Nov. 18, 1952 L. CIARLINI 2,618,146

REINFORCED CONCRETE COLUMN, BRACKET, AND BEAM JOINT

Filed Dec. 10, 1946 3 Sheets-Sheet 1

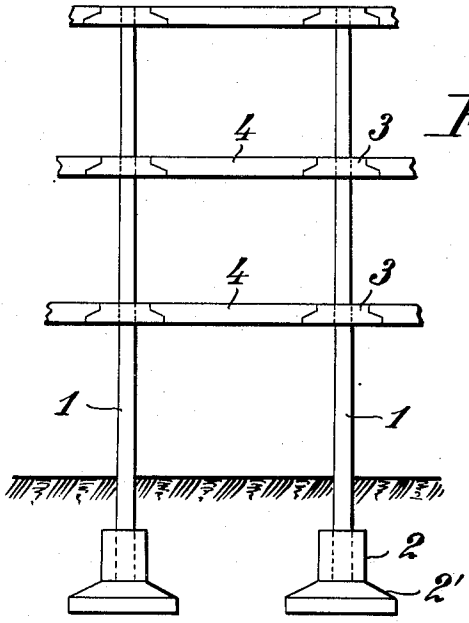


Fig. 1

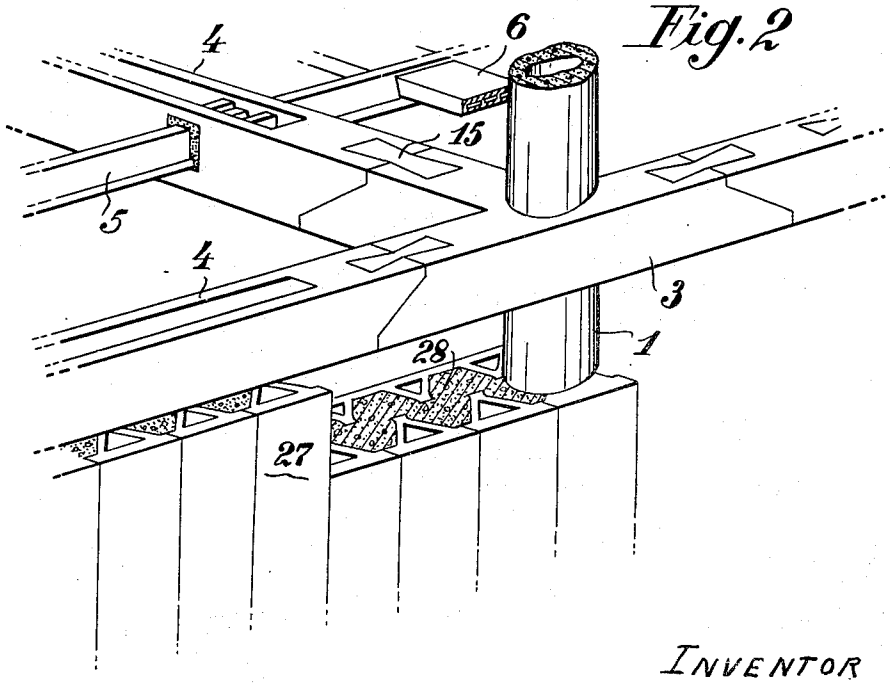


Fig. 2

INVENTOR
LUIGI CIARLINI
By: Young, Emery & Thompson
Att'ys.

Nov. 18, 1952 L. CIARLINI 2,618,146

REINFORCED CONCRETE COLUMN, BRACKET, AND BEAM JOINT

Filed Dec. 10, 1946 3 Sheets-Sheet 2

Fig. 3

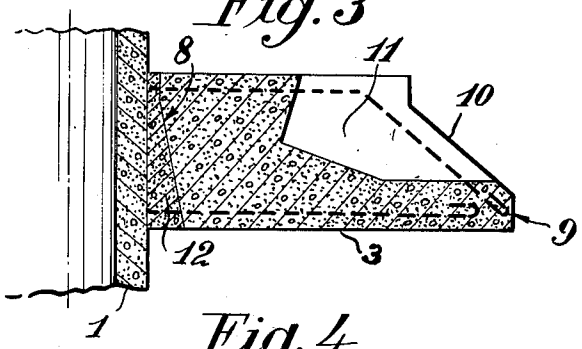
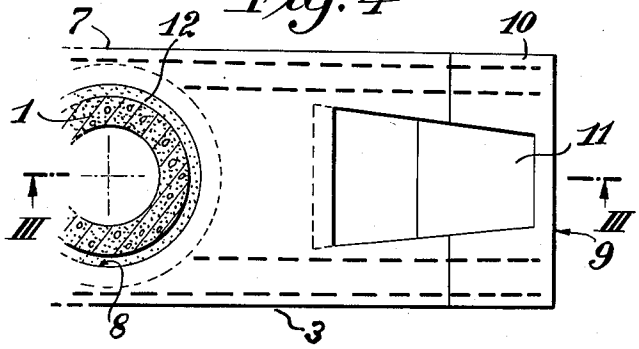


Fig. 4



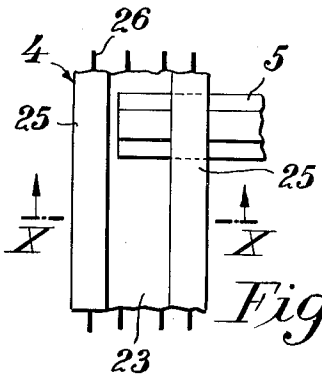
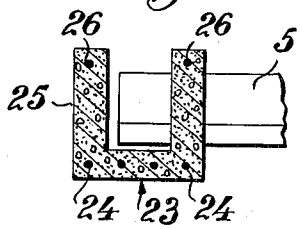


Fig. 8

Fig. 9



INVENTOR
LUIGI CIARLINI

By: Young, Emery & Thompson
Attys.

Nov. 18, 1952 L. CIARLINI 2,618,146

REINFORCED CONCRETE COLUMN, BRACKET, AND BEAM JOINT

Filed Dec. 10, 1946 3 Sheets-Sheet 3

Fig. 5

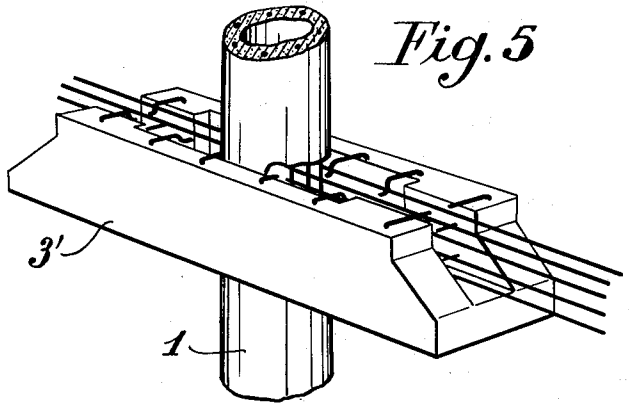


Fig. 6

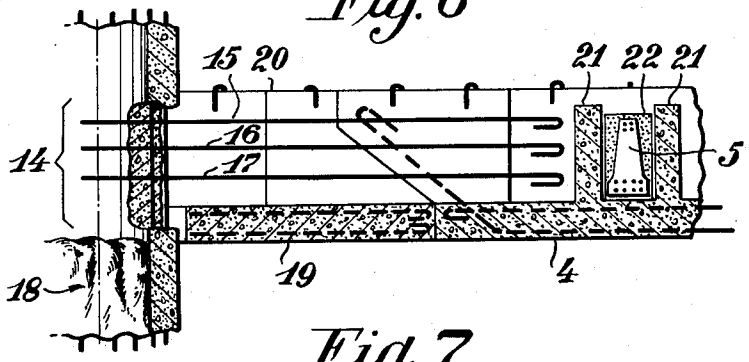
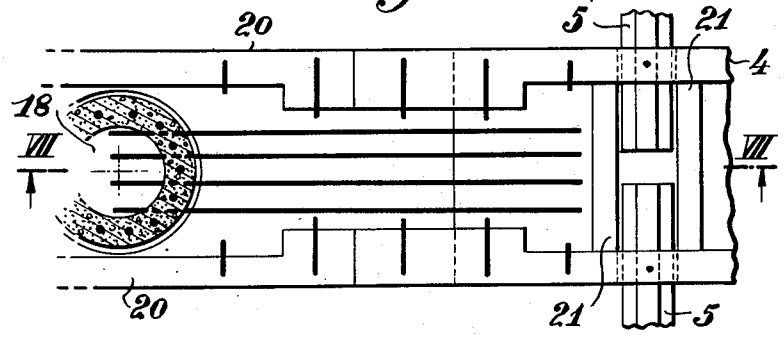


Fig. 7



INVENTOR
LUIGI CIARLINI

By: Young, Emery & Thompson
Attys.

Patented Nov. 18, 1952

2,618,146

UNITED STATES PATENT OFFICE

2,618,146

REINFORCED CONCRETE COLUMN, BRACKET, AND BEAM JOINT

Luigi Ciarlini, Rome, Italy

Application December 10, 1946, Serial No. 715,158
In Italy December 28, 1945

2 Claims. (Cl. 72—15)

1

This invention relates to a building structure composed of prefabricated reinforced concrete elements and comprising foundation piers with plinths, prefabricated reinforced concrete hollow columns inserted in said piers, prefabricated brackets of reinforced concrete fixed on the columns at the level of the various floors, prefabricated main beams resting upon said brackets and fixed thereto, prefabricated secondary beams resting upon said main-beams and fixed thereto, and hollow elements of insulating material forming external walls.

The object of the invention is to provide a building structure wherein all the constituting elements are prefabricated and connected to each other in such a manner that the finished structure has the appearance of a normal reinforced concrete building cast on the spot in accordance with the usual practice.

This object and the novel features of the invention are hereinafter more fully described and the preferred forms of construction by which this object is reached, are shown in the accompanying drawings, in which:

Fig. 1 is a diagrammatic partial side view of the skeleton of a building having the elements prefabricated;

Fig. 2 is a perspective view of a connection between columns and beams, with all the adjacent elements, partially sectioned;

Fig. 3 is a vertical section of a bracket of the type shown in Fig. 2, coupled with the pile taken on line III—III of Fig. 4;

Fig. 4 is a plan view, partially sectioned, of the bracket shown in Fig. 3;

Fig. 5 is a perspective view of another type of bracket connected to the pile;

Fig. 6 is a diagrammatic vertical section showing the connection of the bracket of Fig. 5 with the pile;

Fig. 7 is a plane view, partially sectioned, of the connection shown in Fig. 6;

Fig. 8 is a top view of the connection between a main beam and a secondary beam;

Fig. 9 is a section taken on line X—X of Fig. 8.

Referring to Fig. 1, the building structure comprises piers 2, provided with foundation plinths 2' having a width proportioned to the type of the ground on which the structure is to be constructed. Into piers 2 are introduced, and fixed by means of fluid cement, columns 1 forming the vertical supporting structure of the building. Preferably, use is made of frusto-conical hollow columns of centrifugated reinforced concrete, for example, of the type used for electric lines. The concrete section or the reinforcement is so designed as to correspond to the stress conditions to

2

which they are subjected. When the building comprises more than four floors, it may be advisable to fill the hollow columns 1 with concrete after its erection. On columns 1 at the level of each floor, brackets 3 are fixed on which the main beams 4 are supported. These main beams support the secondary beams 5 which in turn support the hollow bricks 6 of the ceiling.

The brackets 3, according to the embodiment shown in Figs. 3 and 4, comprise a portion 7 provided with central hole 8, and arms 9. These brackets are heavily reinforced and comprise a bearing surface 10 for the main beams and a cavity 11. The arms 9 may be reinforced with metallic elements which are cast so as to leave a free space for hole 8 and for the cavity 11.

The central hole of the brackets may have a diameter substantially equal to the diameter of the column at the floor to which the bracket is applied or, as shown in Fig. 4, the brackets may be formed with a tapered central hole having its smallest diameter slightly greater than the diameter of the column and in the interval between the hole of the bracket and the column, cement concrete 12 is cast. In this manner, a wedge is obtained which, after hardening, gives, due to its form, a rigid connection between the bracket and the column.

In the case of heavy loads, and in order to avoid any sliding of the bracket on the column, abutments may be provided on the external surface of the column at the level of the various floors.

The longitudinal connection between the brackets and main beams is obtained when concrete is cast in the cavity 11 of the bracket and in the recess provided in the main beam.

Another embodiment of the connection between the column and the bracket is illustrated in Figs. 5, 6 and 7, wherein 14 denotes a section of a reinforced concrete column, in which section the concrete has been removed so as to expose the reinforcing bars. In the interval between these reinforcing bars, reinforcing bars 15, 16, 17 of the bracket are inserted (these reinforcing bars having been only diagrammatically indicated, and their position does not represent an actual construction). Plug 18, for instance of paper, is placed in the central hollow of the column to obturate it. Reference numerals 19, 20 are a U-shaped prefabricated bracket, the bottom 19 being shown in section and a side 20 being shown in elevational view (Fig. 7). Beam 4 which bears on bracket 19, 20 is provided with reinforcements 21 surrounding a hole 22 designed to receive the secondary beams 5, which beams 5 are thereafter fixed in the hole by means of a concrete casting.

When the connection between the bracket and the column is made according to the above modification, the column is brought to the place of construction, the brackets having been previously fixed thereto at the levels corresponding to the floors of the building. The brackets are fixed to the column by means of concrete cast in the central portion of the column and bracket. The reinforcing bars project beyond the free ends of the bracket and are adapted to be placed between the reinforcing bars of the main beams.

After the columns having the pre-attached brackets have been erected on the foundation, the U-shaped main beams **4** are placed on the brackets and the reinforcing bars projecting from the bracket are made to pass between the reinforcing bars of the beams. The filling core of concrete is then cast into the U of the bracket and the main beam and the secondary beam are inserted into the space between the reinforcements **21**.

The connection shown in Fig. 6 has the following advantages:

(*a*) A continuous beam is obtained having a connection to which the desired strength may be given by properly selecting the reinforcing bars of the column and bracket.

(*b*) The excessive thickening of the bracket is avoided in the part which surrounds the column, it being possible to build the bracket having a width identical to the width of the beam, and to have the mounting of the walls greatly simplified.

(*c*) It is easier to adapt a standard bracket to cases of different loads since the reinforcing of the concrete core which is cast locally may be changed to suit the particular conditions.

The main beams shown in Figs. 8 and 9 are U-shaped and formed of high strength concrete suitably reinforced.

On the bottom **23** of the beam the reinforcement **24** is embodied, and in the upper part of the sides **25**, the reinforcement **26** is embodied.

The ceiling structure is formed with secondary beams **5** having a cross-section proportioned to the width of the rooms. These beams are constructed with high-strength concrete and are reinforced with pre-stressed steel wires. Their laying is made by leaving during the construction of the main beams rectangular holes **22** whereinto penetrates the end of the secondary beams. Such holes do not interfere with the reinforced part of the main beams. On the secondary beams, the bricks **6** are laid which support the banking of the floor (not shown).

The external walls, illustrated in Fig. 2, are constructed of elements **27** of light-weight material, for instance, a concrete formed of cement and pumice stone in small grains, a concrete with cellulite or similar material. The elements **27** have a triangular section and are mounted vertically in two rows in the spaces comprised between columns and beams, the rows being spaced from each other according to the desired width of the wall, in such a manner as to obtain inwardly and outwardly two walls which are insulated due to the kind of material from which they are made. A space is thus obtained, without casings being needed, which may be filled with cheap material **28**, which might be recovery material from demolished buildings. The two rows of elements **27** are mounted staggered, leaving between them an empty, zig-zag shaped space.

I claim:

1. A building structure composed of prefabricated reinforced concrete elements comprising prefabricated hollow columns of reinforced concrete, prefabricated brackets of reinforced concrete mounted on the said columns at floor levels, each of said brackets having a central hole through which the column extends and at least two arms of U-shaped cross section, each arm having its free end in the form of an inclined surface, reinforcement bars in said brackets passing through openings in said columns and projecting from the free ends of the arms, prefabricated U-shaped main beams of reinforced concrete having their ends in the form of an inclined surface, complemental to and resting on the inclined surface of the free end of each arm of the bracket, and concrete material filling the U-shaped arms, the openings in the columns and the U-shaped main beams, thereby bonding said columns, brackets and beams together as a monolithic unit.

2. A building structure composed of prefabricated reinforced concrete elements comprising prefabricated hollow columns of reinforced concrete, prefabricated brackets of reinforced concrete mounted on the said columns at floor levels, each of said brackets having a central hole through which the column extends and at least two arms of U-shaped cross section, each arm having its free end in the form of an inclined surface, reinforcement bars in said brackets passing through openings in said columns and projecting from the free ends of the arms, prefabricated U-shaped main beams of reinforced concrete having their ends in the form of an inclined surface, complemental to and resting on the inclined surface of the free end of each arm of the bracket opposite vertical walls of the U-shaped cross-sectioned arms of the brackets being more closely spaced at the free ends of the arms than at other portions, and opposite vertical walls of the U-shaped cross sectioned main beam being more closely spaced at their free ends than at intermediate portions, and concrete material filling the U-shaped arms, the openings in the columns and the U-shaped main beams, thereby bonding said columns, brackets and beams together as a monolithic unit.

LUIGI CIARLINI.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
844,296	Winslow	Feb. 12, 1907
1,299,842	Landwehr	Apr. 8, 1919
1,516,074	Borg	Nov. 18, 1924
1,757,077	Eiserloh	May 6, 1930
1,791,645	Sproul	Feb. 10, 1931
1,973,741	Bauer	Sept. 18, 1934
2,057,732	Navarre	Oct. 20, 1936
2,392,551	Roe	Jan. 8, 1946
2,414,738	Henderson	Jan. 21, 1947
2,483,175	Billner	Sept. 27, 1949

FOREIGN PATENTS

Number	Country	Date
481,825	France	Oct. 27, 1917
77,084	Switzerland	1918
708,167	France	July 21, 1931
318,216	Italy	1934