Oct. 18, 1966 R. K. JACOBSEN 3,279,135

COMPOSITE COLUMN FOR PRECAST CONCRETE STRUCTURES

Filed Jan. 23, 1963 4 Sheets-Sheet 1

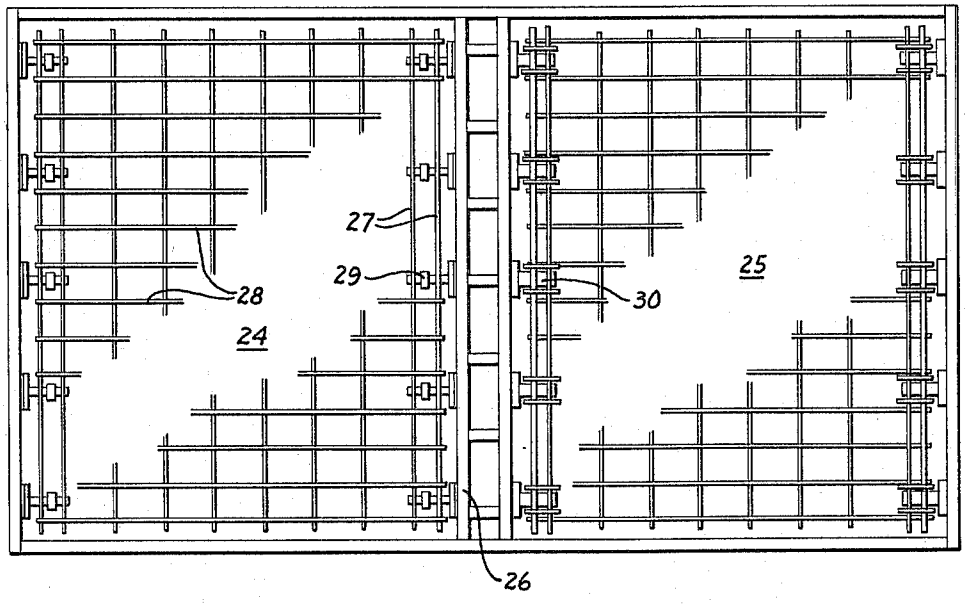


FIG. 2.

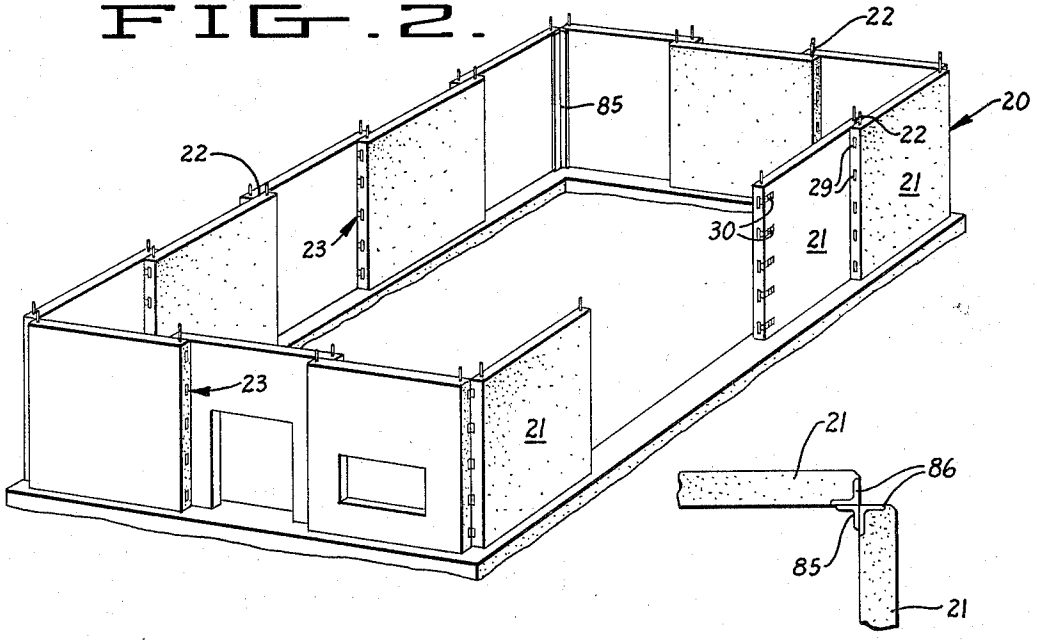


FIG. 3.

FIG. 1.

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Oct. 18, 1966 R. K. JACOBSEN 3,279,135

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Filed Jan. 23, 1963 4 Sheets-Sheet 2

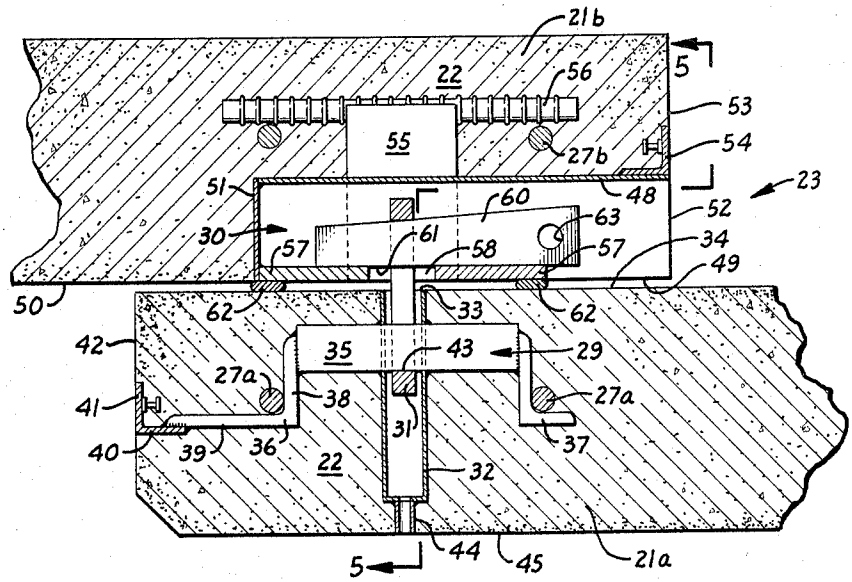


FIG. 4.

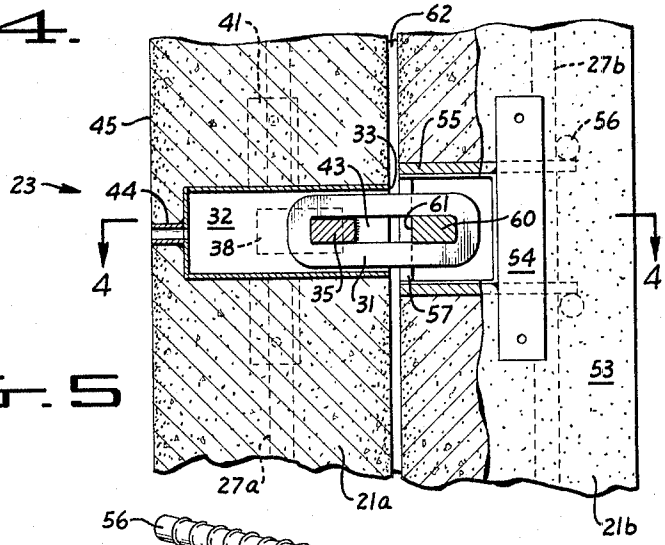


FIG. 5

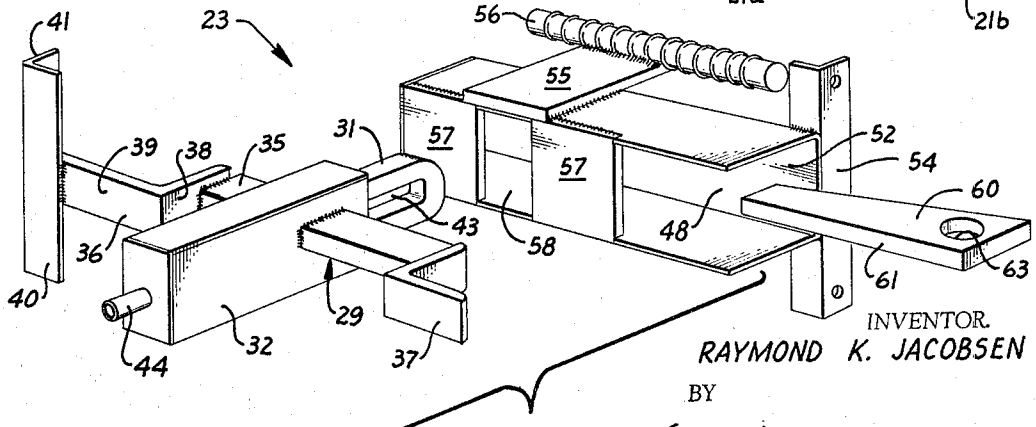


FIG. 6.

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COMPOSITE COLUMN FOR PRECAST CONCRETE STRUCTURES

Filed Jan. 23, 1963 4 Sheets-Sheet 3

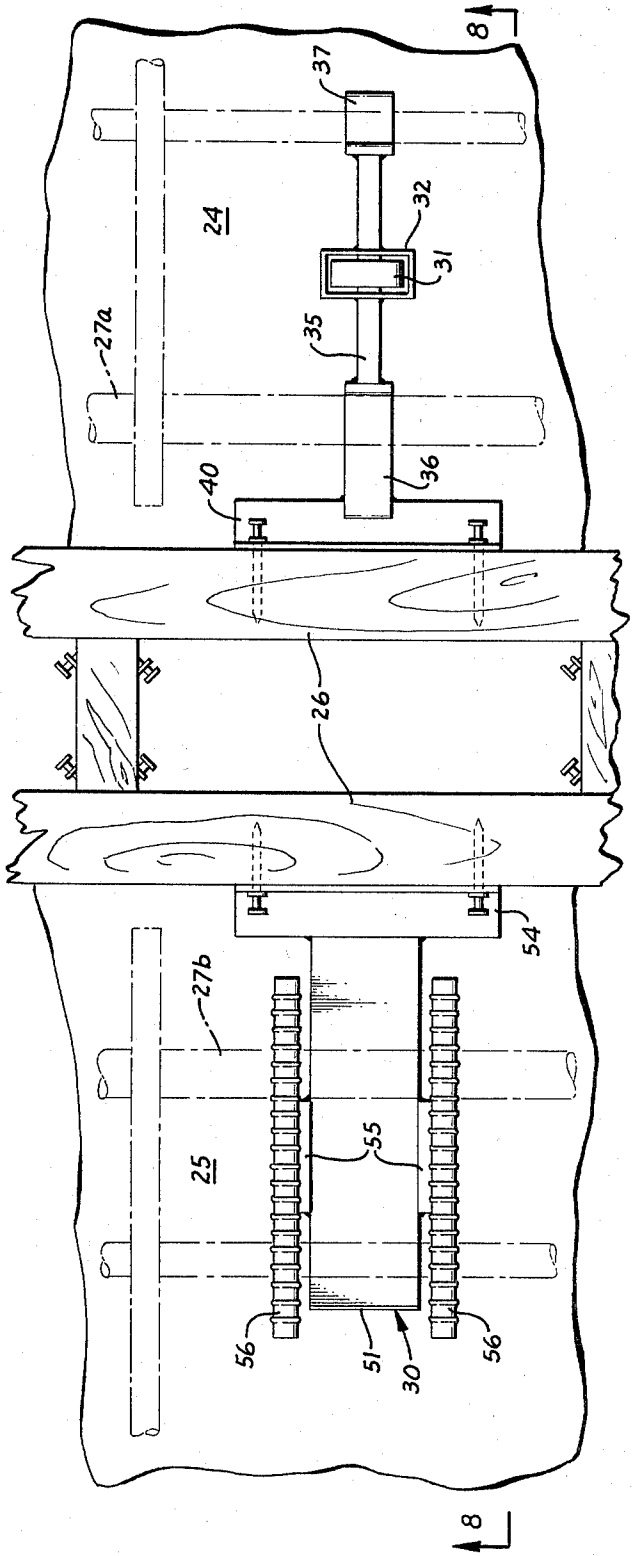


FIG. 7.

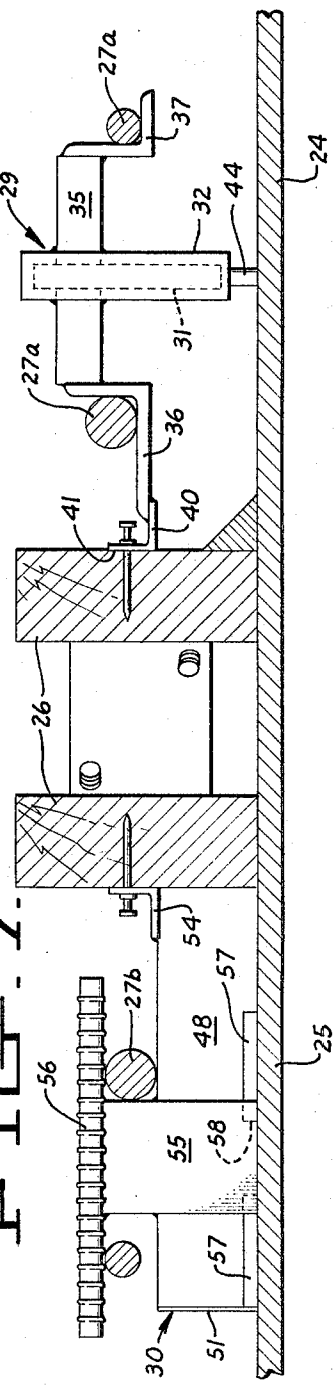


FIG. 8.

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Oct. 18, 1966 R. K. JACOBSEN 3,279,135

COMPOSITE COLUMN FOR PRECAST CONCRETE STRUCTURES

Filed Jan. 23, 1963 4 Sheets-Sheet 4

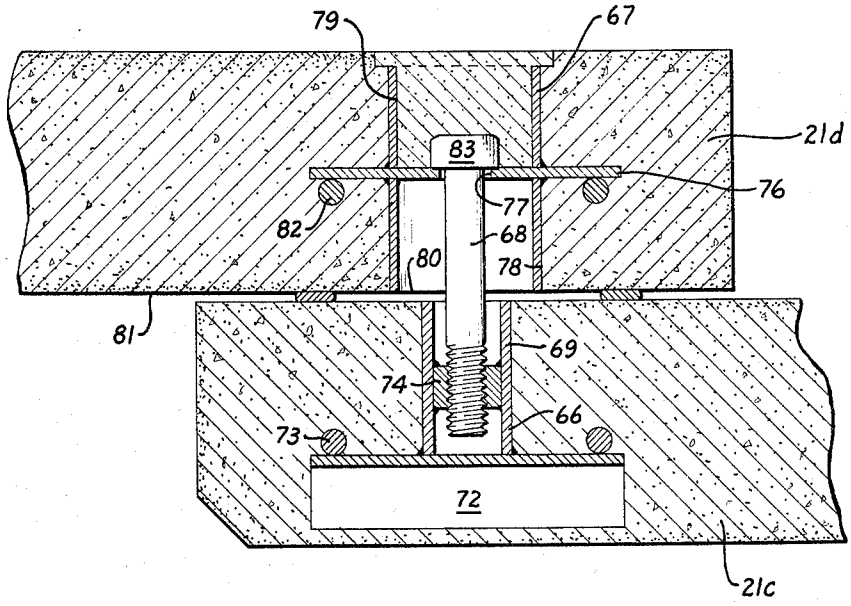


FIG. 9.

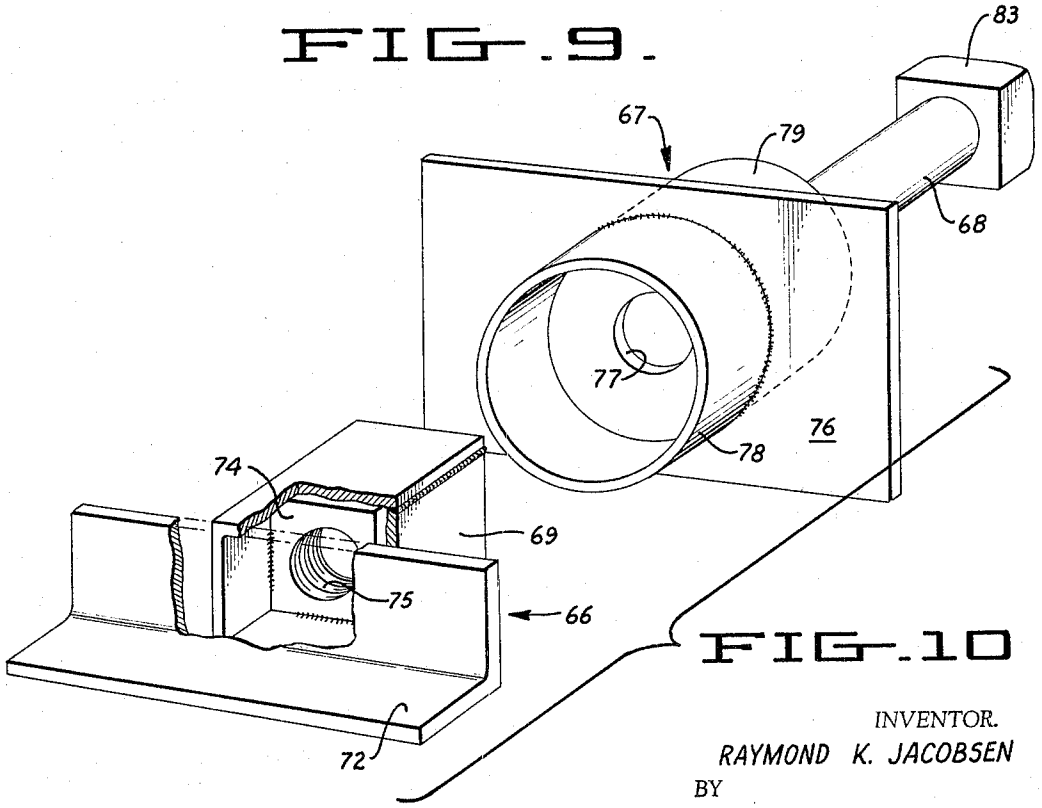


FIG. 10

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United States Patent Office 3,279,135 Patented Oct. 18, 1966

3,279,135

COMPOSITE COLUMN FOR PRECAST CONCRETE STRUCTURES

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Filed Jan. 23, 1963, Ser. No. 253,425
6 Claims. (Cl. 52—127)

This invention relates to a unique building construction composed of prefabricated or precast structural units of formable material such as concrete. It also relates to novel connector means particularly adapted for use with such structural units to secure them together in erecting a building.

In the building industry a form of construction, commonly referred to as the tilt-up wall method, has become quite widely known and practiced. In general the method consists of forming slabs or panels of reinforced concrete in horizontal forms and then tilting the slabs upward on edge to the vertical position to form the building wall. In the tilt-up wall structures heretofore used the slabs or panels when raised were aligned and spaced apart at the ends to form a gap between adjacent slabs. A form was then placed around the vertical edges of the spaced apart slabs or panels, and suitable reinforcing bars were installed so that they projected from the panels into the area that was later filled by a column of concrete poured into the forms. In this manner a column was formed embracing the two adjacent panels and interlocking the whole wall. These columns, spaced apart along the wall between the precast slabs or panels were necessary not only to interlock them together but also to provide the necessary support for the roof or additional upper floors of the building. However, in the prior art construction just described, the method of interlocking the panels and of forming the separate permanent column structures after the panels were in place had many inherent disadvantages, not the least of which was the matter of cost due to the extra material and labor required to form the columns.

In light of the foregoing, it is one principal object of my invention to provide an improved prefabricated reinforced concrete building construction formed from a series of precast panel or slab members that, when erected and connected together, form a continuous building wall having equivalent column strength at spaced apart intervals along the wall without requiring a separate column construction between wall sections.

Another object of the invention is to provide an unusually strong tilt-up wall construction using precast slab or panel members that are secured together in a predetermined partially overlapped position at their ends, said overlapped portions together providing additional columnar strength to the wall and also providing at least the minimum structural requirements for reinforced concrete columns as established under the Uniform Building Code.

Another object of the present invention is to provide a building wall structure formed from a series of precast reinforced concrete panels or slabs that can be erected easily and rapidly in a minimum of time and with a substantially reduced requirement for labor and material compared with prefabricated building constructions heretofore devised.

Still another object of the invention is to provide improved precast reinforced concrete wall panels or slab members having connection devices that can secure adjoining precast slab members to each other with great strength and rigidity in a building construction and which, if necessary, can be readily disconnected.

A further object of my invention is to provide precast concrete building panels with embedded connection devices that are well anchored, easy to install and also easy to connect together with mating devices in adjacent panels with a minimum of labor and without need for special tools.

My invention provides a substantial advance in the building field and particularly in building methods employing tilt-up walls because it eliminates the need to construct the additional forms heretofore required in forming separate columns of concrete between panels or to provide other structural members as columns. The present invention thus provides not only a saving in material but it also enables a substantial reduction in the time required for erecting a building, because once the walls are tilted up into position and quickly connected, the roof can be readily attached and interior work can proceed at a rapid rate.

Another advantage that is afforded by my invention is that the connectable overlapping prefabricated panels that form the building walls can be removed and replaced when necessary. This gives a unique flexibility to the building design since walls can be readily disconnected and moved to expand the building size or to alter its shape as conditions dictate.

Other objects, advantages and features of my invention will become apparent from the following detailed description presented in accordance with 35 U.S.C. 112.

In the drawings:

FIG. 1 is a view in perspective of a building having a tilt-up wall construction in accordance with the principles of the present invention;

FIG. 2 is an enlarged plan view showing a pair of forms for molding precast building panels to be used in forming building walls such as shown in FIG. 1;

FIG. 3 is an enlarged fragmentary plan view of a portion of the building wall construction of FIG. 1, showing the corner connection of a pair of precast panels or slabs;

FIG. 4 is a greatly enlarged fragmentary plan view in section taken along line 4—4 of FIG. 5 and showing an overlapping joint of two adjoining precast concrete panels connected in accordance with the invention;

FIG. 5 is an enlarged view in elevation and in section of the adjoining precast concrete panels shown in FIG. 4 and taken along line 5—5 thereof;

FIG. 6 is an exploded view in perspective showing the connecting members of the precast slabs of FIGS. 4 and 5 in the disconnected position;

FIG. 7 is an enlarged fragmentary plan view showing the connector device of FIGS. 4–6 in position within a slab form before the concrete is poured;

FIG. 8 is a fragmentary view in elevation and in section taken along the line 8—8 of FIG. 7;

FIG. 9 is an enlarged fragmentary plan view in section of a pair of adjoining overlapping precast concrete slabs having a modified form of connector device;

FIG. 10 is an exploded view in perspective and partially in section of the connector device of FIG. 9.

With reference now to the drawings, FIG. 1 shows a building 20 being constructed with walls formed from precast concrete panels or slabs 21 embodying the principles of the invention. Although the building 20 as shown has a simple rectangular shape, it will be apparent from the following description that innumerable building floor plan shapes and sizes can be formed using my invention and also that the invention is not limited to one story structures.

It may be noted that the building 20 does not have the conventional spaced apart columns along its walls but, in accordance with the invention, the precast panels or slabs 21 are substantially aligned on edge and they overlap each other a predetermined amount at their vertical end

edge portions. The increased wall thickness that occurs at the panel end portions which overlap, indicated generally by the numeral **22**, provides a wall section of increased strength that is substantially equivalent to the strength afforded by separate columns spaced apart along the building walls as in tilt-up wall type buildings heretofore constructed, but without the many aforementioned disadvantages of such constructions. At the overlapping joint the adjoining precast reinforced concrete slabs or panels **21** are firmly connected together by a series of connection devices **23** which are embedded in the precast slabs or panels at the time they are formed.

It may be assumed that any building constructed with my tilt-up precast panels will be provided with adequate footings or any suitable foundation structure. Preferably, such foundation members would be located substantially beneath the areas **22** where the tilt-up panels or slabs **21** overlap each other along the building wall. Similarly the loads of additional floors or roof structures would preferably be taken up to a greater degree in the areas **22** of overlapping precast wall panels **21** since these connected overlapping end portions of the slabs serve the function of columns.

The building panels or slabs **21** may all have a generally rectangular shape, although where certain sections of a building wall are to have doors or windows, the slabs can be provided with openings of the appropriate size and shape. To simplify the description of the panel structure only panels without openings will be described. In FIG. 2 is shown a plan view of a pair of forms **24** and **25** for making a pair of adjoining reinforced concrete precast panels **21***a* and **21***b* in accordance with the invention. The forms generally are of the conventional type and are arranged horizontally with frame members **26** that define the overall shape of the slab being made. Extended between the frame members **26** are a plurality of steel reinforcing bars **27** which are arranged generally parallel to each other at spaced apart intervals across the forms and similar bars **28** spaced apart and at right angles thereto. When embedded in the concrete that is poured into the forms, the bars **27** provide additional internal strength in the well known manner. Within the forms **24** and **25** are fixed the connection devices **23** that enable adjoining slabs **21** to be connected together in overlapping engagement when the building wall is constructed. The connection devices **23** are fixed at predetermined spaced apart locations within the forms so that they will be exactly aligned with mating portions of the connection devices on the adjoining slab. To firmly anchor the connection devices **23** within each slab or panel **21** they are not only embedded in the concrete as it is poured into the panel form, but they are originally positioned within the form so as to be retained by portions of the embedded steel reinforcing rods **27**. After the slab forms **24** and **25** have been filled with concrete and smoothed off on the top the connection devices **23** are precisely located within the slab or panel and completely flush with its outer surfaces.

The connector devices **23** which hold the overlapped slabs or panels together in a building construction are an important part of my invention and one form thereof is shown in detail in FIGS. 4–8. Since the connection devices perform the function of structurally tying the adjoining overlapping panels together where their end surfaces engage in substantially flush contact, each connection device must provide a bridging or tie member extending between the panels and also means within each adjoining panel to retain an end of the tie member. In addition, the connector devices within both adjoining slabs must be positioned so as to be aligned when the slabs are moved into position as a building is erected.

Thus the connection device **23** comprises essentially a pair of first and second mating members **29** and **30** respectively that are embedded in adjoining slabs or panels for holding the opposite ends of a tie member **31** extending between the members. In FIG. 4, the members **29–31** are shown holding the overlapped end portions **22** of a pair of tilt-up wall slabs or panels **21***a* and **21***b* together. The male or first member **29** of the connector **23** comprises an elongated sheet metal enclosure **32** fixed within the slab **21***a* and having an open end **33** that is flush with the surface **34** of the slab **21***a* adjacent the adjoining slab **21***b*. Extending at right angles through the enclosure **32** is a rigid bar **35** having a cross-section giving it a substantial resistance to bending. Fixed to the opposite ends of the bar **35** are a pair of right angle members **36** and **37** each having one leg **38** fixed (as by welding) to an end of the bar **35** and with their other leg members **39** being aligned and extending parallel to the bar **35** and thus transversely to the enclosure **32**. The length of the bar **35** and hence the distance between the legs **38** of the angle members **36** and **37** is such that connector member **29** can be positioned between two reinforcing rods **27** within the slab **21***a* so that the extended legs **39** are just in back of the rods **27**, thereby firmly anchoring the bar **35** within the slab **21***a*. Fixed to the end of the leg **39** of the angle member **36** is a short length of another smaller angle member **40** which serves as a positioning member to hold the connector member **29** in the exact predetermined location within the form as the slab **21***a* is poured. As shown in FIGS. 7 and 8, the angle member **40** has an outer flange **41** that is adapted to bear against a frame member **26** of the slab form **24** when the slab is poured and it is thus flush with the end surface **42** of the solidified slab or panel **21***a*.

The tie member **31** or connecting link between the members **29** and **30** consists of an elongated ring having a generally rectangular central opening **43** (FIG. 5) through which passes the bar **35**. There is ample clearance between the opening **43** and the bar **35** so that link **31** can readily be moved from a completely retracted position within the enclosure **32** and beneath the surface **34** of the slab **21***a* to an extended position wherein the link **31** and its central opening **43** projects beyond the slab surface and into the mating connection member **30**. The amount of extension of the link **31** is, of course, limited by the bar **35**. At the rear end of the elongated enclosure **32** is a tubular member **44** providing an opening which enables the tie member or link **31** to be engaged from the outer side **45** of the slab **21***a* so that it can be pushed to the extended position when adjoining slabs are ready to be connected.

The mating female or second connector member **30** comprises an elongated sheet metal enclosure **48** that is embedded in the adjoining slab **21***b* in a position substantially parallel with the plane of the slab and thus transverse to the position of the enclosure **32** in the slab **21***a*. The enclosure **48** is essentially channel-shaped with its long open side **49** located flush with the inside surface **50** of the slab or panel section **21***b* that engages the surface **34** of the adjoining overlapping slab section **21***a*. One end **51** of the channel-shaped enclosure within the slab **21***b* is covered and the opposite end **52** is also open and flush with the end surface **53** of the slab **21***b*. A short angle member **54** is fixed to the enclosure **48** near its open end **52** and serves to position the connector member **30** properly with its slab form **25** in the same manner as the positioning member **40** on the male connector member **29**. Fixed transversely to the top and bottom sides of the enclosure **48** and extending rearwardly therefrom through the slab **21***b* are a pair of rigid metal plates **55** of substantial thickness, and welded to the ends of both plates **55** are a pair of short transverse members **56** of steel reinforcing bar. These members **56** are positioned on the plates **55** so that they are located just in back of a pair of the reinforcing rods **27***b* extending through the slab **21***b* when the open front **49** of the enclosure member **48** is properly flush with the engaging surface **50** of the slab **21***b*. Thus when the member **30** is fixed within the slab **21***b* it is structurally anchored by the bars **55** behind the buried reinforcing bars **27***b*.

Across the open front **49** of the enclosure **48** are fixed a pair of rigid plates **57** that are spaced apart so as to

form a gap **58** that is aligned with the open end **33** of the enclosure **32** of the adjoining slab **21***a* containing the movable tie member **31**. The plates **57** are also partially connected to the aforementioned rearwardly extending rigid plate members **55** that are restrained by the bars **56** behind the reinforcing rods **27***b* within the slab.

To secure the connection between the members **29** and **30** and thus the slabs **21***a* and **21***b*, a rigid wedge-shaped pin member **60** is adapted to be inserted through the end opening **52** afforded by the enclosure **48** at the end of the slab **21***b* and through the elongated opening **43** of the tie member or link **31** after it has been extended from its enclosure **32** through the gap **58** between the plates **57** and into the enclosure **48** of the slab **21***b*. As the pin **60** is inserted through the tie member **31** one of its sides **61** bears against the plates **57**. Further insertion of the pin **60** causes the tie member to extend to its limit and pull up tightly on the bar **35**. Ultimately, the pin **60** itself wedges tightly within the link opening **43** while bearing against the plates **57**. Thus, as the tapered pin is inserted properly it pulls the tie member father into the enclosure **48** and thereby pulls the adjoining slabs **21***a* and **21***b* tightly together into flush engagement in a firmly locked joint. As shown in FIG. 4, strips of some compressible material **62** such as a rubber composition material may be placed between the slabs before they are pulled close together thereby providing a tight moisture-proof seal between them. No mortaring of the joint is required. When the pin **60** is properly in place within the tie member **31** it is fully within the enclosure **48** and thus the slab member **21***b*. Should the slab members **21***a* and **21***b* ever need to be disconnected during a dismantling or remodeling of the building, each pin **60** is provided with a hole **63** at one end so that it can be readily grasped for quick removal. Mere removal of the pins **60** is all that is required to completely disconnect the linking structural tie between two connected panel members such as the slabs **21***a* and **21***b*.

An alternate form of connection device **65** which may be used with the unique building construction of the present invention is shown in FIGS. 9 and 10 and comprises generally a pair of embedded connector members **66** and **67** with a heavy machine bolt **68** forming the connecting link. The first member **66** consists simply of a short box-like hollow section **69** having an open end **70** adapted to be flush with the inner surface **71** of one slab member **21***c*. The section **69** may be formed simply from two angle members of the same length that are welded together. Attached transversely to the inner end of the section **69** is a relatively short rigid member **72** which is adapted to fit behind a pair of parallel reinforcing rods **73** within the slab before the concrete is poured around the member **66**. Within the hollow section **69** and transverse to its longitudinal axis is secured a fixed nut member **74** having a central threaded opening **75**.

The complementary connector **67** of the connector device **65** consists of a rigid piece of relatively thick metal retaining plate **76** having a central opening **77** with aligned enclosure portions **78** and **79** such as metal pipe sections extending perpendicular from opposite sides of the plate **76** and concentric with the central opening **77**. In the slab member **21***d* as shown in FIG. 9, the connector member **67** is positioned with its open forward end **80** flush with the surface **81** of the slab adjacent the adjoining slab **21***c* and with the end portions of the plate **76** located behind a pair of reinforcing rods **82** within the slab **21***d*. If preferred, extensions with end members similar to the angle members **40** and **54** could be attached to the members **72** and **76** to hold in position the connector members **66** and **67** within their slab forms when the slabs **21***c* and **21***d* are being made.

The large sized bolt **68** which is the connecting link for the device **65** is inserted from the rear of the slab **21***d* when it is in the proper predetermined position relative to the adjoining slab **21***c* with the opening **77** in the plate **76** substantially aligned with the section **69** and its fixed nut **74**. The bolt **68** is then taken up to its maximum tension with its head **83** bearing on the plate **76**. The plate opening **77** is made fairly large so that its alignment with the connector member **69** and its fixed nut member **74** is not critical.

As apparent in FIGS. 4 and 9 showing the two forms of connectors in a horizontal cross section of a wall constructed according to my invention, the overlapped portions **22** of each pair of adjoining wall section **21** become as a single column unit when connected. This column **22** fulfills all of the requirements of the Uniform Building Code for reinforced concrete columns, including the minimum cross sectional column dimensions, the number of steel reinforcing forms (four) extending vertically within the column, and the required internal transverse members which are provided by the bars such as members **56** that anchor the connector means.

In constructing a building using the precast concrete panels or slabs as described above, the method varies from that previously employed with other prefabricated building constructions. On the building site a suitable foundation consisting of a floating type slab or piers and footings is constructed. The panels or wall slabs can then be formed as in the forms **24** and **25** at the site in the aforesaid manner as shown in FIG. 2. When the slabs **21** have solidified they are removed from their forms and raised into their upright position. A first slab is placed into alignment with the wall line of the building and then an adjoining slab is moved into an overlapping position relative to the first slab with the connector members of both slabs being in alignment. The connection devices **23** or **65** are then connected together to secure the overlapping joint. Additional slabs or panels of the building wall are then added in the same manner.

At the corners of the building **20**, as shown in FIGS. 1 and 3, the adjoining panels or slabs **21** are connected by a series of right angle corner members **85** which are bolted to angle members **86** that are anchored to the ends of the panels **21**. Other suitable corner connection means (not shown) could also be used within the scope of the invention.

From the foregoing it should be apparent that the present invention is a unique tilt-up wall construction with many advantages over prior art constructions. The precast concrete panels or slabs can be formed rapidly with a minimum of labor and material and can then be tilted up or lifted into position and easily joined with other similar panels or slabs to form a building wall. A vast amount of time and labor can be saved and the resulting structure is strong, durable, yet attractive and also capable of being disassembled or dismantled later on for remodeling, or expansion with the slabs.

To those skilled in the art to which this invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. The disclosures and the description herein are purely illustrative and are not intended to be in any sense limiting.

I claim:

1. A building wall construction comprising a plurality of precast reinforced concrete wall panels, said panels being supported on edge in an upright position to form the walls of a building:

said wall sections being overlapped vertically with portions of their ends in flatwise engagement, thereby forming a series of spaced apart column-like portions along the building wall having double panel thickness;

and connection means for holding said adjoining wall panels together at their overlapped ends, each said means including a linking member retained completely within one of said panels and extendable outwardly therefrom substantially perpendicular to the plane of the adjoining panel, a separate con-

nector member embedded in the said adjoining panel having means forming a recess aligned with and adapted to receive one end of said linking member, said recess providing access to said linking member from an exposed surface of said adjoining panel when said panels are connected, and means for engaging said linking member at its other end to anchor it in said recess and retain said adjoining panels closer together.

2. A wall construction for buildings comprising:

a plurality of precast reinforced concrete wall sections, said sections being supported on edge in an upright position with the end portion of adjacent sections being overlapped, said overlapped end portions thereby forming spaced apart portions of increased thickness along the wall that serve as column supports for the building walls and roof;

a plurality of spaced apart parallel reinforcing bars embedded in each of said sections;

first and second connector means secured to said reinforcing bars within the adjacent end portions of adjoining wall sections, said first connector means in one wall section including means forming a cavity within the wall section, a rigid retaining member embedded within the wall section and extending transversely through said cavity, said retaining member having extended end portions engaging a pair of said reinforcing bars;

a movable link within said cavity, said link having an elongated central opening and fitting loosely around said retaining member, said link being extendable outwardly from said cavity so that a portion of its central opening projects beyond the surface of the wall section, the amount of its projection being limited by said transverse retaining member;

said second connector means in the adjoining wall section including means forming a cavity accessible from the end surface of the wall section, bearing plates across the front of said cavity forming a gap for receiving said movable link when it is extended from the adjoining wall section, means extending inwardly from said bearing plate and located behind a pair of said reinforcing bars within said wall section for anchoring said plates and the cavity forming means within the wall section;

and tapered pin means adapted to be inserted from the end of said second wall section into its said cavity and through the opening in said link, said pin means engaging said bearing plates on one of its sides;

whereby as it is inserted, the pin means pulls the movable link against the retaining member and forces the adjoining wall sections closer together while forming a firmly locked joint.

3. A wall construction for buildings comprising:

a plurality of precast reinforced concrete wall sections, said sections being supported on edge in an upright position with the end portions of adjacent sections being overlapped, said overlapped end portions thereby forming spaced apart portions of increased thickness along the wall that serve as column supports for the building walls and roof;

a plurality of spaced apart parallel reinforcing bars embedded in each of said sections;

first and second connector means embedded within the adjacent end portions of adjoining wall sections and connected to said bars, said first connector means in one wall section including means forming a cavity within the wall section, a rigid retaining member extending transversely through said cavity;

an elongated movable link extending axially within said cavity, said link having an elongated central opening through which extends said retaining member, said link being extendable outwardly from said cavity beyond the surface of the wall section, the amount of its projection being limited by said transverse retaining member;

said second connector means in the adjoining wall section including means forming a cavity accessible from the end surface of the wall section, bearing members across the front of said cavity forming a gap for receiving said movable link when it is extended from the adjoining wall section;

and wedge shaped means adapted to be inserted from the end of said second wall section into its said cavity and through the opening in said link, said latter means engaging said bearing member on one of its sides;

whereby, as said wedge shaped member is inserted, it pulls the adjoining wall sections closer together and forms a firmly locked joint.

4. A wall construction for buildings comprising:

a plurality of precast reinforced concrete wall sections, said sections being supported on edge in an upright position with the end portions of adjacent sections being overlapped, said overlapped end portions thereby forming spaced apart portions of increased thickness along the wall that serve as column supports for the building walls and roof;

a plurality of spaced apart parallel reinforcing bars embedded in each of said sections;

first and second connector means secured to said reinforcing bars within the said end portions of the adjoining wall sections, said first connector means including means forming a cavity within the wall section, a rigid retaining member extending transversely through said cavity, means on said retaining member for anchoring it within said wall section behind a pair of said reinforcing bars;

a movable link within said cavity, said link having an elongated central opening and adapted to fit loosely around said retaining member, said link being extendable outwardly from said cavity so that a portion of its central opening projects beyond the surface of the wall section, the amount of its projection being limited by said transverse retaining member, means providing access to said cavity from the outside surface of said wall section for pushing said link to the extended position;

said second connector means in the adjoining wall section including means forming a cavity that is accessible from the end surface of the wall section, bearing plates across the front of said latter cavity forming a gap for receiving said movable link when it is extended from the adjoining wall section, means extending inwardly from said bearing plate and located behind a pair of said reinforcing bars in said wall section for anchoring said plates and the cavity forming means within the wall section;

and tapered pin means adapted to be inserted from the end of said second wall section into its said cavity and through the opening in said pin, said pin means engaging said bearing plates on one of its sides;

whereby as the pin means is inserted, it pulls the adjoining wall sections closer together and forms a firmly locked connection between them.

5. A wall construction for buildings comprising:

a plurality of precast reinforced concrete wall sections, said sections being supported on edge in an upright position with the end portions of adjacent sections being overlapped a predetermined amount, each pair of said overlapped end portions thereby forming a column-like portion of increased thickness that serves along the wall to support the building walls and roof;

a plurality of spaced apart parallel reinforcing bars embedded in each of said sections, at least two of said reinforcing bars extending longitudinally within each of said overlapped end portions;

a plurality of male and female connector means secured to said reinforcing bars at spaced apart intervals within the adjacent overlapping end portions of adjoining wall section, each said male connector means in one wall section including means forming a cavity

within the wall section, a rigid retaining member extending transversely through said cavity and having end portions embedded in the surrounding wall section;

an elongated movable link extending axially within said cavity, said link having an elongated central opening through which extends said retaining member, said link being extendable outwardly from said cavity beyond the surface of the wall section, the amount of its projection being limited by said transverse retaining member;

each said female connector means in the adjoining wall section including means forming a cavity accessible from the end surface of the wall section, bearing members across the front of said latter cavity forming a gap for receiving said movable link when it is extended from the adjoining wall section;

and wedge shaped means adapted to be inserted from the end of the wall section into said latter cavity and through the opening in said link, said latter means engaging said bearing member on one of its sides;

whereby as said wedge shaped member is inserted it pulls the adjoining wall sections closer together and forms a firmly locked joint.

6. A wall construction for buildings comprising:

a plurality of precast reinforced concrete wall sections, said sections being supported on edge in an upright position with the end portions of adjacent sections being overlapped, each pair of said overlapped end portions thereby forming a column-like portion of increased thickness that serves along the wall to support the building walls and roof;

a plurality of spaced apart parallel reinforcing bars

embedded in each of said sections, at least two of said reinforcing bars extending longitudinally and vertically within each of said overlapped end portions;

a plurality of male and female connector means secured to said reinforcing bars at vertically spaced apart intervals within the said overlapping end portions of the adjoining wall sections, said male connector means being aligned with said female connector means when said adjoining wall sections are overlapped a predetermined amount;

means controllable from the end of one of said overlapped wall sections for mechanically interconnecting each aligned pair of said male and female connector means.

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