

April 15, 1969

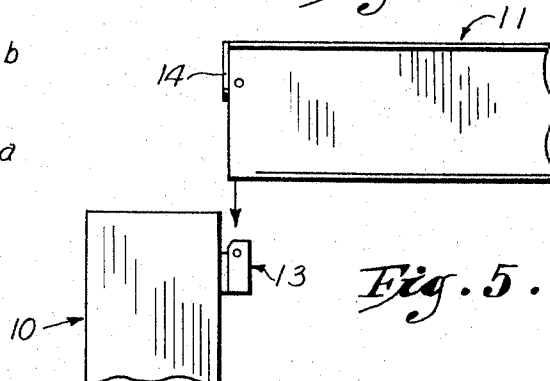
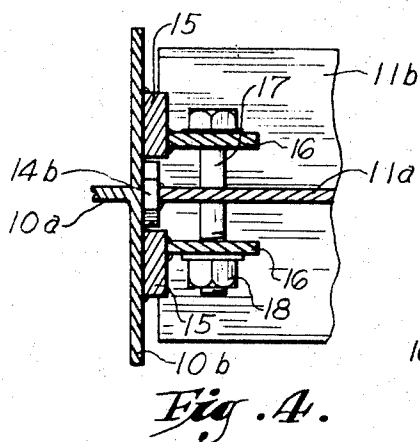
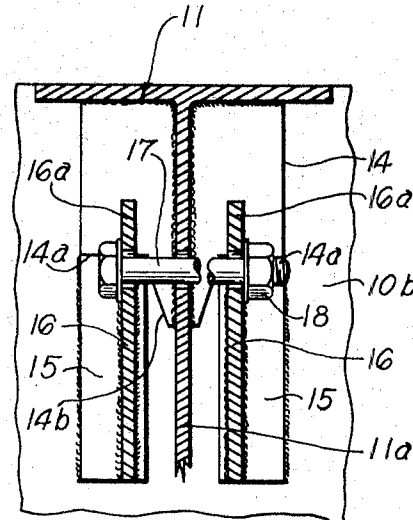
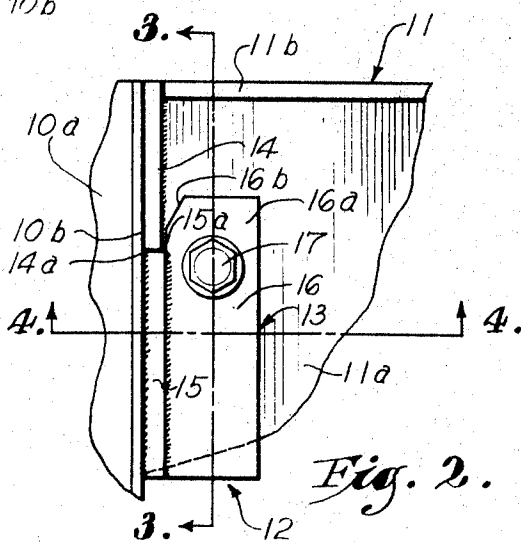
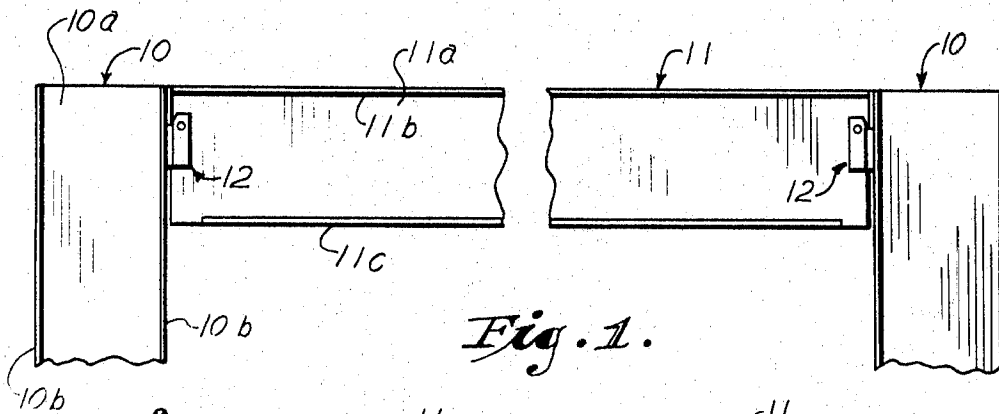
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3,438,663

COLUMN AND BEAM STRUCTURE

Filed May 29, 1967

Sheet 1 of 2



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Sheet 2 of 2

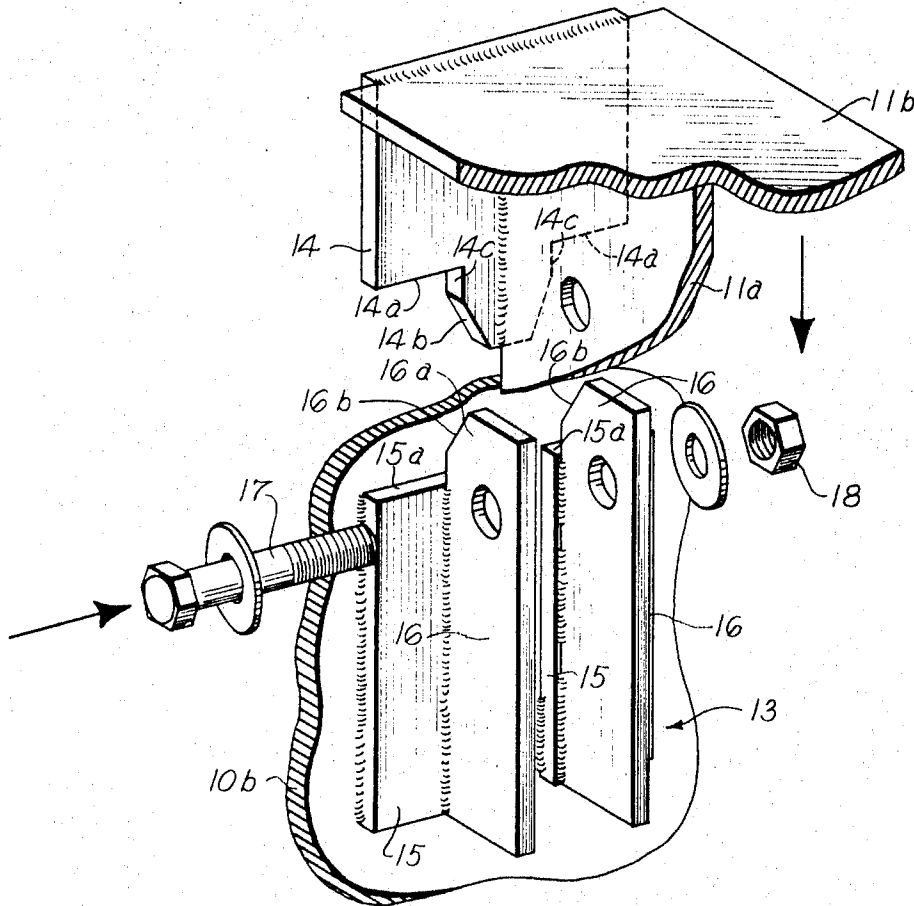


Fig. 6.

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3,438,663

COLUMN AND BEAM STRUCTURE

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6 Claims

ABSTRACT OF THE DISCLOSURE

The ends of a transverse beam are connected to spaced supporting columns by connector assemblies having co-operating inclined surfaces which, during lowering of the beam into position, serve to guide the beam and connector components into a locked and supported condition pending completion of the joint at each connector by insertion of a bolt or similar fastener.

Summary of the invention

It is common in the construction of structures employing horizontal beams which are supported at their ends and between upright columns to lift the beam into position by a crane and, while suspending it from the crane, complete the connection with the appropriate bolts or other fasteners. The system, while workable, has some paramount difficulties. Chief among these are the tying up of the crane during the final assembly of the joints, i.e. the crane must continue to hold the beam while the joints are being completed, the difficulty in obtaining quick alignment of the bolt holes at the beam ends with the bolt holes in the columns and that the requirement during erection of the presence of a number of workmen at beam height.

One of the primary advantages of the present invention is that it provides a column and beam structure which permits erection and placing of the beam in final position by a crane but without the disadvantages noted above. In my invention, the beam ends are preliminarily joined with the column by dropping the beam into final position and the crane may thereafter be disconnected and moved to a new location while the final fasteners are being installed. The cooperating connector elements and assemblies on the beam and column are so formed as to guide the beam ends into a stabilized and locked condition relative to the column as the beam descends or is dropped into place. Since only a rough approximation of the final position is required before the beam is dropped into place, the beam ends can be preliminarily positioned with respect to the final position by tag lines running to the ground which can be manipulated by men on the ground. Thus, the safety of workmen is greatly enhanced while achieving substantially improved efficiency and speed in erection.

Another advantage of the present invention resides in the provision of a beam-to-column connector arrangement in which the beam load is transferred to the column through bearing plates and without loading bolts or other fasteners. In my arrangement, the bolts serve primarily as safety fasteners for maintaining the parts in proper supporting relationship.

Still another advantage and object of my invention is in the provision of a beam-to-column connector arrangement which maintains the end of the beam adjacent the side of the column without loading fastening bolts and with no eccentricity.

Yet another advantage and object of the invention is in the provision of a beam-to-column connector arrangement which is readily adaptable to any type of column

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face, i.e. curved or flat, and to various beams having upright webs or plate-like portions.

Other and further objects and advantages of the invention, together with the features of novelty appurtenant thereto, will appear in the course of the following description.

In the accompanying drawings, which form a part of the specification and are to be read in conjunction therewith, and in which like reference numerals indicate like parts in the various views;

FIG. 1 is a side elevational view of a typical pair of columns supporting a beam therebetween and constructed in accordance with a preferred form of the invention, only the upper portions of the columns being shown and the beam broken away to indicate interrupted length;

FIG. 2 is an enlarged fragmentary side elevational view of the left hand end of the beam and its adjacent column, as viewed in FIG. 1;

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 2 in the direction of the arrows;

FIG. 4 is a sectional view taken along line 4—4 of FIG. 2 in the direction of the arrows;

FIG. 5 is a fragmentary view of the left hand column and beam as viewed in FIG. 1 with the beam in its preliminary elevated position prior to its final descent into assembled condition with the column; and

FIG. 6 is a greatly enlarged perspective view of a typical beam and column connection as illustrated in the preceding figures, the parts being shown in exploded relationship.

Referring now to the drawings, and initially to FIG. 1, reference numeral 10 indicates in each case one of a pair of upright columns which in the illustrated form comprises steel I-beams each having the central web 10a and the side flanges 10b. The exterior surface of the innermost flange 10b provides the inner side face of the column. However, as will be evident from the description that follows, the invention is adaptable to columns of other configuration and I do not intend to be limited specifically to I-beam columns.

Supported between the columns 10 is a horizontal steel beam 11. This beam is also of I cross section, although, and as will be seen, it may also take other forms without departing from the invention so long as it includes one or more members providing plate-like end portions of the beam. The beam 11 is substantially conventional in its construction, having the web 11a and top and bottom flanges 11b and 11c. It will be noted, however, that the bottom flange 11c is cut away near the opposite beam ends to provide a short length of unflanged web.

The beam is connected with the columns 10 by means of the connector arrangements generally indicated at 12.

Each connector arrangement includes a column mounted connector assembly, generally indicated at 13, and a beam mounted connector member 14.

The column mounted connector assembly includes a pair of spaced bearing bars 15 which, in the illustrated embodiment, are elongate rectangular steel bar members which are welded to the side face of the column. Secured to the outer face of each of the bearing bars by welding and extending outwardly therefrom is a plate member 16, the upper end of which projects above the level of the upper end 15a of the associated bar 15 to form an ear-like portion 17a. The plate members 16 are substantially parallel and, as can be seen best in FIG. 4, are spaced from one another, preferably a greater distance than the spacing between the confronting side edges of the bars 15. The upper end portion, i.e. the ear 16a, of each plate terminates along its innermost edge in an outwardly and upwardly inclined surface 16b, the purpose of which will later be described.

Each end connection member 14 comprises, in the illustrated embodiment, a generally rectangular piece of steel plate disposed normal to the long axis of the beam and welded securely to the upper end portion thereof. The bottom edges 14a of the connector member proceed inwardly from the side and are seated upon and bear downwardly upon the upper end edges 15a of the bars 15. Disposed centrally on the bottom edge of the connector member and formed integrally therewith is a downwardly tapering nose portion 14b, which at its widest dimension is slightly of less width than the spacing between the bars 15 so that the nose 14b extends in its entirety downwardly between the bars.

Preferably, the inclined surfaces which form the tapered nose do not extend all the way to the edges 14a of the connector members; instead, they are joined with short vertical side edge portions 14c which are designed to register with the adjacent side edges of the bars near the upper end of the bars.

When the beam is in its final installed and connected position, as illustrated in FIGS. 1 through 4, beam load is transmitted to the column by the bearing engagement between the lower edges 14a of the connector member 14 to the upper ends of the bearing bars 15. The cooperation between the sides 14c, the downwardly extending nose 14a and the side bars 15 prevents a sidewise shifting of the beam while the interengagement between the outer face of connector member 14 and the inner edges of ears 16a extending above the surfaces 15a of the bar prevents the connector member from pulling away from the face of the column. In order to assure that the beam remains at all times in a locked position with respect to the column, the web 11a of the beam and the plates 16 are provided with aligned apertures through which are received a bolt 17 which is secured in place by its associated nut 18. The bolt acts merely as a safety fastener designed to prevent dislocation of the beam from its locked position.

In assembling the beam with the columns, the beam is initially hoisted into the position illustrated in FIGS. 5 and 6 by a crane (not shown) or other suitable equipment. The beam is positioned with the ends generally so located that the connector members 14 are above and generally aligned with the column mounted connector assemblies 13. The beam is then lowered, and either by tag lines to the ground (not shown) or other means, the beam is maintained generally in the proper orientation during lowering. As the leading end of tapered nose portion 14b passes between the inner upper corners of the bars, it acts to guide the beam into the proper vertical relationship while the inclined surfaces 16b on the inner upper edges of the plate serve to cooperate with the connector member to aid in guiding the connector member onto the upper ends of the bearing plates. Obviously, once the beam connector members have been properly seated with relation to their associated column mounted connector assemblies, the crane can be disconnected since the beam will be fully supported. A workman may at a later time insert the final fastening bolts 17.

From the foregoing, it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth, together with other advantages which are obvious and which are inherent to the structure.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. A beam supporting structure comprising an upright support, a connector assembly mounted on said support and including a substantially horizontal bearing surface, and a pair of spaced parallel and upright ear members adjacent said surface extending in a direction away from said support, said ear members having inner edges extending above said bearing surfaces, said inner edge surfaces spaced from said support,
- a beam having an upright plate-like end portion positioned between and parallel with said ear members, and
- a beam mounted connector member on said end portion, said connector member having surfaces transverse to said end portion and seating on said bearing surface, said surfaces positioned between said inner edges of said ear members and said support.
2. A beam support structure as in claim 1, said bearing surface having a center opening therein, and said end connector member including a downwardly tapered nose portion at the base thereof operable to enter said opening and guide said connector member into and maintain it in a predetermined position for the beam relative to said ear members.
3. A beam support structure as in claim 1, said inner edges of said ear members terminating at the upper ends thereof in end portions inclined upwardly and outwardly with respect to said support.
4. A beam support structure as in claim 1, said bearing surface having a center opening therein, said end connector member including a downwardly tapering nose portion at the base thereof operable to enter said opening and guide said connector member into and maintain it in a predetermined position for the beam relative to said support,
- said inner edges of said ear members terminating at the upper ends thereof in edge portions inclined upwardly and outwardly with respect to said support.
5. A beam support structure as in claim 1, said beam comprising an I-beam with a bottom flange, said bottom flange terminating short of said end of said beam to provide an unflanged lower edge on said beam for a distance inwardly of the end of the beam.
6. A beam support structure as in claim 1, including fastening means comprising a bolt member passed through aligned apertures in said connector assembly and said plate-like end portion of said beam.

References Cited

UNITED STATES PATENTS

1,826,419	10/1931	Butkus	5—296
2,728,923	1/1956	Allen	5—294
3,022,871	2/1962	Saxe	287—189.36
3,136,530	6/1964	Case,	
3,278,208	10/1966	Smith	5—295 X

FOREIGN PATENTS

763,256	12/1956	Great Britain.
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U.S. Cl. X.R.

5—296; 182—179; 52—645