Oct. 3, 1961 R. DORSETT 3,002,322

BUILDING CONSTRUCTION

Filed Oct. 17, 1956 2 Sheets-Sheet 1

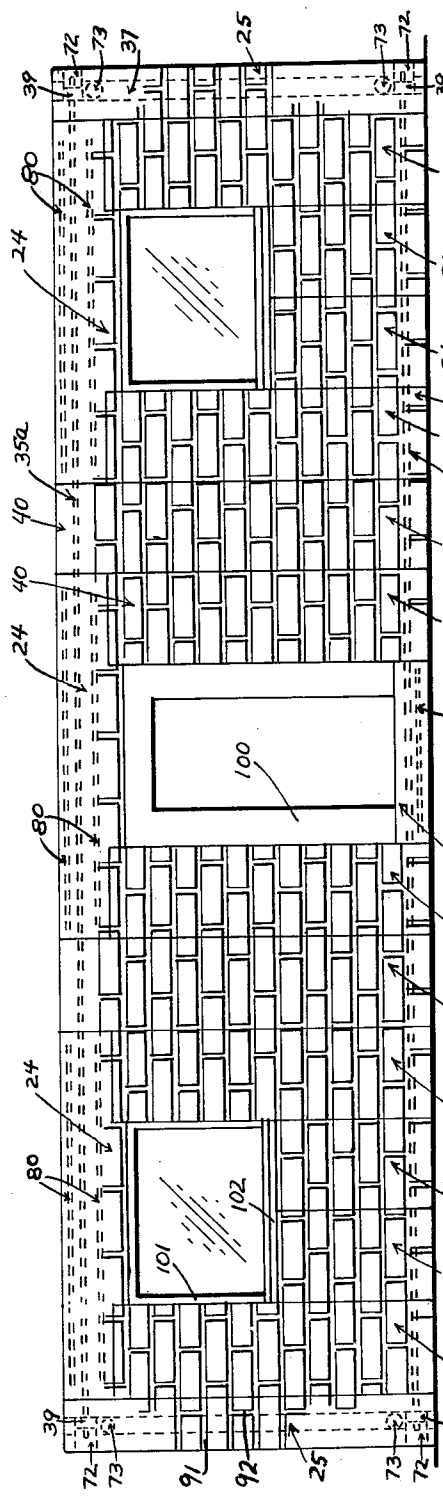


Fig. 1

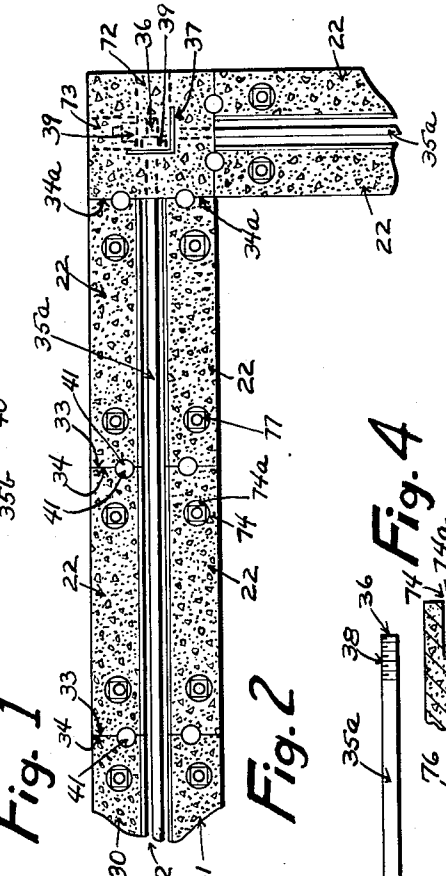


Fig. 2

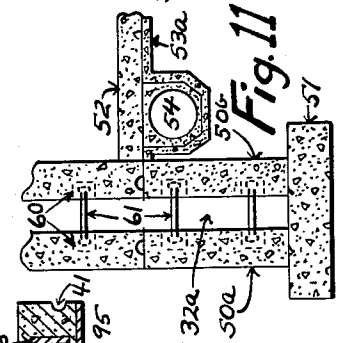


Fig. 11

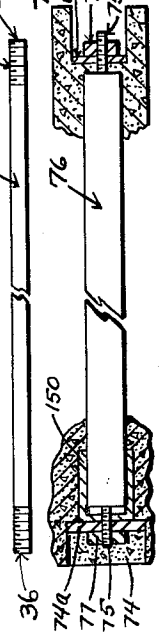


Fig. 4

Fig. 5

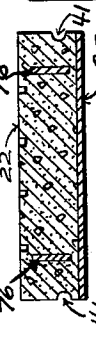


Fig. 6

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BUILDING CONSTRUCTION

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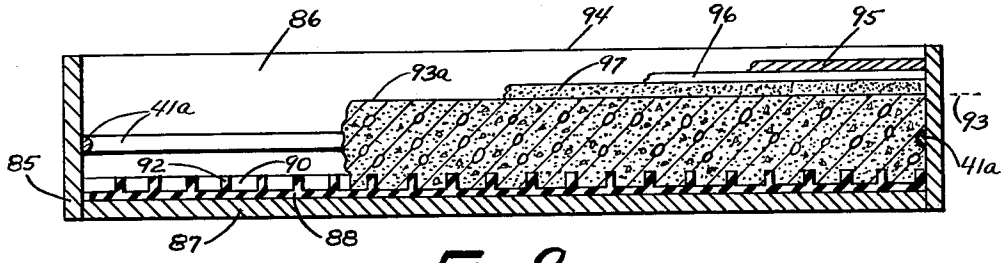


Fig. 9

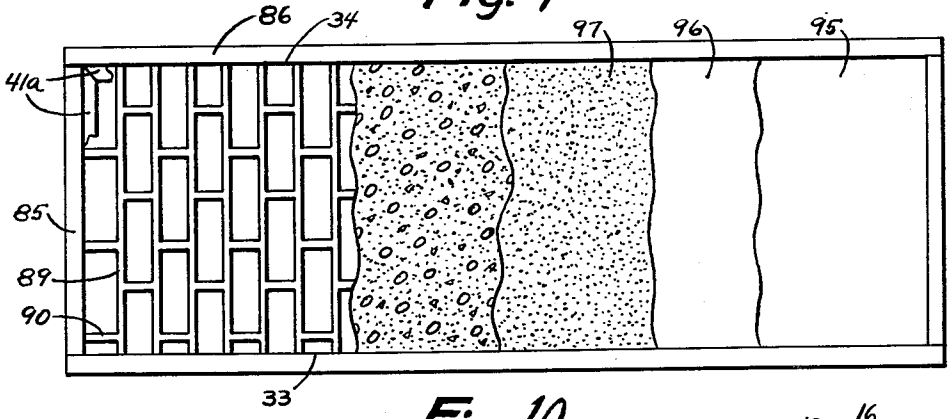


Fig. 10

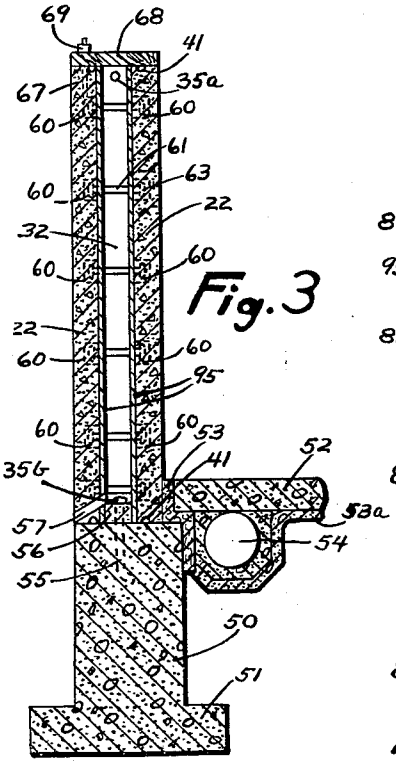


Fig. 3

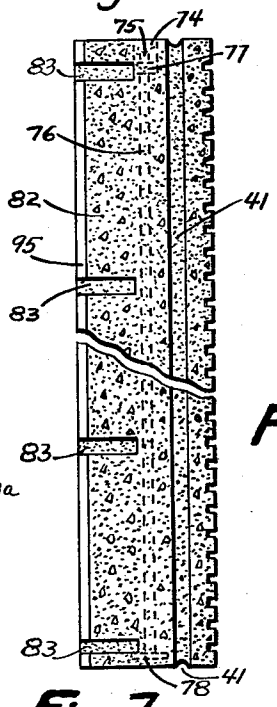


Fig. 7

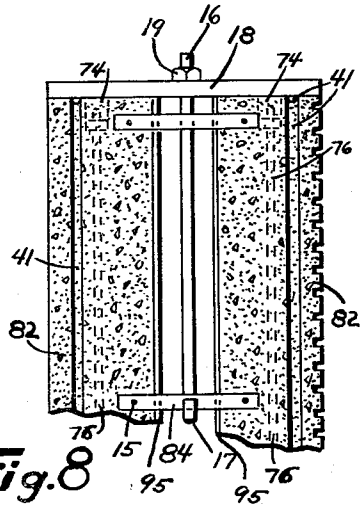


Fig. 8

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3,002,322

BUILDING CONSTRUCTION

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1 Claim. (Cl. 50—132)

This invention relates to the construction of buildings by the use of unitary preformed concrete units of standard form, which can be delivered to the site of construction where they can be erected to form the major portions of the exterior and/or the interior walls of the building.

Certain units are in the form of preformed rectangular slabs of concrete or the like, which can be erected with their longitudinal edges adjacent each other to form a continuous wall suitable to form the exterior or interior walls of the building. In a preferred form, these edge to edge slabs are pulled together in an edgewise direction by one or more metal tension bars to produce a firm wall.

In one form of wall, the slabs are erected in two parallel courses, with an insulating air space between them. One or more metal tension bars are placed between the courses and act upon the end slabs of both courses, and the bars are then drawn tightly to bring the longitudinal edges of the slabs tightly together. Vertical columns may span the ends of the courses, and the bar or bars may be attached to these columns, which in turn apply the tension of the bars to the two slab courses.

Preferably the units are also bonded along their various edges by the injection of wet concrete or mortar into grooves in said edges in a manner that the concrete or mortar, when sufficiently set or hardened, provides an additional means or bonding agent for holding the units in place.

One face of the slabs may be indented to form an ornamentation similar to a brick wall, or the like, and the ornamentation along one edge of the slab is adapted to cooperate with the ornamentation of the adjacent slab to display a continuity of the ornamentation to simulate a continuous brick wall, or the like.

The back face of the slab may have a metal sheet or foil, such as aluminum foil, attached to it by first coating one side of the sheet or foil with asphaltum, and then coating the asphaltum with a thin layer of sand, or similar solid particles, which layer then adheres to the asphaltum on the foil and to the concrete which is applied in wet condition and sets and adheres to the sand. This makes an effective bond between the concrete and metal sheet or foil. The layer of asphaltum prevents sheet or foil from being attacked by the elements of the concrete.

These and other features of this invention will become more apparent in the description which follows, it being understood that such description is intended to amplify rather than limit the invention.

In the drawings:

FIGURE 1 is an elevation of a wall made in accordance with this invention.

FIGURE 2 is an enlarged top view of two walls attached to a corner piece or column.

FIGURE 3 is a typical vertical cross section of a wall.

FIGURE 4 is a side view of one form of tension bar which may be used.

FIGURE 5 is a side view of another form of tension bar which may be used.

FIGURE 6 is a transverse cross section of a concrete slab.

FIGURE 7 is a longitudinal elevation of a modified form of slab.

FIGURE 8 is a vertical elevation of a portion of a vertical wall made with slabs as shown in FIGURE 7.

FIGURE 9 is a vertical cross section, with portions broken away, of a slab and form used in its manufacture.

FIGURE 10 is a top view of FIGURE 9.

FIGURE 11 is a vertical cross section of another form of foundation.

In constructing a building according to this invention, a plurality of unitary preformed concrete units of standard form are preformed at the site, or are delivered to the site, of construction where they can be erected to form the major portion of the walls of the building. For example, the exterior walls of the building may be constructed as indicated in FIGURE 1, by erecting a plurality of preformed rectangular slabs **20**, **21**, **22**, corner columns **25**, sill **23**, lintels **24** and such other units as may be required.

In FIGURES 2 and 3 it is assumed that the slabs are of the character indicated as **22** in FIGURE 1, inasmuch as the relationship of the units is apparent from FIGURE 1.

In constructing the exterior walls of the building, two closely adjacent parallel horizontal courses **30** and **31** are erected with an insulating air space **32** between them. Each course **30** and **31** comprises a plurality of slabs **22** or any of the other slabs illustrated in FIGURE 1. These slabs are erected with their longitudinal or vertical edges **33** and **34** placed edge to edge. One or more tension bars **35***a*, **35***b* are attached indirectly to the end edges **34***a* of the wall. When tension is applied to the bar, or both bars, a pulling action is exerted on the edges of the slabs to pull them together tightly and effectively. Preferably two bars **35***a* and **35***b* are used, one near the top of the wall and one near the bottom of the wall.

A pair of vertical end columns **25** are erected at each end of the wall and these columns span the end edges **34***a* of both courses **30** and **31**. These columns **25** may also be corner columns of the building, if desired, as illustrated in FIGURE 2.

The pair of horizontal metal tension bars **35***a* and **35***b*, are placed in the air space **32** adjacent the top and bottom of the wall respectively and between the courses **30** and **31**. These bars have their ends **36** passing through an angle iron **37** embedded in the columns **25**. The ends **36** of the bars are threaded, as at **38** in FIGURE 4, and the bars are tensioned by turning the nut **39** tightly to bring the edges **33** and **34** tightly against each other.

The longitudinal edges **33** and **34**, as well as the end edges of all of the slabs, are provided with half cylindrical grooves **41** which form cylindrical or half cylindrical grooves, as the case may be, suitable for the injection of wet concrete or mortar under pressure, which, when sufficiently set or hardened, provides a means or bond for holding the slabs in place. Preferably this wet concrete or mortar is introduced into the passages prior to the final tensioning of the bars **35***a*, and **35***b*, so the concrete or mortar oozes out along the edges **33** and **34** and forms a bonding film along substantially the entire seam. The vertical grooves **41** may be near the inner side of the slab, as shown in FIGURE 2, or near the outer side, as shown in FIGURES 7 and 8.

Referring now particularly to FIGURE 3, walls, such as illustrated in FIGURE 1, may be erected on a foundation **50**, of the usual type, having a footer **51**. The building may include a usual floor slab **52** of concrete, or the floor may be the usual wooden flooring construction, if desired. Insulation **53**, asphalt, asphalt impregnated paper or the like **53***a*, and air conditioning duct **54** may be included in the construction of the building. Bolts **55** are embedded in the foundation **50** and their upper ends may extend above the top of the foundation **50** and can be surrounded by an additional concrete

cap 56. A few or all of the slabs may be provided with downwardly directed drain holes or bleeders 57 which have their upper ends substantially at the same level as the cap 56, so any condensation or water which finds its way into the air space 32 may drain to the outside of the building.

The slabs are provided with a plurality of holes 60 drilled therein or formed during the manufacture thereof. As the slabs are being erected, tie bolts 61 are inserted in the holes 60 and cement or mortar is introduced into the holes, which, when set, securely holds the tie bolts 61 in place and strengthens the wall, as is apparent. The ends of the bolts 61 have heads 63, or the ends of the bolts may be deformed or bent in any suitable manner to form anchoring heads, at the ends of bolts. Bolts 67 are inserted and secured at the top edges of the slabs to secure the wall tie plate 68 by the nut construction 69. The bolts 67 may be placed in the casting forms of the slabs, or holes may be drilled and the bolts inserted with wet concrete after the slabs are formed.

The lintels 24 are sufficiently thick to span both courses of the slab constructions, or they may be made of two parallel slabs of the same thickness as the slabs 20 through 22. The threshold 23 likewise is a single piece sufficiently wide to span both courses of the slabs, or it also may be made of two parallel slabs of the same thickness as the other slabs and covered with the usual wood or metal threshold plate. If the lintels and/or the threshold are of the wide variety just described, then proper holes are made in them during their manufacture to allow the bar or bars 35*a* and 35*b* to pass through them if desired.

The upper edges of the slabs 20, 21, and 22 and the upper edges of the lintels 24 have grooves 41, corresponding in shape to the grooves 41 heretofore described. Likewise the lower edges of the slabs 20, 21, and 22 and the lower edges of the lintels 24 and of the threshold 23 have grooves 41 also corresponding in shape to the grooves 41 heretofore described. Wet cement or mortar may be inserted in these grooves in a similar manner to form a means to hold the units in place. Preferably the grooves at the ends of the slabs are fed mortar or concrete from the vertical grooves, as shown in FIGURE 7.

The columns 25 have holes 72 for countersinking the ends 36 of the bars 35*a* and 35*b*, together with the nut construction 39. If the column 25 is a corner column, it also has holes 73, similar to holes 72, for receiving a set of similar bars 35*a* and 35*b* used to tension a wall at right angles to the first described wall which may likewise be made up of any of the units 20–24.

Reinforcement is added to the units 20–24. Bars, similar to those illustrated in either FIGURES 4 or 5 may be used. Holes 74, shown in FIGURES 7 and 8, as well as in FIGURE 2, are made during the casting of the slabs or other units by suitable removable plugs, and these holes 74 receive the ends 75 of the metal bars 76, if the bars are of the form shown in FIGURE 5, or of the ends 38 of bars similar to 35*a*, but shorter, if they are of the shape shown in FIGURE 4. The nuts 77 with suitable washer 74*a*, if desired, are threaded over the ends 75 and the bars are tensioned by the turning of these nuts after the slabs have been formed and set. Preferably the washers 74*a* are cast with the rod 76 in the concrete. These washers prevent the nuts from breaking into the concrete when tightened. The construction may be the same at both ends of the slab, or one end may be made with a head 78 welded thereon which does not need to be a tensioning member and, in fact, need not have any hole corresponding to 74. The ends 75 may be welded to the flat bars 76, in FIGURE 5, and these bars are placed with their width at right angles to the width of the slabs, as shown in FIGURE 6, to impart rigidity in a sidewise direction of the slabs. The lintels 24 have reinforcement 80, shown in dotted lines in FIGURE 1 which are bars similar to those previously described and may be of the shape of either FIGURE 4 or 5 with end construction similar to 74 and 75. Likewise the threshold 23 has a reinforcement 81, shown in dotted lines in FIGURE 1, of a similar construction. The columns 25 are reinforced by the angle iron 37, which preferably extends throughout the length of the column. The sides and, if desired, upper and lower ends of the columns 25 have grooves 41 and bolts 67 similar to those shown in FIGURE 3.

In the modifications shown in FIGURES 7 and 8, the longitudinal edges 82 of the slab members are provided with notches 83 in which metal tie plates 84 may be placed and nailed as at 15 to tie the two courses together. In this instance, the bolts 16 may be hooked to one of the tie plates, as at 17, and may be used to pull down the tie plate 18 by means of the nut 19. These bolts may be placed at various intervals along the length of the wall.

In forming the slabs, an apparatus as shown in FIGURES 9 and 10 preferably is used. A box-like frame having sides 85 and 86 and bottom 87 is supported on a stationary or shakeable support. A substantially imperforate rubber-like sheet 88 is placed on the bottom 87. The sheet 88 may be of any other suitable material, such as metal, wood, plastics, or the like. The sheet 88 has ridges 89 and 90 at right angles to each other in a manner to simulate a brick wall construction in the finished slab, and these ridges 89 and 90 are adapted to form grooves 91 and 92 in the slabs as illustrated in FIGURE 1. The ridges 89 along edge 34 of a slab are so proportioned with respect to the ridges along edge 33 of another similar slab to produce the effect of a continuous brick wall when the slabs are assembled as a wall, as in FIGURE 1. If desired, the sides 85 and 86 of the boxlike frame may terminate at the level 93 instead of at the level 94, as indicated in FIGURE 9. After the rubber-like sheet 88 is in place, concrete is poured in the boxlike frame up to the level 93*a*, corresponding to the level 93 heretofore described. A metal sheet 95, such as aluminum foil, of rectangular shape substantially identical with the slab to be formed, has been previously coated with a layer of asphaltum 96 on which a thin layer of small solid particles, such as sand, has been poured. These particles are adherent both to the layer of asphaltum 96 and to the wet concrete of the slab after it has been poured. The aluminum foil having thus been prepared is then placed over the slab along the face 93*a* while the slab is still wet and unset, so the sand, layer of asphaltum and the foil are firmly attached to the concrete slab. The slabs shown in the process of construction in FIGURES 9 and 10 are particularly adapted to be placed on the outer wall illustrated in FIGURE 1, although they are also useful to form the interior of the wall for any interior walls in the building. If desired, the ornamentation for any of the exterior or interior walls, produced by the sheet 88 may be varied from that of a bricklike construction to any other ornamental configuration desired, such as stone, tile, or any figuration design desired.

The boxlike frame may terminate at level 93 or level 94. If level 93 is used, then the layers of sand and asphaltum, and the aluminum foil extend above the top of the frame. The slabs 22, for example, may be 8 feet, more or less in length, 2 feet, more or less in width, and three inches more or less in thickness. These dimensions are given for the purpose of illustration only and may be varied as desired. The other slabs, 20 and 21, may be proportionally shorter, as shown in FIGURE 1.

The main body of the slab may be cast of Vermiculite concrete, or other light weight concrete aggregate, and the face of the slab may be of a heavier concrete, such as made from sand, gravel, or stone aggregate.

In fabricating slabs with smooth faces instead of bricklike faces, a perfectly smooth rubber or other sheet, without the ridges 89 and 90, may be placed at the bottom of the boxlike frame and the slab may be cast in the

same manner as previously described, with the aluminum foil construction, if desired. It is to be understood that the aluminum foil may be omitted under certain conditions.

In another method of manufacturing the slab, the aluminum foil may be placed in an inverted position, with the layer of sand **97** upward and the concrete may be poured on this foil with the sand layer.

When the box terminates at the level **93**, the slab may be leveled off and troweled by a straight planklike member, not shown, as is apparent.

The boxlike frame preferably has half round bars **41***a* of wood, metal or the like, to form the grooves **41** in the slab. The reinforcing bars **76** are placed in the frame with the washers **74***a* thereon, and with suitable removable plugs over the ends **75** to form the holes **74** in the slabs.

In FIGURE 11 another form of foundation construction is used. The footer **51** supports the two spaced foundations **50***a* and **50***b*, having the heat insulating space **32***a* between them. If desired, these foundations are poured at the place of use, being tied together by tie bars similar to **61** when desired. The slabs **20**, **21**, and **22**, and columns **25** may be placed on the foundations **50***a* and **50***b*. Such construction eliminates the use of insulation **53** of FIGURE 3, since the insulating space **32***a* prevents the flow of heat from the slab **52**. The other members of FIGURE 11 which are numbered similarly as in FIGURE 3 preferably are of the same construction and operation.

In using the units of this invention, the units are fabricated at any convenient place, either at a factory or at a temporary place of manufacture adjacent site. The wall is assembled in the manner illustrated in FIGURES 1, 2, and 3 or 8. The slabs **20**, **21**, **22** and the threshold **23** and lintels **24** are erected and aligned on the foundation **50** in two courses as illustrated in FIGURE 2 and the tension bars **35***a* and **35***b* are inserted in the columns **25** and are tensioned by means of the nut construction **39**. However, before the final turns of the nut construction, the grooves **41** have concrete injected into them under pressure in such a manner that a certain amount of it oozes out along the seams between the edges **33** and **34**, and at the top and bottom of the wall and thereafter the nut constructions **39** are given their final twist.

The door frame **100** and the window frames **101** and the window sills **102** may be of the usual construction now used in the erection of buildings. The window and door constructions may be of wood, aluminum, or any other material, as is well known.

For floor slabs, a cap **150**, of sheet metal or the like, of smaller diameter than the washer **74***a*, may be placed over the end **75** of the reinforcing bar **76** to prevent the travel of concrete around the end **75**, and to allow a better tension pull on the bar when the nut is turned.

While I have disclosed the preferred form of my invention, many other forms may be used, within the scope of the claim which follows.

I claim:

In combination: a plurality of unitary slabs of concrete each in the form of a relatively long, relatively thin, and relatively wide rectangular parallelepiped, said slabs being placed in two closely adjacent parallel horizontal courses, each course comprising a plurality of slabs placed vertically longitudinal edge to vertically longitudinal edge to form a continuous horizontal wall and each slab extending substantially from the bottom to the top of said wall; said slabs having vertical reinforcing metal bars in the form of relatively long, thin and wide ribbons with their thin edges extending toward the sides of said slabs, said ribbons being smooth and of uniform cross-section throughout their length and their edges extending on both sides of the central vertical plane of said slabs which is parallel to said courses, each ribbon having a threaded portion thereof exposed from its respective slab adjacent the top thereof and an opposed portion rigidly secured to said slab adjacent the bottom thereof; a plurality of nuts respectively threadedly received on said threaded portions of said ribbons and placing said ribbons under vertical tension to impose a vertical compression force on said slabs between said opposed portions of said ribbons; and a pair of horizontal metal tension bars adjacent the top and bottom of said wall respectively and between said courses and extending the entire length of said wall and pulling the end and intermediate ones of said longitudinal edges of both courses toward each other.

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