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PRECAST COLUMN ATTACHING MEANS

Filed May 24, 1951

2 Sheets-Sheet 1

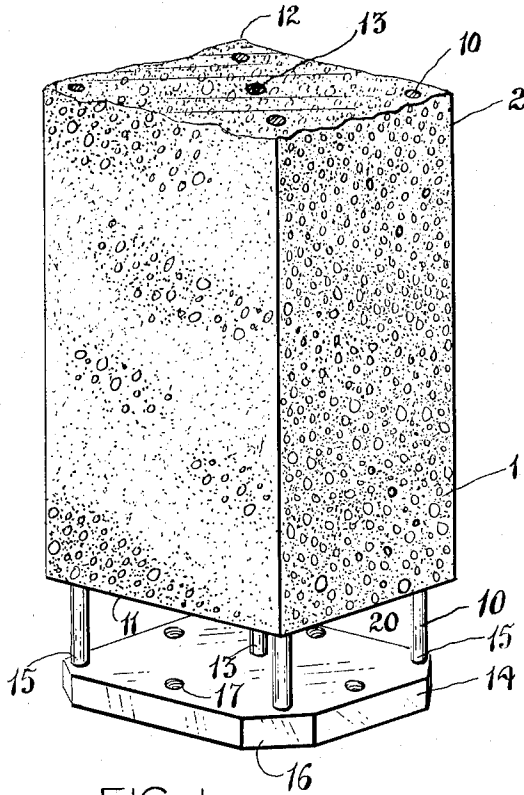


FIG. 1

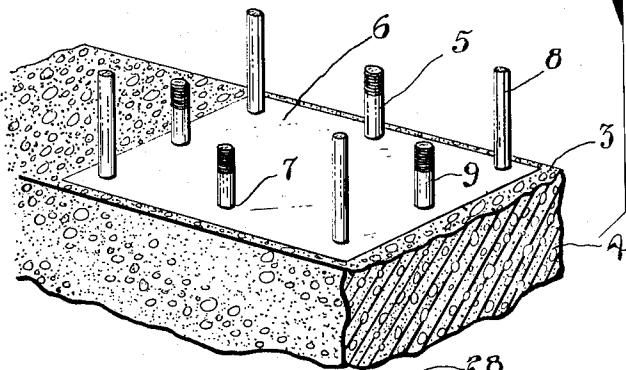
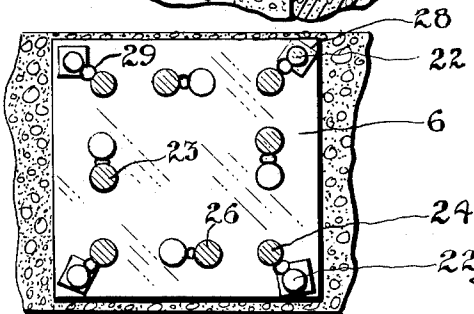


FIG. 3

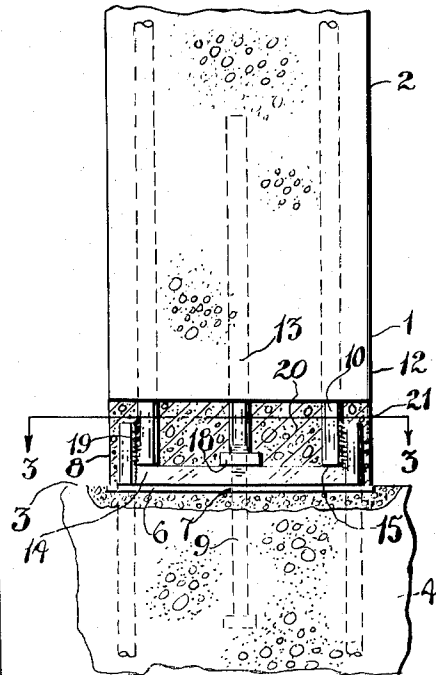


FIG. 4

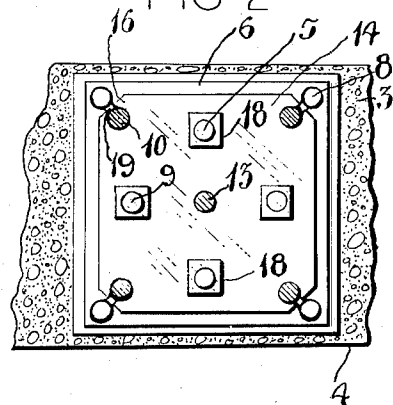


FIG. 5

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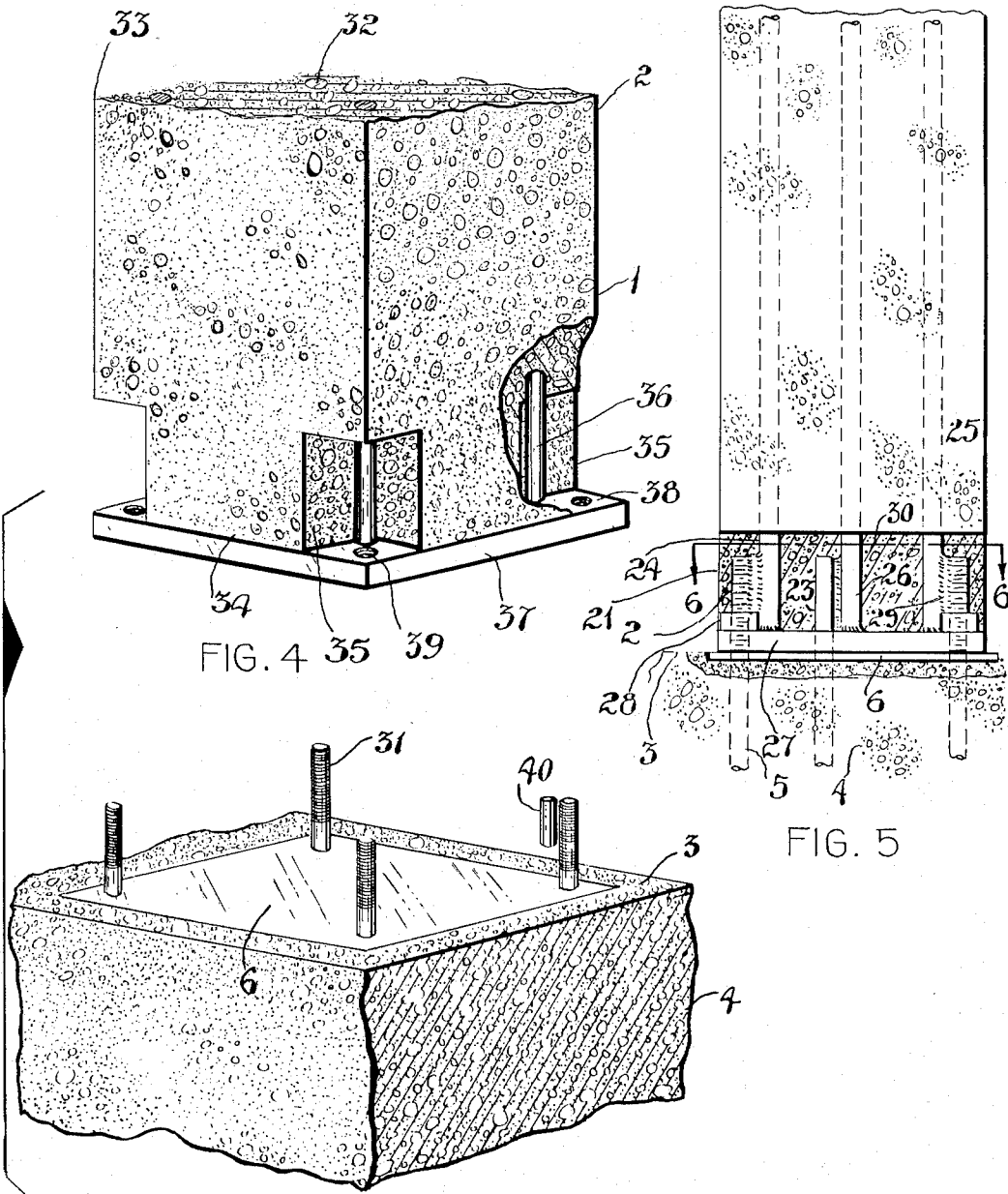
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2 Sheets-Sheet 2



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PRECAST COLUMN ATTACHING MEANS

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6 Claims. (Cl. 72-107)

My invention relates to new and useful improvements in means for attaching precast vertical concrete columns to a substantially horizontal supporting surface such as a footing or wall, an object of my invention being to provide a device of the character herewithin described the use of which permits rapid erection of precast columns and the immediate securing thereof in position by means of the auxiliary fastening bolts provided.

A further object of my invention is to provide a device of the character herewithin described which eliminates the necessity for providing temporary scaffolding or shoring for the erection of the columns.

Another object of my invention is to provide a device of the character herewithin described which permits the horizontal beams for the next succeeding floor to be placed in position immediately after the columns are secured by means of the aforementioned fastening bolts thereby eliminating the necessity of bringing in the erecting equipment a second time. By this is meant that in the conventional erection of precast columns, the cement key between such columns and supporting surface must be given several days to harden sufficiently to take the load of the additional beams. In other words, the stability of the columns in conventional erection methods normally depends upon the hardening of the concrete keys.

A yet further object of my invention is to provide a device of the character herewithin described which provides direct load transfer from the column-members to the supporting members which also has the effect in providing additional lateral shear strength to the column.

A still further object of my invention is to provide a device of the character herewithin described which permits a column to be placed directly above another column in the same cross-section or of any other cross-section, and also permits a column to be placed on top of a wall or footing at any location including a corner as all components and means for connecting the column to the supporting surface are contained within the cross-sectional area of the column.

Yet another object of my invention is to provide a device of the character herewithin described which, due to the direct load transfer from the column-members to the supporting members, permits the space between the foot of the column and the supporting surface to be filled with field concrete, which concrete has an equal or smaller coefficient of shrinkage and a higher coefficient of elasticity than the ordinary column concrete. As this field concrete can be of a stronger mix, it can be packed in sufficiently hard to take a proportion of additional loads applied to the column.

Another object of my invention is to provide a device of the character herewithin described which includes means for positioning the surface-members during installation in the correct relationship to the bonding plate and column-members.

A further object of my invention is to provide a device of the character herewithin described which is economi-

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cal in manufacture, simple in construction and, otherwise, well suited for the purpose for which it is designed.

With the foregoing objects in view, and such other objects and advantages as will become apparent to those skilled in the art to which this invention relates as this specification proceeds, my invention consists essentially in the arrangement and construction of parts all as hereinafter more particularly described, reference being had to the accompanying drawings in which:

10 Figure 1 is a perspective exploded view of the lower end of a precast column and the corresponding supporting surface.

Figure 2 is a side elevation of Figure 1 but in the installed position and reduced in size thereto.

15 Figure 3 is a section substantially along the lines 3-3 of Figure 2.

Figure 4 is a perspective exploded view of an alternative embodiment of my device showing the lower end of a precast column and the supporting surface therefor.

20 Figure 5 is a side elevation of an alternative embodiment of my device.

Figure 6 is a section substantially along the lines 6-6 of Figure 5.

25 In the drawings like characters of reference indicate corresponding parts in the different figures.

In the past, speed of erection of precast vertical columns has been slowed down by the relatively long time required for the provision of temporary shoring, bracing or wedging necessary before the column can be released from the hoisting and erection machine. A further long waiting period is required for the key or connecting concrete to harden sufficiently to take the load of subsequent components such as horizontal beams for the next storey or further vertical columns. The conventional method of erecting a precast column, for example, on to a footing or wall is to provide an aperture within the upper supporting surface of the wall within which the column may be placed. However, it will be appreciated that a layer of cement mortar has to be placed at the bottom of the column hole, which layer will flow readily under pressure when the column is inserted thereby forming an even bearing surface for the column.

30 As soon as the column is in position it has to be aligned in both the horizontal and vertical planes before premature hardening of the layer of cement has taken place. The column is then secured rigidly by braces or wedges in the correct position whereupon the space between the foot of the column and the walls of the hole is filled with a concrete mixture which has to be packed in place.

35 Under these conditions, it will be appreciated that no further work can take place in conjunction with the column thus located until the cement mixture has hardened sufficiently which sometimes takes seven or more days and that, consequently, subsequent erection is slowed down.

40 Therefore, one of the principal advantages of the present invention resides in the fact that work can proceed continuously and as soon as the column is in position the horizontal beams or further vertical columns can be erected.

45 Proceeding now to describe my invention in detail, preference should be made first to Figures 1 to 3 inclusive in which I have illustrated the lower end 1 of a precast reinforced concrete column 2. Also illustrated in fragmentary form is the upper or supporting surface 3 of a horizontal wall or footing 4 but it will be appreciated that this supporting surface may be, for example, a horizontal beam or the upper end of a precast column.

50 In forming the aforementioned supporting surface 3, a set of what I designate as surface-members collectively enumerated 5 are secured within the surface, said mem-

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bers extending upwardly as clearly illustrated in Figure 1. These members may either be inserted within the concrete during pouring or, alternatively, a recess may be provided and the members secured within the recess by means of the addition of further concrete after the original concrete has set.

It is desirable that these members be located in a definite relationship one to the other and for this purpose a positioning plate 6 is incorporated. This plate, which is substantially rectangular and of relatively thin section, is provided with a series of drilled apertures 7 correctly positioned as will hereinafter be described, which, through the various surface-members 5 may extend. Furthermore, this plate is recessed within the supporting surface 3 so that the upper surface thereof is flush with the supporting surface and at the same time it may be correctly levelled in both planes to provide an even bearing surface for the precast column 2 when erected.

From a perusal of Figure 1 of the accompanying drawings, it will be observed that the aforementioned set of surface-members 5 comprises four rods 8 situated substantially at the corners of the positioning plate 6 and four screw-threaded bolts 9 positioned between the rods 8 and, it will be seen that the upper ends of the bolts are screw-threaded for the purpose hereinafter to be described.

Turning now to a description of the foot 1 of the column 2, it will be seen that I have provided a set of what I define as column-members 10 which include a plurality of rods imbedded within the foot of the column 2 and extending downwardly from the lower face 11 thereof. Four of these rods are positioned adjacent the corners 12 of the column while an auxiliary rod specifically designated 13 is positioned centrally and I wish to point out that the provision of this central rod is optional depending upon the cross-sectional area of the column and the load to be carried thereby.

A bonding plate 14 made preferably from steel, is secured to the distal ends 15 of the rods 10 either by welding or screw-threading so that said plate is held in parallel spaced relationship from the lower end 11 of the column. The plate 14 is substantially the same configuration in plan as a section of the column to which it is to be secured with the exception that the corners of the plate are removed to form a facet 16 adjacent the four corner rods 10 so that, when erected, the aforementioned surface-member rods 8 pass by these facets as will hereinafter be described. Furthermore, the bonding plate 14 is provided with four drilled apertures 17 passing therethrough substantially equidistant between the corner rods 10, these apertures corresponding with the position of the aforementioned surface-member bolts 9.

When erected, the column 2 and bonding plate 14 secured thereto, is placed upon the supporting surface 3 so that bolts 9 extending upwardly therefrom pass through apertures 17 within the bonding plate and as the positioning plate 6 has been levelled and the bonding plate 14 is positioned parallel to the base of the column, the column will stand substantially vertical in both planes. Nuts 18 then engage the screw-threaded portions of the bolts 9 which are extending through the apertures 17 thereby providing a preliminary anchoring of the plate and column in position upon the supporting surface so that further erection can be continued.

Once anchored, as hereinbefore described, the final securing of the column to the supporting surface may be proceeded with as convenient and in this connection reference to Figure 3 will show that the aforementioned surface-member rods 8 pass alongside the facets 16 of the bonding plate to lie in what I define as parallel overlapping relationship with the corner column-members 10 and these overlapping portions designated by reference character 19 are then welded together thereby assisting in direct load transfer from the column to the supporting surface as well as providing additional lateral strength to the column.

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The space 20 existing between the base 11 of the column and the upper surface of the bonding plate 14 is then filled with field concrete 21 (Figure 2), well packed and allowed to harden which then encloses entirely the connection between the column and the supporting surface as well as adding to the strength of said connection.

Figures 4, 5 and 6 show alternative embodiments of my connection and I will first describe the embodiment illustrated in Figures 5 and 6. This embodiment is for an attachment of a column containing relatively large numbers of column members for extra strength and load carrying facilities and I have shown a precast column 2 secured to a supporting surface 3 of a wall or footing 4 as in the previous embodiment.

A positioning plate 6 is also provided imbedded within the supporting surface 3 and a set of surface-members 5 extend upwardly therefrom. In this embodiment the set includes four screw-threaded bolts 22 situated substantially at the corners of the plate 6 and four rods 23 positioned between and equidistant from bolts 22.

The base 1 of the column 2 is provided with a set of column-members, four of which (designated 24) are situated substantially at the corners 25 of the column and extend downwardly therefrom as in the previous embodiment. The other four, specifically designated 26, are situated intermediate of the members 24 and a bonding plate 27 is secured to the lower ends of this set by means of welding or the like so that said plate is in spaced and parallel relationship with the base of the column.

The surface-members and column-members in this embodiment lie in overlapping parallel relationship as illustrated in the sectional view in Figure 6 when the column is in position, the bolts 22 passing through apertures provided substantially at the corners of the bonding plate 27. Nuts 28 are then screwed upon the bolts extending through the bonding plate thus giving the preliminary anchorage as hereinbefore described whereupon the overlapping portions of both sets may be welded as at 29 to provide the final attachment of the column to the supporting surface. In this connection, it will be observed that a wider gap must be left between the bolts 22 and the corresponding rods 24 in order to permit the engagement of the nut 28 when in position and to avoid weakening the weld therebetween, I provide a short cylindrical spacer 29 which is welded to both components.

As in the previous embodiment, the space 30 between the foot of the column and the bonding plate 27 is filled with compacted field concrete 21.

Turning now to the description of the embodiment illustrated in Figure 4, this specific construction is of particular use in columns only requiring four supporting rods. A supporting surface 3 is illustrated upon a wall or footing 4 together with a positioning plate 6 as in the previous embodiments and in this connection, it will be observed, that four bolts 31 extend upwardly through the positioning plate and substantially at the corners thereof.

The foot 1 of the column 2 is modified in construction as compared with the previous embodiments inasmuch as only four column-members 32 are provided substantially adjacent the corners 33 of the column. These members do not extend below the base 34 of the column but instead, four substantially cube-like recesses 35 are provided during the forming of the column, these recesses being at the lower corners of the column so that the lower ends 36 of the members 32 are exposed. A bonding plate 37 is secured to the lower extremities of the members 36 as by welding or the like so that the upper surface 38 of the bonding plate is in contact with the base 34 of the column.

It will be seen that apertures 39 are provided through the bonding plate adjacent the corners thereof and it will be appreciated that surface-members 31 pass through these apertures when the column is in position whereupon nuts (not illustrated) may be threaded upon the bolts thus forming the provisional anchoring of the column to the

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supporting surface. Once again, the overlapping portions of the bolts 31 and the members 32 are welded together with a spacer 40 therebetween whereupon the recesses 35 may be packed with field concrete after erection and it will be observed that, in this embodiment, only the corners of the column have to be filled.

In conclusion, I wish to stress that any of the three embodiments hereinbefore described may be utilized for the erection of precast columns upon a wall, footing, horizontal beam, or other vertical column and that subsequent erection can be proceeded with as soon as the preliminary anchoring has taken place thereby shortening considerably the erection time of a frame yet providing a connection which is, in fact, stronger than the conventional connection. In this connection I would state that the erection time with this form of connection takes approximately one-third of the time taken for the erection of columns set into a hole in the foundation in a conventional manner.

Since various modifications can be made in my invention as hereinabove described, and many apparently widely different embodiments of same made within the spirit and scope of the claims without departing from such spirit and scope, it is intended that all matter contained in the accompanying specification shall be interpreted as illustrative only and not in a limiting sense.

What I claim as my invention is:

1. In the art of precast concrete construction which includes a vertical precast concrete column and a horizontal supporting surface therefor; means attaching said vertical precast concrete column to said horizontal supporting surface, said means comprising in combination a set of surface-members secured to and extending upwardly from said supporting surface, a set of column-members secured to and extending downwardly from the foot of said column, a bonding plate secured to the distal ends of one of said sets, the distal ends of the other set engaging apertures within said plate, corresponding members of each set lying in parallel overlapping relationship, said corresponding members being welded together, and means securing said other set to said plate, said bonding plate being secured to the distal ends of the set of column-members in parallel spaced relationship from the end face of said column, said set of surface-members including a plurality of rods and a plurality of screw-threaded bolts alternating between said rods, said bolts extending through apertures within said plate, corresponding screw-threaded elements engaging said screw-threaded bolts thereby anchoring said plate and said column in position, said rods lying adjacent to the corners of said plate in parallel relationship with the members of said set of column-members, said rods being welded to said column-members.

2. The device according to claim 1, which includes a positioning plate recessed within said supporting surface, said set of surface-members passing through said plate

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thereby providing correct alignment with said column-members.

3. The device according to claim 1, in which certain of said column-members lie alongside said bolts and in parallel spaced relationship thereto, spacers between said bolts and said column-members, said spacers being welded to said bolts and said column-members, said rods passing through apertures within said plate and lying parallel to others of said column-members, said rods being welded to said last mentioned column-members.

4. The device according to claim 3, which includes a positioning plate recessed within said supporting surface, said set of surface-members passing through said plate thereby providing correct alignment with said column-members.

5. In the art of precast concrete construction, which includes a vertical precast concrete column and a horizontal supporting surface therefor, said column being recessed at the corners thereof, means attaching said vertical precast column to said supporting surface, said means comprising in combination a set of screw-threaded surface-members secured to and extending upwardly from said supporting surface, a set of column-members secured to and extending downwardly from within said column and into said recessed corners thereof, the lower ends of said column-members terminating substantially flush with the end face of said column, a bonding plate secured to the lower ends of said column-members and in contact with the lower end faces of said column, said screw-threaded members engaging within apertures formed within said plate subjacent said recessed corners, screw-threaded elements engaging with said screw-threaded members and anchoring said plate and said column in position, said screw-threaded members lying in spaced and parallel relationship with said column-members, and spacers between said screw-threaded members and said column-members, said spacers being welded to said screw-threaded members and said column-members.

6. The device according to column 5, which includes a positioning plate recessed within said supporting surface, said set of surface-members passing through said plate thereby providing correct alignment with said column-members.

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