Sept. 16, 1952 H. S. SHANNON 2,610,708

BUILDING FRAMEWORK

Filed June 17, 1946

Fig. 1

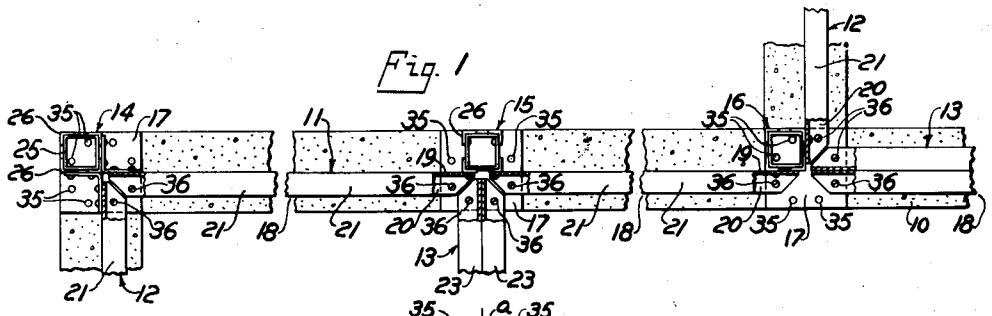


Fig. 4

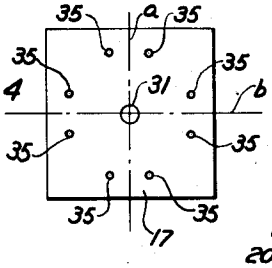


Fig. 5

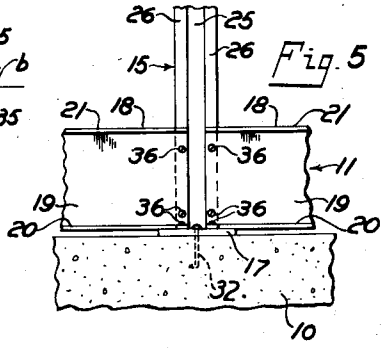
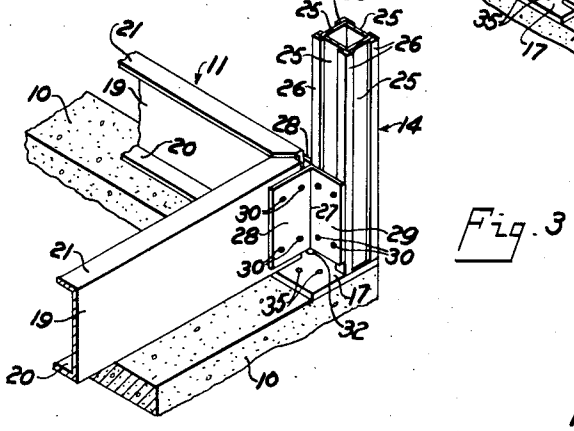


Fig. 2

Fig. 3



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BUILDING FRAMEWORK

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7 Claims. (Cl. 189—1)

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This invention relates generally to building construction and more particularly to column base plates.

In certain types of steel building construction where grade beam sections are connected at their ends to columns, it has been the practice to provide each of the columns with a large base plate for added supporting area and for supporting adjacent end portions of the grade beam sections and end portions of joists. These columns are usually factory fabricated with the base plate secured thereto, as by welding, the column seating centrally of the base plate. In order to employ satisfactorily this type of column and integral base throughout a building construction, that is, at building corners, at intermediate positions and also at columns where floor joists connect thereto or to the base, it has been the practice to connect the ends of the beams and also the ends of the joists to the columns by so-called beam enders or connector members. With this arrangement of the framework members, it was usually the practice to align the grade beams with the columns so that adjacent ends of the beam sections were respectively in opposed relation to opposite sides of the columns in order to have sufficient room or clearance for the extension of a joist to the inwardly facing side of the column for connection thereto. These beam enders or connector members are usually separate pieces welded or otherwise secured to the ends of the beam proper and are of a form to present an end portion which may be secured flat against an opposed side of a column. While this structure is satisfactory from the standpoint of structural strength and rigidity, the use of beam enders or connector members unduly complicates the construction in addition to entailing added cost of manufacture and erection. An alternative to the above mentioned aligned arrangement of grade beams and columns comprises positioning the grade beam inwardly of the columns for connection to the inner sides thereof. To do this, in the past, either required an unduly large base plate to provide for seating of joist end portions, or required the prefabrication of columns arranged in different positions on the base plates for different locations in the building, either of which is objectionable.

Accordingly, it is an object of the present invention to provide a new and improved arrangement and connection of columns, base plates and grade beams in which need of the above mentioned beam enders or connector members is eliminated without detrimentally affecting the building structure.

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Another object of the invention is to provide a new and improved connection between building columns, base plates and grade beams to facilitate mass production of these structures without detrimentally affecting erection of the building.

Another object of the invention is to provide a new and improved arrangement and interconnection between building columns, grade beams and base plates so that columns may seat in different locations on the base plates to fulfill needs of framework connections at different columns using like base plates throughout the building.

Another object of the invention is to provide a new and improved base plate which, although anchored against shifting and although directly supporting adjacent framework members, is rotatably adjustable on the building foundation to aid alignment of screw holes in the plate with corresponding screw holes in the adjacent framework members.

Another object of the invention is to decrease manufacturing and erection costs of factory fabricated structures of the above mentioned character.

Other objects of the invention will become apparent from the following detailed description taken in connection with accompanying drawings in which:

Figure 1 is a fragmentary plan view of a building construction embodying features of the present invention;

Figure 2 is a fragmentary isometric view of substantially the same structure as is shown in Figure 1;

Figure 3 is a fragmentary isometric view of a corner of the building to show certain details of construction;

Figure 4 is a plan view of a column base plate shown removed from the building construction; and

Figure 5 is a fragmentary side view of the building structure showing certain details of construction.

In the drawings, which illustrate a preferred embodiment of the present invention, the building construction shown comprises, in general, a foundation 10, side grade beams 11, end grade beams 12, joists 13, spaced columns 14, 15 and 16 and individual column base plates 17. The column base plates 17 seat on the foundation 10 in spaced relation, presenting upper seating surfaces for the columns, grade beams and joists, the grade beams being located inwardly of the columns. The foundation 10 may be of any suitable type, such as the poured, concrete slab

shown in the drawing. The joists 13 extend between opposite pairs of intermediate columns 15 in parallel relation to the end wall grade beams 12.

The side and end grade beams 11, 12, each comprise a number of end to end aligned channel sections 18 each having a web 19, a lower seating flange 20 and an upper supporting flange 21. These channel sections 18 are arranged so that end portions of the webs 19 position against the inner sides of the columns 14, 15 and 16 with the grade beam flanges 20, 21 directed inwardly of the building. The joists 13 may each comprise, a pair of channel members 23 which may be welded together back to back to present large upper seating surface for flooring (not shown).

As shown, the columns 14, 15 and 16 are preferably four-sided, hollow members constructed of metallic plates 25 reinforced and secured together by corner angle members 26 which may be welded thereto. At the building corner, a pair of angle brackets 27 may be provided to connect the grade beams 11 and 12 to the corner column 14. Each of these angle brackets 27 has a leg 28 thereof seating flat against the outer surface of a grade beam web and has another leg, as at 29, seating against an adjacent pair of the column angle members 26. Self-threading screws 30 or other suitable securing means may be used to secure the angle brackets 27 to the grade beam webs and to the column angle members 26. At the columns 15 and 16 the grade beams are secured directly to the angle members thereof, preferably by the self-threading screws 36, the grade beam webs and the angle members having aligning apertures to receive the screws.

The column base plate 17 is preferably square, as shown in Figure 4 having a centrally located aperture 31 therethrough to receive an anchor bolt 32. The anchor bolt 32 is partially embedded in the concrete foundation having a head seating against the upper surface of the base plate. This anchor bolt 32 locates the plate 17 and holds it against shifting on the foundation, but permits the plate to be movably adjustable thereabout for a purpose hereinafter described.

The base plate 17 is of a size to present a large upper supporting surface for a column and associated grade beams and joists, the area of the base plate preferably being four times that of the lower end of the column. For convenience of description and definition, the area of the plate 17 may be divided into four equal parts or quadrants as represented by the dot and dash axes lines *a* and *b*, Figure 4. In this plate 17 is provided a plurality of apertures 35, preferably eight in number, equally spaced from the center, anchor bolt hole 31. The apertures 35 are provided to receive securing means, such as self-threading screws 36 for securing ends of the grade beams 11, 12 and joists 13 to the base plate 17. Each of the grade beams, adjacent its end is provided with an aperture in the lower flange thereof to align with one of the apertures 35 in the base plate. Also, in the oppositely directed lower flanges of the joists 13, apertures are provided near the joist ends to align with other of the apertures 35 in the base plate 17. The number and arrangement of the apertures 35 in the base plate are such that a number of like base plates will fulfil all requirements of different structural connections at corner columns, intermediate columns and at columns where joists are located, etc. Although a lesser number than eight of the apertures 35 may be adequate in the base plate 17, the provision of eight apertures eliminates the need for locating the plate in any particular position on the foundation. In the present base plates there is a pair of the apertures 35 in each of the aforementioned quadrants, the spacing between the apertures of each pair being greater than the spacing between adjacent apertures of adjacent pairs.

In erection of the building, after the foundation 10 has been poured and before it has set, the base plates 17 are placed in their predetermined positions thereon, and in each of the plates centrally located apertures 31, an anchor bolt 32 is inserted and pressed into the still soft concrete until the anchor bolt head seats against the upper surface of the plate. After the concrete foundation 10 has set the grade beams 11, 12 and the columns 14, 15 and 16 may be assembled thereon. At the corner column 14, the side and end grade beam sections 18 at right angles to each other have end portions thereof seating on the base plate 17 in the same and what may be called the inner corner quadrant with the column 14 seating on and occupying the diagonally opposite or outer corner quadrant of the base plate. These ends of the grade beam sections 18 are connected to the column 14 by the angle brackets 27 which are secured to the grade beam webs 19 and to the column angle members 26 by the self-threading screws 30. The base plate 17 is indirectly connected to the column 14 through the grade beam sections 18 and through the corner brackets 27 by securing the grade beam lower flanges 20 to the plate 17 by the self-threading screws 36. By this indirect connection between the column 14 and its base plate 17, the base plate may be adjustably moved about its anchor bolt 32 to align the pair of holes 35 in the inner corner quadrant of the base plate with the screw holes in the lower flanges 20 of the grade beams 11, 12. For this adjustment, any heavy tool may be used to strike the edge of the plate to move it about the anchor bolt to effect aligning of the screw apertures. At the intermediate post 15, the aligned grade beam sections 18 seat on the base plate 17 with their ends in spaced opposed relations, the grade beam sections being secured at their webs by the self-threading screws 36 to the inner corner members 26 of the column. This intermediate column 15, as shown in Figure 1, unlike column 14 is located on its base plate 17 in a position occupying half of each of the outer quadrants of the base plate 17 in alignment with the end of the joist 13 and the grade beam sections 18 and joist 13 are secured at their lower flanges to the base plate by the self-threading screws 36. This base plate 17 at the intermediate column 15 may, like the corner base plate, be tapped on its edge with a heavy tool to move it about its anchor bolt 32 to effect an alignment of the screw holes in the plate with the corresponding screw holes in the grade beam and joist lower flanges. At the column 16 there is a different arrangement of grade beam members as may occur, for example, where there is an offset in the exterior wall of the building. In this arrangement, the column 16 seats on its base 17 in the same relation or in the same quadrant as the corner column 14 seats on its base plate, as shown in Figure 1. An end portion of the side grade beam section 18 seats on the base plate 17 of column 16 and is secured at its lower flange to the base plate by the self-threading screws 36. Also, the grade beam section 18 is secured at its web by the self-threading screws 36 to the column, thus connecting the base plate and column together. At right angles to the side grade beam is

the grade beam section 12 having an end portion seating on the base plate and being secured thereto and to the column 16 by the self-threading screws 36. In alignment with the side grade beam section 18, there is a joist 13 having an end portion seating on the base plate 17 at column 16 and secured at its lower flange by self-threading screws 36 to the base plate. It will be seen that the column 16 occupies one of the quadrants of the plate, that grade beam section 18 seats in an adjacent quadrant wherein one of the pair of apertures 35 will align with the screw aperture in the lower flange of the grade beam section 18. In the diagonally opposite quadrant, the grade beam section 12 at column 16 seats with the screw aperture in its lower flange aligning with one of the pair of apertures located in this quadrant. Partially occupying the remaining two adjacent quadrants of the base plate is the end of the joist 13 at the column 16. Each flange of this joist, like the joist at column 15, has an aperture to align with one of the pairs of apertures 35 in these quadrants of the base plate and receive the screws for securing the parts together.

From the foregoing description, it will now be appreciated that I have provided for new and improved arrangement and connection of grade beams, base plates and columns in a building construction. Among other advantages, the present arrangement and connection of the above structure permit the grade beams to be secured directly to the columns, thus eliminating beam end connectors. Furthermore, the present column and base plate make it possible for the column to be located in different positions on its plate in accordance with the exigencies of the particular grade beam and joist arrangement at a column. Also, mass production of the columns and base plates is not detrimentally affected but instead the welding of them together is rendered unnecessary. In addition, the indirect connecting of the base plates to their columns makes it possible to adjust the base plates about their center anchor bolts to insure aligning of the screw holes in the plates with the corresponding screw holes in the grade beam and joists.

I claim:

1. In a building structure, the combination comprising a foundation, a base plate supported on the foundation, the base plate having a centrally located aperture and a plurality of other apertures, a vertical column having a lower end portion seating on the base plate, a plurality of grade beams each having an end portion with an aperture seating on the base plate, each of the grade beam apertures being in alignment with a respective one of the other base plate apertures, anchor means extending from the foundation up through the centrally located aperture in the base plate, the other base plate apertures encircling the centrally located aperture with a pair of the other apertures being located in each quadrant of the base plate in a symmetrical arrangement about a centrally located aperture, whereby upon misalignment of the apertures of the grade beams and base plate rotation of the base plate about the anchor means to align any one of the other base plate apertures with a grade beam aperture also aligns a base plate aperture with each of the grade beam apertures, securing means in the aligned base plate and grade beam apertures securing together the base plate and grade beams, and means connecting the grade beams to the column.

2. The building structure claimed in claim 1 in which the means connecting the grade beams to the column includes means connecting each of the grade beam end portions to a respective side of the vertical column and in which the base plate is connected to the column only through the grade beams.

3. The building structure claimed in claim 1 in which the lower end portion of a column seating on the base plate is disposed in an area of the base plate exclusive of the centrally located aperture.

4. The building structure claimed in claim 1 in which the lower end portion of the column seating on the base plate is disposed in an area not part of a quadrant in which there is disposed an end portion of a grade beam.

5. In a building structure, the combination comprising a foundation, a base plate supported on the foundation having a centrally located aperture and having a plurality of other apertures encircling the centrally located aperture with a pair of apertures located in each quadrant of the base plate in a symmetrical arrangement about the centrally located aperture, a first grade beam having an end portion seating on the base plate, a second grade beam having an end portion seating on the base plate, the grade beams being disposed at 90° to each other and each grade beam end portion having an aperture aligned with a respective base plate aperture, the base plate apertures aligned with the grade beam apertures being located in the same quadrant, a vertical column having a lower end portion seating on the base plate in a quadrant outside of and not adjacent the quadrant in which the grade beam end portions are seated, anchor means extending from the foundation up through the centrally located aperture whereby upon misalignment of the apertures of the grade beams and base plate rotation of the base plate about the anchor means to align a respective aperture in any one of the base plate quadrants with an aperture in the end portion of the first grade beam also aligns the other aperture in the same quadrant with the aperture in the end portion of the second grade beam, and means connecting together the column, grade beams and base plate including securing means in the aligned base plate and grade beam apertures securing the grade beams to the base plate.

6. In a building structure, the combination comprising a foundation, a base plate supported on the foundation having a centrally located aperture and having a plurality of apertures encircling the centrally located aperture with a pair of apertures located in each quadrant of the base plate in a symmetrical arrangement around the centrally located aperture, a first grade beam having an end portion seating on the base plate in a first quadrant, the end portion of the first grade beam having an aperture aligned with a base plate aperture in a first one of the quadrants with securing means in the aligned apertures securing the grade beam to the base plate, a second grade beam having an end portion seating on the base plate, said last mentioned end portion having an aperture aligned with a base plate aperture in a second quadrant adjacent the first quadrant with securing means received in the aligned apertures securing the second grade beam to the base plate, the first and second grade beams being aligned, anchor means extending on the foundation through the centrally located aperture whereby upon misalignment of the apertures of the grade beams and base plate rotation of the

base plate about the anchor means to align a respective one of the base plate apertures in any quadrant with the aperture in the end portion of the first grade beam also aligns the respective base plate aperture in the second adjacent quadrant with the aperture in the end portion of the second grade beam, a vertical column having a lower end portion seating on the base plate in an area outside of said first and second adjacent quadrants, and means securing at least one of the grade beam end portions to the column.

7. In a building structure the combination comprising a foundation, a base plate supported on the foundation having a centrally located aperture and having a plurality of apertures encircling the centrally located aperture with a pair of apertures located in each of the four quadrants of the base plate in a symmetrical arrangement about the centrally located aperture, a first grade beam having an end portion seating on the base plate, the end portion of the first grade beam having an aperture aligned with a base plate aperture in a first one of the quadrants with securing means in the aligned apertures securing the beam to the base plate, a second grade beam having an end portion seating on the base plate, the end portion of the second grade beam having an aperture aligned with a base plate aperture in a second quadrant with securing means received in the aligned aperture securing the second grade beam to the base plate, a third grade beam having an end portion seating on the base plate, said last mentioned end

portion having an aperture aligned with a base plate aperture in a third one of the quadrants with securing means received in the aligned apertures securing the third grade beam to the base plate, anchor means extending from the foundation through the centrally located aperture whereby upon misalignment of the apertures of the grade beams and base plate rotation of the base plate about the anchor means to align a respective one of the base plate apertures with the aperture of the first grade beam also aligns a respective base plate aperture with each of the other grade beam apertures, a vertical column having a lower end portion seating on the base plate in an area located in the fourth quadrant of the base plate, and means connecting the end portion of at least one of the grade beams to the column.

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