are provided with rectangular recesses, indicated at 8, into which project metallic reinforcing rods 11 and 12 extending horizontally through the block 7, the ends of the reinforcing rods extending a considerable distance into the recess 8.

Fig. 1 also shows the ends of two wall tile 1 and 2 in abutting relation with one end of the corner block 7. The exterior vertical surfaces of the wall tile are preferably plane and as shown in Figs. 1, 2 and 3, the body of the wall tile is relatively thin.

The upper and lower longitudinal or side edges of the wall tile are of increased thickness, as indicated at 13, so as to form a suitable seating surface between meeting faces of adjoining or adjacent tile; such horizontal seating surfaces may be provided with longitudinal grooves 14 adapted to receive grouting material and facilitate the erection of a wall.

The wall tile are further provided with rearwardly extending spacing fins 15, these spacing fins extending rearwardly of the rear surface of the body portion of said tile throughout the full width thereof and extending from a point spaced from the end of the tile so as to leave a recessed portion 16 which is of uniform configuration vertically. In other words, the bearing surface or thicker section 13 does not extend beyond the spacing fins 15.

The wall tile may be provided with reinforcing rods 17 extending longitudinally through the thicker seating sections 13 and projecting out of the rear surface of the body portion of said tile between the fins and the adjacent ends of the tile, the point of exit of the ends of the rods being preferably the junction point between the outermost surface of the fin and the rear face of the body portion of the tile. The ends of the reinforcing may extend beyond the end of the tile, as indicated at 18.

Again referring to Fig. 1, after the wall units 1 and 2 have been placed into abutting relation with the end of the corner block 7 and the wall and corner thus formed has been built to a sufficient height, concrete is poured into the form shaped by the recess 8 of the corner block and the recess 16 of the adjacent wall tile.

In this manner, monolithic concrete column 9 is formed, this column extending through the wall and tying the various corner blocks and wall tile together. The reinforcing rods 11 and 12 of the corner blocks and rods 17 of the wall tile extend into this concrete column 9. Before pouring the column, the various rods, such as the reinforcing rods 11 and 12 of the corner block and 17 of the wall tile, may be twisted or otherwise suitably tied together, such twisted reinforcing being eventually covered by and embedded in the finished column 9.

From the description given hereinabove, it is evident that no forms have been required in the construction of the monolithic column 9, thereby eliminating the cost of temporary wooden forms.

In order to strengthen the corner construction, the bore 10 of the various corner blocks 7 may be also filled with concrete. Fig. 1 shows a vertical reinforcing rod 19 positioned in the center of said bore prior to the pouring of the concrete into place. Again, the resulting column ties the corner blocks together but does not require the use of any special forms.

If desired, reinforcing rods 19 may be placed in the spaces formed by the recesses 16 to reinforce the poured columns 6 and reinforcing rods 11 and 12 and 17 may be interwoven with such reinforcing rods 19 to assist in tying all of the wall units firmly together.

The formation of beams either at the top of a wall or elsewhere is facilitated by employing slabs formed in the manner indicated in Fig. 4. The wall, for example, may be composed of opposing wall slabs 1 and 2 similar to those shown in Figs. 1, 2, and 3, but in order to form a continuous beam along the top of such wall, opposing slabs 20 and 21 are employed, these slabs distinguishing from slabs 1 and 2 in that their lower edges are provided with inwardly extending flanges 22 and 23 respectively, such flanges being adapted to contact with one another when the opposing slabs are in position so as to form a member adapted to bridge the hollow space between the lower slabs 1 and 2 and thereby permit the retention of concrete 24 poured beween the slabs 20 and 21.

The manufacture of the precast or preformed structural units described hereinabove has not been described in detail as it does not form a part of the present invention. Any suitable forms, machines or methods of making preformed bodies may be employed in the manufacture of the slabs or tile. Furthermore, the proportions and character of aggregate, sand, cinder, ash, etc., used in the slab composition may be very materially varied. It may be stated, however, that slabs made of Portland cement and an aggregate not

exceeding about ½'' mesh have been found to be very satisfactory, particularly when such slabs are compacted by vibration of the molds in which they are cast.

All such changes, modifications and adaptations of the invention as come within the scope of the following claims are embraced thereby.

I claim:

1. A precast structural unit including a body member formed as a slab having front and rear faces, a plurality of fins formed on and projecting rearwardly of the rear face of said body member, said fins extending the full width of the body member and spaced inwardly of the ends thereof, the side edges of said body member being thickened between said fins to form strengthened meeting edges between said units when two of said units are assembled one upon the other, a reinforcing rod extending longitudinally of said slab and embedded in said thickened edge portion of said body member, the ends of said reinforcing rod extending from the rear surface of said body member at the junction between said fins and the rear face of said body member.

2. A precast structural unit including a body member formed as a slab having front and rear faces, a plurality of fins formed on and projecting rearwardly of the rear face of said body member, said fins extending the full width of the body member and spaced inwardly of the ends thereof, and the side edges of said body member being thickened throughout the entire space between said fins to form rearwardly projecting side flanges on said body member, a reinforcing rod extending longitudinally of said slab to a depth substantially equal to the unthickened portion of said slab, whereby the ends of said reinforcing rod extend outwardly from the rear face of said slab at the junction between said fins and the rear face of said slab.

3. A precast structural unit including a body member formed as a slab having front and rear faces, a plurality of fins formed on and projecting rearwardly of the rear face of said body member, said fins extending the full width of the body member and spaced inwardly of the ends thereof, a pair of reinforcing rods extending longitudinally of said slab parallel with the face of said slab and spaced therefrom a distance equal to the distance between the front and rear faces of said slab, one adjacent each side edge of said slab, the ends of said reinforcing rods extending outwardly of said slab at the junction between said fins and the rear face of said slab, the side edges of said body member being thickened to form side flanges on said body member extending rearwardly thereof a lesser distance than said fins, said thickened side edges of said body member embedding that portion of the reinforcing rods lying between the fins.

4. A precast structural unit including a body member formed as a slab having front and rear faces, a plurality of fins formed on and projecting rearwardly of the rear face of said body member, said fins extending the full width of the body member and spaced inwardly of the ends thereof, and the side edges of said body member being thickened to form rearwardly extending flanges, one of said flanges extending rearwardly a lesser distance than said fin and the other of said flanges extending rearwardly to the full extent of said fins.

DONALD G. UNDERDOWN.