United States Patent

Cooper

[15] **3,685,241**

[45] **Aug. 22, 1972**

[54] **WALL CONSTRUCTION**

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[21] Appl. No.: **135,502**

Related U.S. Application Data

[63] Continuation of Ser. No. 840,681, July 10, 1969, abandoned.

[52] **U.S. Cl.** **52/270,** 52/274, 52/286, 52/293, 52/300, 52/439

[51] **Int. Cl.**.....**E04b 1/04,** E04c 1/10

[58] **Field of Search**.....52/270, 271, 272, 274, 258, 52/259, 275, 286, 284, 293, 295, 300, 436, 435, 434, 432, 439, 588, 595, 593, 125, 264, 587

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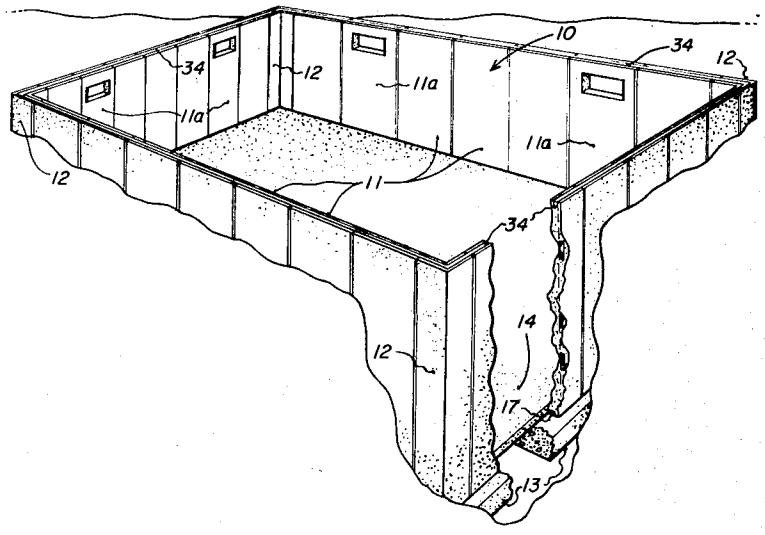
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[57] **ABSTRACT**

A building wall is formed by erecting on a concrete footing, masonry panels of at least one story height having corner and intermediate panels formed with a groove in the upper, lower, and one lateral edge of each panel and having a cooperating tongue member formed on the other lateral edge of the panels forming a plurality of joints sealed at the edges with a mastic material, and filled with grouting material to secure the wall to the footing, and form an integral wall. The upper portion of the wall is locked together through the use of concrete bars secured in the upper grooves to vertically extending rods used to lift the panels, the grooves then being filled with concrete to bond the panels together.

4 Claims, 7 Drawing Figures



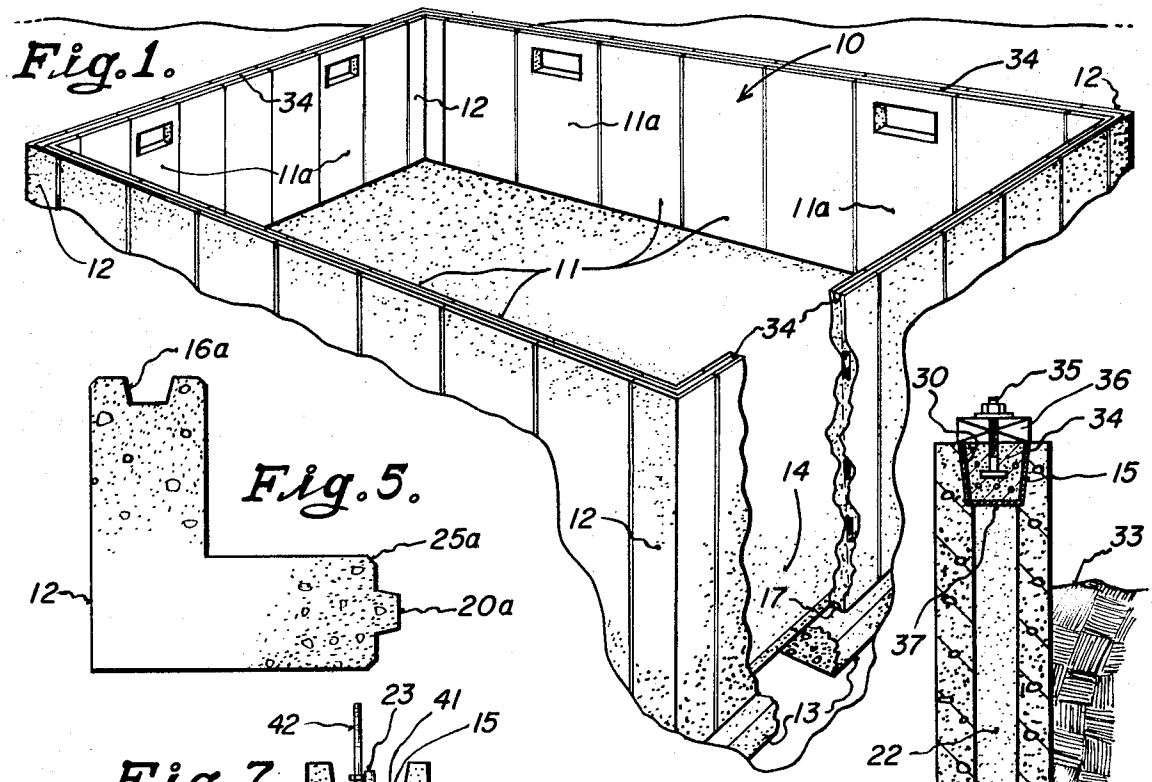


Fig. 1.

Fig. 5.

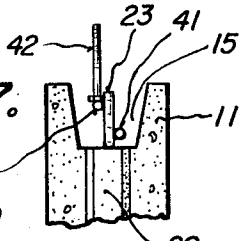


Fig. 7.

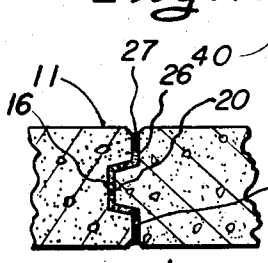


Fig. 4.

Fig. 6.

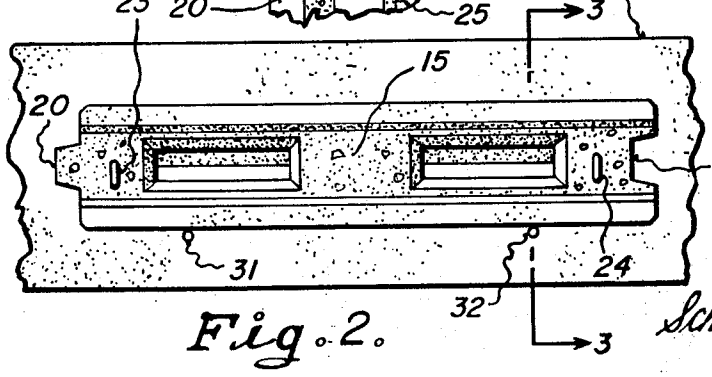
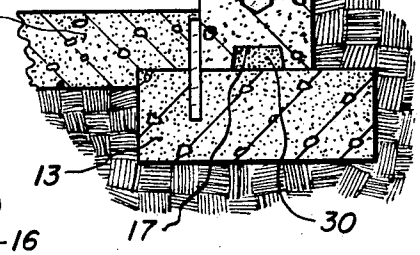


Fig. 2.

Fig. 3.



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WALL CONSTRUCTION

This is a continuation of my copending application Ser. No. 840,681, filed July 10, 1969, and now abandoned.

This invention relates to the construction field and more particularly to a structure and method of forming a building wall of at least a one story height.

The general practice of erecting walls and particularly for residential buildings has almost entirely centered around the use of concrete blocks. That is, the basement walls or walls which are used to support the upper structure of the house or other similar building is formed by rows of concrete blocks which are substantially 18 inches in length, and approximately 10 inches high and 10 inches wide with void spaces formed in the center of the blocks. The blocks are laid in an overlapping manner on top of each other in rows to form the lower part of the building walls. The practice of using building blocks replaced the previous practice of generally "pouring" concrete into forms to produce a wall having reinforcing members and which generally has been recognized as being of superior strength. However, with the advent of increased labor costs in preparing the forms and the amount of time involved, the use of blocks has replaced the practice.

The present invention is directed to erecting a wall which is of at least one story height by the use of concrete panels which are formed substantially 8 feet in height, 4 feet in width, and approximately 10 inches in depth. The corner panels are substantially 2 feet wide on the outside surfaces and otherwise conform to the general configuration of the intermediate panels which are secured in between the corner panels. The panels are set in place and form an integral wall assembly when the joints and the groove which is at the bottom of the panels are poured with a grouting material to form a bond between the concrete footing and the wall panels. The upper part of the wall is bonded or strengthened through the use of a locking bar or concrete which is poured into a groove at the top of the block, the groove containing additional strengthening members.

It is therefore a general object of the present invention to provide a wall construction and the method for erecting the same from building panels of at least one story height.

It is yet another object of this invention to provide a building wall by bonding all of the building wall panels into a solid wall construction.

It is still a further object of this invention to provide a building wall which may be erected in a relatively short period of time by comparison to the present day methods of using building blocks.

It is still another object of this invention to provide a structure and method of securing at least single story height building panels in place on a concrete footing.

It is yet another object of this invention to provide a structure and method of securing the upper portion of wall panels of the invention in a bonded arrangement and provide a means of securing the building structural members at the top of the walls.

These and other objects of this invention will become apparent from a reading of the attached description together with the drawings, the figure descriptions which are as follows:

FIG. 1 is a perspective view of a wall erected according to the invention with one wall broken away exposing the footing and flooring;

FIG. 2 is a sectional plan view of a panel and footing on which it rests;

FIG. 3 is a broken elevational section showing a building panel in place;

FIG. 4 is a plan sectional view showing a typical joint formed by two panels;

FIG. 5 is a top plan view in section of a corner panel;

FIG. 6 is a sectional perspective view of the top portion of a panel with structural rods secured in the groove; and

FIG. 7 is a section of an upper panel showing a groove and rod arrangement in preparation for pouring concrete in the groove.

A building construction **10** is best shown in FIG. **1** in which a plurality of intermediate panels **11** are secured between four corner panels **12**, all of the intermediate panels being substantially alike and all of the corner panels being alike. Certain of the intermediate panels such as those designated **11a** contain openings therein which accommodate windows. The openings are preformed with the panels when the concrete panels are fabricated. Panels **11** and **12** rest upon a concrete footing **13** and the lower surface of the area bounded by the walls just described is finished with a floor **14**. Intermediate panels **11** have a groove **15** formed in the upper edge thereof and a groove **16** formed on one of the lateral edges and also includes another groove **17** (FIG. **3**) at the bottom of panel **11**. The tongue **20** is secured on the other lateral edge of panel **11** which is designed to mate with a corresponding groove **16** in another panel **11**. A pair of void spaces **21** and **22** are also formed in panel **11**, the space being one which is tapered from a larger dimension in groove **15** to a smaller dimension near the bottom of the panel. A pair of rod hook members **23** and **24** are embedded in panel **11** near the tongue and groove **20** and **16** respectively and extend vertically within groove **15** to a height of at least the depth of channel **15**. That is, rods **23** and **24** may extend above the upper edge of panels **11** and they are then cut at the appropriate place after the panel has been erected on the footing.

Panel **11**, which is 4 feet wide, 8 feet high and 10 inches thick weighs approximately 3,000 pounds and thus special equipment is required for handling the panels which completely sets the panels apart from the common building blocks. The void areas **21** and **22** are approximately 13 inches long and 4 ⅜ inches wide at the top having approximately a 1 inch taper through approximately 7½ feet of the height of the panel. The corners of panel **11** have a chamfer **25** starting approximately one-quarter inch from each side of the corner. Groove **16** is tapered where the outer part or mouth of groove **16** is approximately 4 inches wide, the inner part of the groove is approximately 2¾ inches wide, the depths of the groove being approximately 2 inches. The mating tongue portion extends approximately 2 inches from the end of panel **11**, is approximately 2¼ inches in width at its furthest extension and is approximately 3½ inches wide where the tongue joins the face of the lateral edge. Reinforcing materials may also be used in panel **11** to provide additional strengthening of the panel if it is so desired.

Due to the dimensions just set forth, a joint **26** is formed between tongue **20** and groove **16** at the lateral edges of the panels, it being observed that a space of approximately one-fourth inch appears between the abutting members forming the joint. The joint is completed by applying a mastic material **27** that forms a liquid seal at both edges of joint **26**. That is, the mastic material is applied to both the inner and outer faces of panels **11** and for that matter, corner panels **12** where intermediate panels **11** mate therewith. The joint is made solid by introducing a grouting material **30** in the space between the lateral edge faces of the panels and the mating tongue and grooves **20** and **16**. Further explanation of how the grouting material is applied to the joint will be set forth later.

Corner panel **12** (FIG. **5**) is very similar to intermediate panels **11**, the outside dimensions of the corner panel being 2 feet on each side. The panel is of course 10 inches thick and has an inner face of approximately 1 foot, 2 inches on each inner face side. A tongue **20***a* and a groove **16***a* are substantially the same dimensions as that just provided for intermediate panel **11** and a chamfer **25***a* is formed on each corner in the same manner as panel **11**. A groove is formed at the top and bottom (not shown) of panel **12** in the same manner as grooves **15** and **17** of intermediate panel **11**. The footing **13** is generally wider than panels **11** and **12** (See FIGS. **1** and **3**).

As shown in FIGS. **2** and **3**, a plurality of pins **31** and **32** are set in footing **13** at the time the footing is prepared. Pins **31** and **32** are located along the inner wall line and the panels **11** and **12** have their inner faces abutted against pins **31** and **32** so that the panels may be held in place before the flooring **14** is poured or set in place. Generally, earth **33** is moved against the outer wall of panels **11** and **12** to position and hold the panels in place and the locating pins **31** and **32** properly position panels **11** and **12** to form the wall. As will be explained later, the panels are secured to footing **13** by grouting materials **30** and the floor **14** is poured so as to cover the upper edge of pins **31** and **32**.

Groove **15** at the top of each of the panels is appropriately prepared in one of two ways to secure the upper portion of the panels. A locking bar **34** (FIG. **3**) is formed of a concrete material and may be pre-cast with longitudinal reinforcing rods formed therein. Additionally, a vertically extending bolt or pin **35** is secured within locking bar **34** and extends upwardly to engage a sill or other building member and hold it in place. Locking bar **34** is slightly narrower than groove **15** and may also be secured in place by grouting material **30**. A plate member **37** overlies each of the void areas **21** and **22** so that the material which is placed in groove **15** will not flow into the void areas. Any suitable material may be used to cover the opening or fit in the opening to prevent the flow of material.

In certain applications of the wall panels **11** and **12**, it will be desirable to pour concrete into groove **15** to form a locking bar and this is preceded by welding at least a single rod **40** horizontally within groove **15**, to vertically extending pins **23** and **24**. If desirable another rod **41** may be welded to pins **23** and **24** to provide additional strength. A vertically extending bolt **42** is welded to rod **40** and extends upwardly to form a building structural member engaging pin such as bolt **35** (FIG. **3**). Using the configuration found in FIG. **6**, the hook portion of pin **23** would be cut off below or even with the top of groove **15** and if the locking bar arrangement such as found in FIG. **3** is used, pin **23** would be cut flush with the bottom of groove **15**.

As explained previously, the time involved in erecting a wall of the type described herein is considerably less than that of erecting rows of building blocks and the end result is one of having a stronger wall than that using building blocks. In erecting the walls, footing **13** is first poured at the building site and pins such as pins **31** and **32** are located in the footing which described the outline of the inner wall surface. That is, pins **31** and **32** are used to locate the inner edge of the walls. Starting with a corner panel **12**, intermediate panels **11** or **11***a* are set in place in the manner as described in FIG. **4** where there is approximately a ¼ inch spacing or gap between the lateral edge faces and the tongue and groove arrangements. After the last panel is set in place, mastic material **27** is applied to the edges of the joint on the outside and inside surfaces of the wall. Thus, there then exists an open space in the tongue and groove arrangement which is in communication with lower groove **17** which extends around the footing beneath panels **11**,**11***a*, and **12**. Upon mastic **27** being applied to the blocks as just described, grouting material **30** is poured into each of the vertical joints formed by tongue and grooves **20** and **16** respectively and the grouting is allowed to flow into groove **17** and thus bond panels to footing **13**. When a locking bar is used, and if panels **11** and **12** have void spaces such as spaces **21** and **22** therein, a covering or closing material is inserted into the top of the void spaces and grouting is poured between groove **15** and locking bar member **34** to bond the upper part of the wall construction.

In the event it is desirable to pour concrete into groove **15** to form the locking bar, horizontal reinforcing rods are first welded to upright pins **23** and **24** and if the hook portion of pin **23** extends above the upper edge of panels **11** and **12**, the pins are cut off. Additionally, bolts **42** are welded to the horizontal bars to provide adequate anchoring points for the sill to be attached thereto.

Thus, it will be seen that I have provided a wall construction and method of erecting the same which is far superior to the method and end product for using the conventional concrete blocks. By the use of this construction and method, a wall may be constructed in a matter of hours that took several days to construct using the well-known techniques of working with building blocks. While I have not particularly shown a panel with a doorway frame therein, it is contemplated that such a panel may be formed in much the same manner as panels **11**a incorporate the openings for windows.

What is claimed is:

1. In a building wall construction including substantially homogenious load bearing concrete panels of at least single story height, the combination comprising:

a. a concrete footing conforming to the outline of the building wall to be constructed;

b. a plurality of concrete corner panels disposed on said footing at each of the corners of said building wall, each of said corner panels having substantially a uniform thickness and height, with a groove formed in the upper, lower and one lateral edge

thereof and having a cooperating tongue member formed on the other lateral edge thereof;

c. a plurality of intermediate concrete panels each of which has substantially the same uniform height and thickness as said plurality of corner panels with a groove formed in the upper, lower and one lateral edge thereof and with a cooperating tongue member formed on the other lateral edge thereof, said plurality of intermediate panels being erected on said footing in spatially disposed tongue and groove confronting relationship forming vertical joints extending substantially the thickness of said concrete panels between said plurality of corner and intermediate panels;

d. mastic material disposed in the outer edges of each of said vertical joints forming a seal to contain grouting;

e. grouting integrally disposed in said vertical joints between said mastic material and at least said lower grooves of said panels in communication with said footing;

f. the locking bar means disposed in said upper grooves of said plurality of intermediate and corner panels, said locking bar means traversing said joints between said panels in cementitious relationship, said combination forming an integral wall construction.

2. The building wall construction as set forth in claim 1 including:

g. structural rods extending within and along the longitudinal axis of said locking bar means;

h. and anchor bolts vertically disposed and extending upwardly above said locking bar means.

3. The building wall construction as set forth in claim 1 including:

i. a plurality of locating pin means disposed in said concrete footing and extending upwardly for engaging the inner faces of said plurality of corner and intermediate panels, said footing being wider than the wall to be erected thereon and extending laterally at least on the inward side of the wall.

4. The structure of claim 1 having a locking bar means which includes:

j. a plurality of preformed concrete bars laid in end abutting relationship in said upper grooves and secured in locking relationship therewith by said grouting disposed between said plurality of preformed bars and said upper grooves in cementitious relationship.

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