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BUILDING CONSTRUCTION

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1 Claim. (Cl. 189—36)

This invention relates to construction elements and joint assemblies for building structures, more particularly to construction elements and joint assemblies for joining beams or girders to a column.

The construction elements and joint assemblies according to the present invention are particularly advantageous for use in connection with the pre-fabricated construction elements and joint assemblies as described in the co-pending application Serial No. 279,083 filed March 28, 1953.

In erecting building structures including beams or girders and columns, a strong rigid attachment is required between the beams or girders and the columns in order to develop a maximum negative moment at the connections.

Accordingly, one of the objects of the invention is to provide a novel and improved construction element and joint assembly by means of which a strong and rigid attachment is attained between a beam or girder and a column.

Another object of the invention is to provide a novel and improved construction element and joint assembly attachable to the corner of a column and a beam or girder respectively. As a result, the loads are applied at the strongest and stiffest part of the building structure whereby maximum stiffness and load carrying capacity of the building structure are attained.

Still another object of the invention is to provide a novel and improved construction element and joint assembly which permits rapid installation by unskilled labor in order to facilitate field assembly thereby carrying forward the advantages attained by the use of the pre-fabricated construction elements and joint assemblies as disclosed in the aforesaid pending application.

Other and further objects, features and advantages of the invention will be explained hereinafter and set forth in the appended claim forming part of this application.

In the accompanying drawing an embodiment of the invention is shown by way of illustration and not by way of limitation.

In the drawing:

Fig. 1 is an isometric view of a joint assembly and construction element according to the invention.

Fig. 2 is a fragmentary, partly sectional view of the joint assembly and construction element according to Fig. 1, on an enlarged scale and

Fig. 3 is a section taken on line 3—3 of Fig. 2.

Referring now to the figures in detail, Fig. 1 shows a column generally designated by 1 to which are horizontally joined members generally designated by 2 such as beams and girders. In this connection it should be pointed out that the term "beam" hereinafter used in the specification or claim is intended to include girders or similar members also.

Column 1 is shown as exemplified as a hollow column formed of four sections 3. Each of the sections comprises two webs 4 and 5 disposed at a right angle. The free ends of each web are bent off twice at right angles to form together with the bent off end portions of the

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adjacent section a T-portion 6. The sections are secured to each other by joining the abutting branches of the T-shapes by any suitable means such as welding. The sections may further be secured to each other by fitting clamps over the cross-arms of the T-shapes. The column may be further strengthened by fitting corner flanges 7 in each corner of the columns. Columns as shown in Fig. 1 and related forms thereof are more fully described in the aforesaid co-pending application. While such columns are suitable for use in connection with the present invention, it should be understood that the invention is not limited to the use of columns as illustrated herein. The column may be a one piece hollow column or may be an open column having wall portions facing the beams to be joined thereto such as a column formed of I girders.

Beams 2 are shown herein as having a C cross section. The free ends of the branches of the C beam are bent off twice at right angles to form top wall portions 8 and depending flanges 9. The end of the beam facing the column is capped by an end wall member 10 secured to the beam by any suitable means for instance, by flanges 10' telescoped into the beam.

The beams are supported on the column by any means suitable for the purpose. Particularly useful means are fully described in the aforesaid co-pending application. The means described therein include noses or hooks that engage corresponding slots in the end wall member 10 of the beams and an anchoring strap 16. A detailed description of the primary supporting means for locating the beams upon the column is not essential for the understanding of the present invention, since any suitable means may be employed for this purpose. In application Serial No. 279,083, end plate 10 is disclosed as being extended somewhat below the lower surface of the beam, this downward extension being received within a seat defined by an upset projection which extends outwardly below a horizontal slot extending across the column as shown in cross-section in Fig. 2.

As previously explained, the principal object of the present invention resides in providing means to strengthen the attachment between the beams and the column in order to develop a maximum negative moment at the connections. These means are shown as comprising a plate shaped slotted member 11. The slot 12 of the plate has a width such as to receive end wall member 10, the respective column section 3 and the corner flange 7, if any, with a pressure fit. If the column does not have corner flanges, the slot should fit the end wall member of the beam and the respective corner section of the column with a pressure fit. The slot has preferably an inner part 12' defined by parallel edges to produce said pressure fit and an outwardly tapered outer part 12'' to facilitate insertion of the plate.

The means for reinforcing the attachment of the beams to the column further comprise an axially elongated slot 13 extending through a column section 3 and a corner angle 7 if any and a slot 14 extending through a top wall portion 8 of a beam thereby exposing part of the end wall member 10 of the beam. The length of vertical slot 13 above and below the upper level of the beam and the length of horizontal slot 14 are so correlated with the height of member 11 that the latter can be conveniently fitted through the slots into a position in which slot 12 of the plate is engaged by wall member 10, column section 3 and corner angle 7. Fig. 2 shows the insertion of the plate through slots 13 and 14 and Figs. 1 and 3 show the plate in its final position. The end wall member 10 is preferably notched at 15 so that the upper edge of the inserted plate is substantially flush with the upper level of the beam as can be clearly seen in Figs. 1 and 2.

Two sets of plates and mounting slots are provided

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for each beam. The mounting slots are preferably placed at the corners of the column so that the loads are applied to the strongest and stiffest part of the building structure resulting in a strong rigid attachment.

As is apparent from the previous description the insertion of the plate effectuates the wedging together of the construction elements engaged by its slot, thus pulling the beams tightly against the column.

The plates or wedges may be forced into their final positions by any suitable means. Generally they are dropped by hand into place and driven home with a suitable tool such as a hammer, etc.

It will be understood that the foregoing description of the invention and the embodiment shown are merely illustrative of the principles thereof. Accordingly, the appended claim is to be construed as defining the invention within, the full spirit and scope thereof.

We claim:

A joint assembly of a hollow vertical column and a hollow horizontal beam, said column and beam being of sheet material and filled with concrete, said column including a side wall, said beam having an end wall secured thereto with the upper edge thereof in alignment with the upper side of said beam, means for supporting said beam at a location intermediate the upper and lower ends of the side wall of the column, said side wall having a pair of slots respectively positioned substantially at the corners of the column, said end wall having a pair of

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slots each extending vertically downwardly from said upper side of the beam to a lower end which end is in alignment with the lower end of the corresponding slot in the side wall, a pair of plate members holding said beam and column in assembled position, each of said slots in said side wall extending upwardly beyond the upper edge of said end wall to a distance approximately equal to the length of the plate, each plate member having a slot extending upwardly from its lower edge, said slot in said plate member having spaced opposed side edges respectively engaging said side and end walls and clamping said walls in face to face abutment when said plate member is seated in said aligned slots in said walls with said opposed side edges of said slot in said plate member extending downwardly beyond the lower ends of said aligned slots of said walls, and a T-shaped member rigidly connected to said side wall interiorly of the column and intermediate said pair of vertical slots for strengthening said side wall and joint assembly.

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