

J. M. CORNELL.
CONSTRUCTION OF BUILDINGS.

No. 523,425.

Patented July 24, 1894.

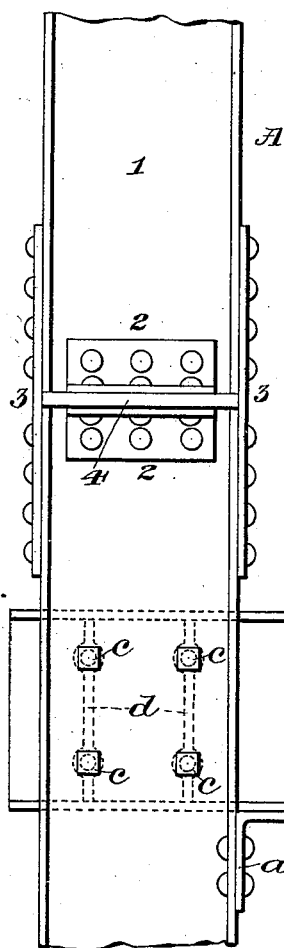


Fig. I.

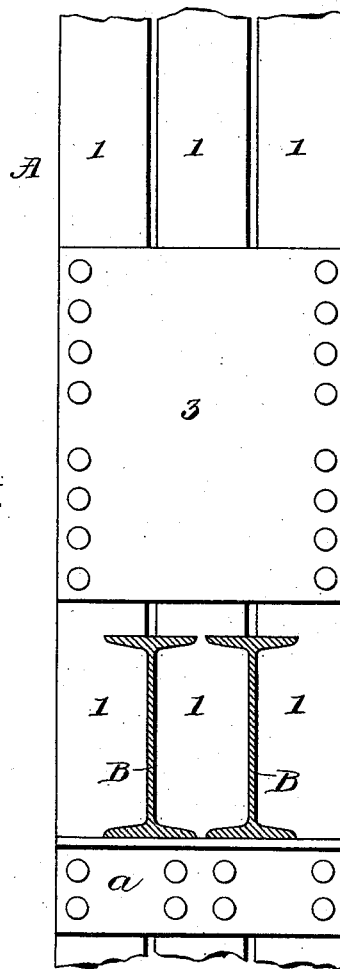


Fig. II.

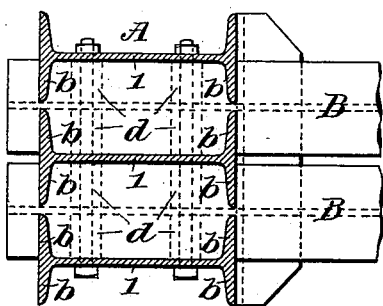


Fig. III.

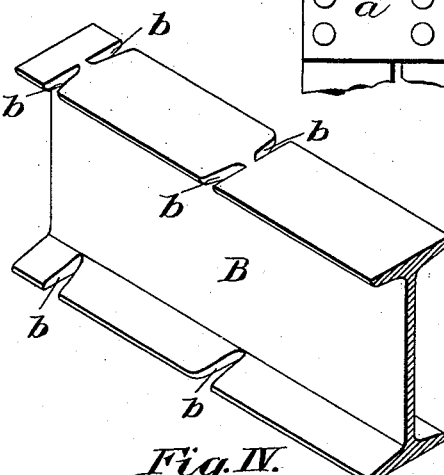


Fig. IV.

Witnesses

J. A. Cornell
Geo. M. Whitney.

Inventor

John M. Cornell
by *[Signature]*
Attorney

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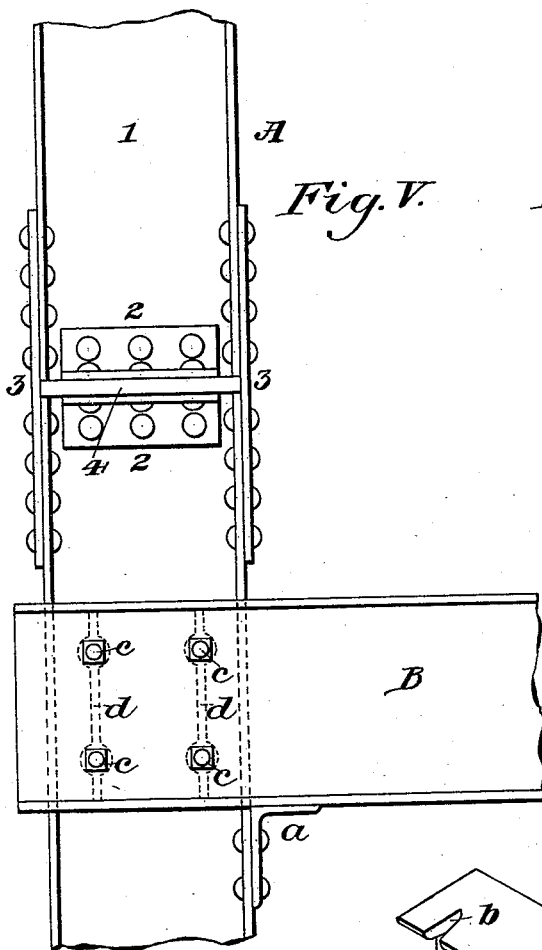


Fig. V.

Fig. VI.

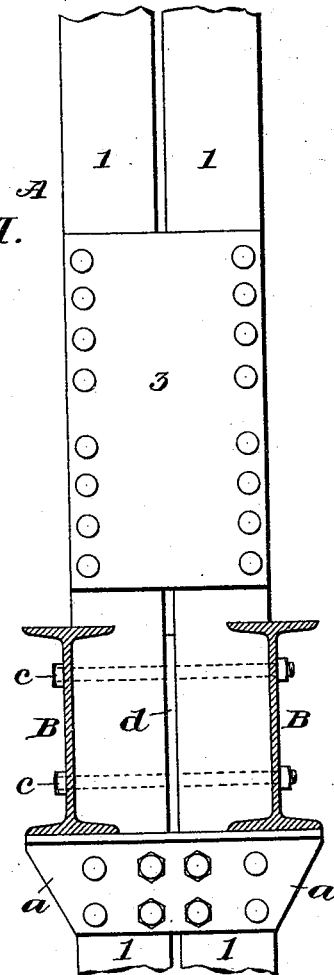


Fig. VII.

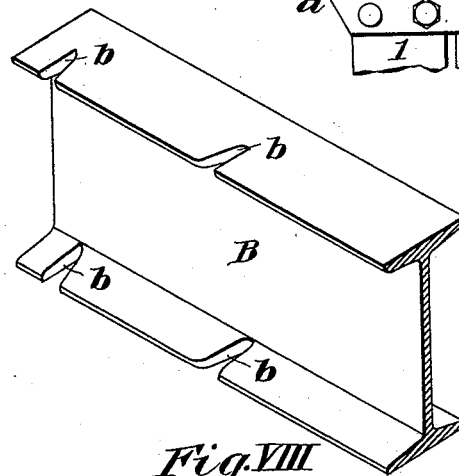
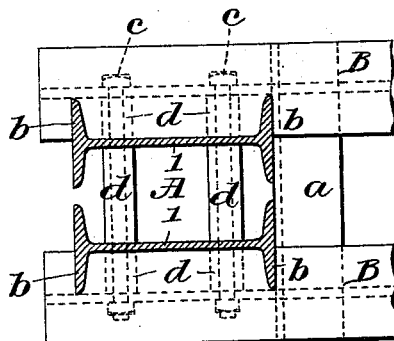


Fig. VIII.

Witnesses

J. A. Cornell
Geo. M. Whitney

Inventor

John M. Cornell
by *[Signature]*
Attorney

(No Model.)

5 Sheets—Sheet 3.

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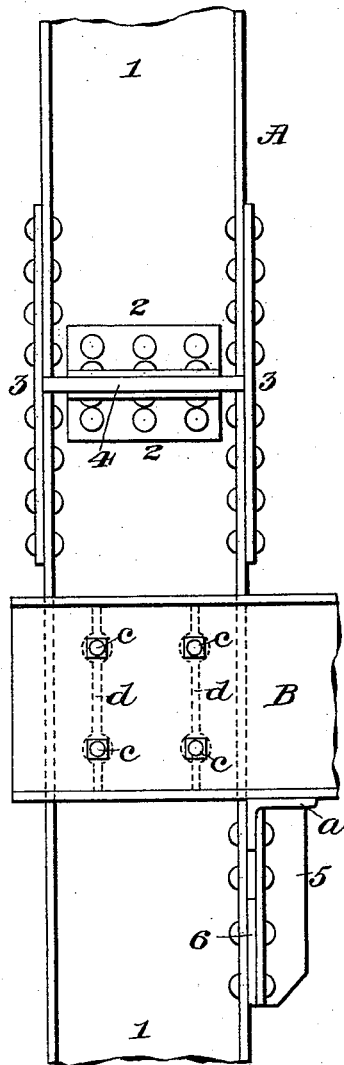


Fig. IX.

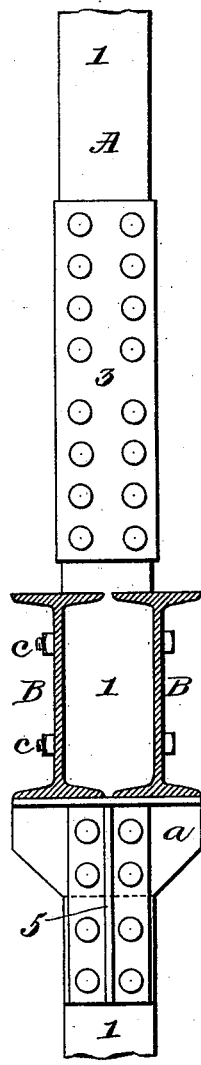


Fig. X

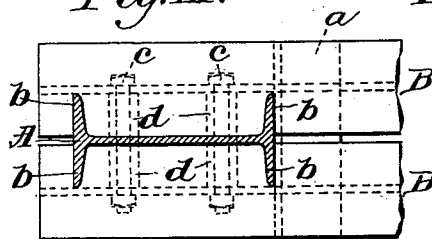


Fig. XI.

Witnesses

L.A. Comer & Co.
Geo M Whitney

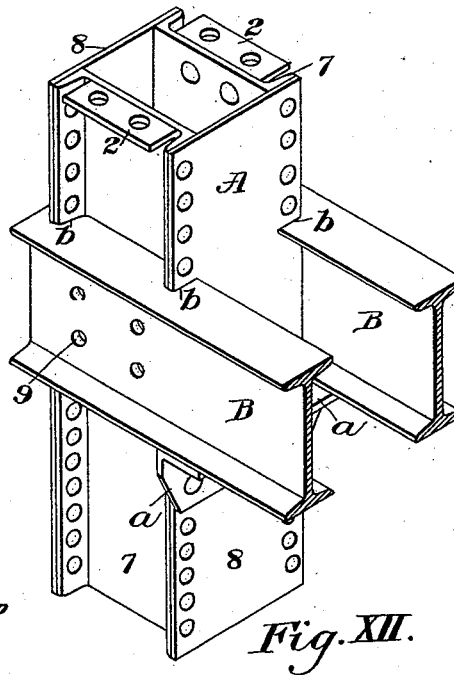


Fig. XII.

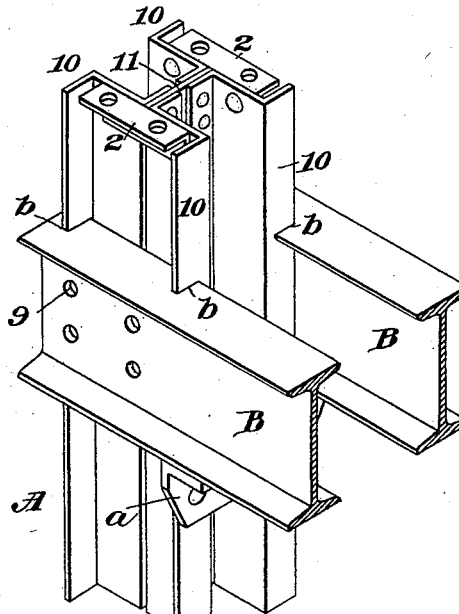


Fig. XIII.

Inventor

John M. Cornell
by Wm. L. Ewin,
Attorney

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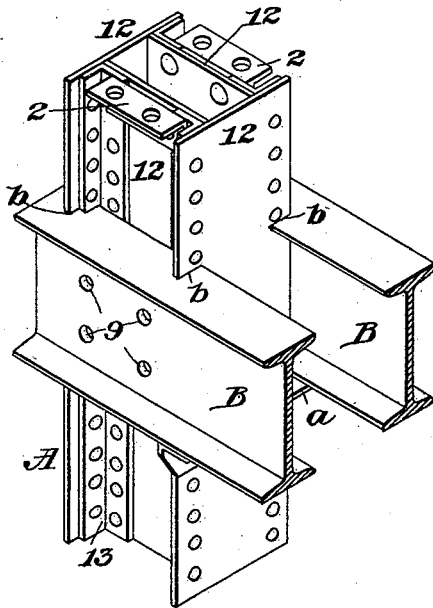


Fig. XIV.

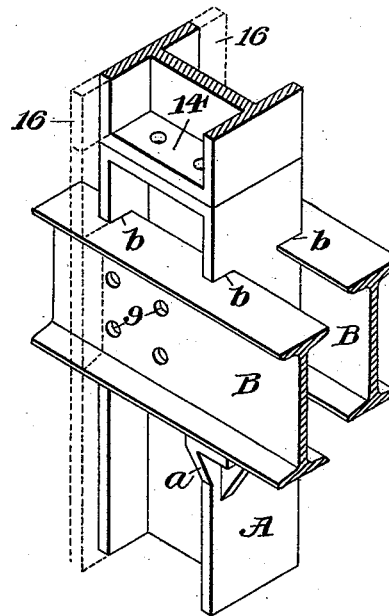


Fig. XV.

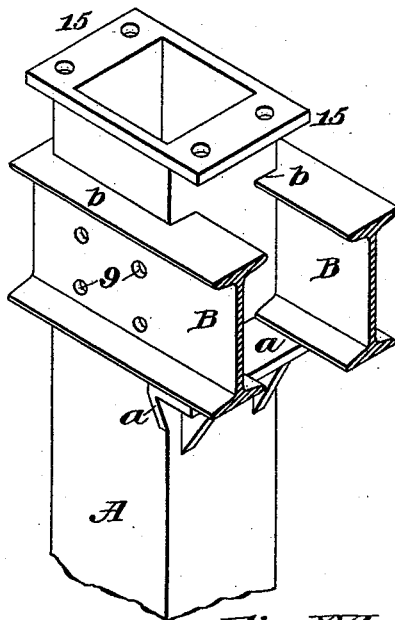


Fig. XVI.

Witnesses
T. A. Comer, Jr.
Geo M. Whitney

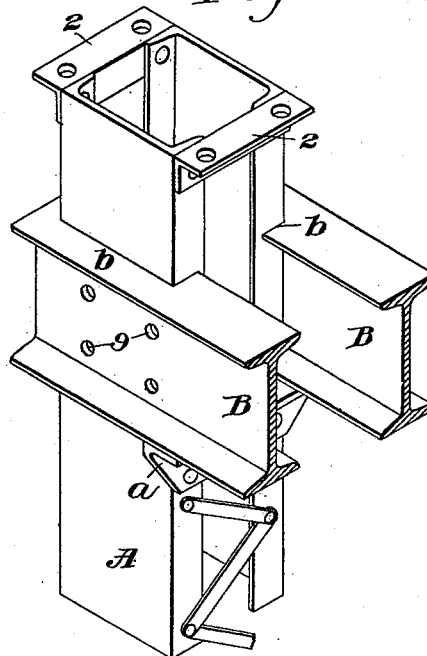


Fig. XVII.

Inventor
John M. Cornell
by *[Signature]* L. E. Ewing,
Attorney

J. M. CORNELL.
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Fig. XVIII.

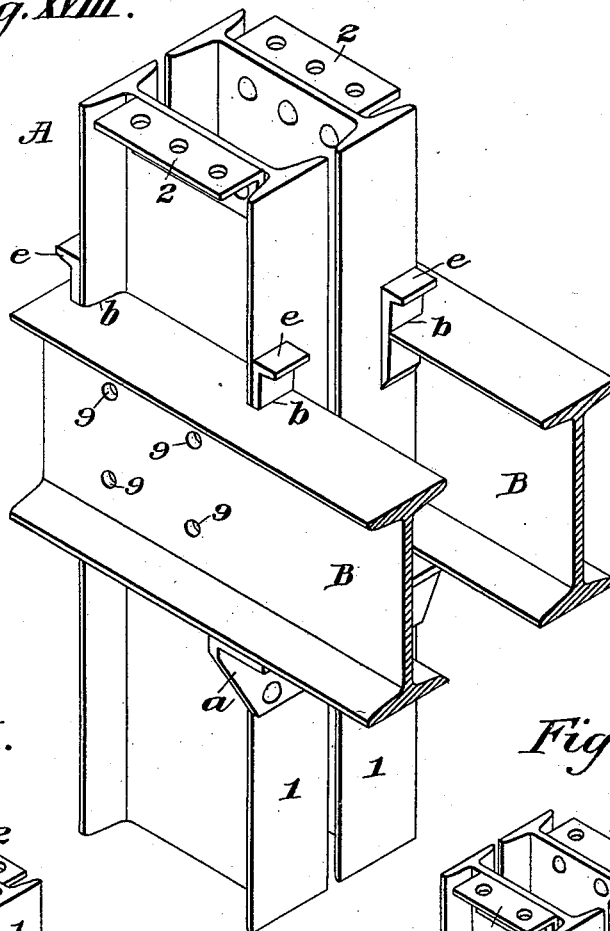
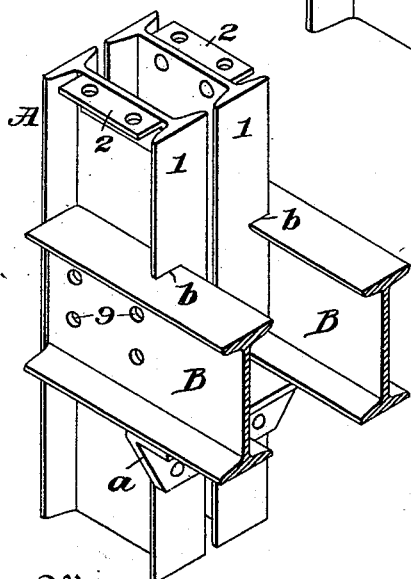


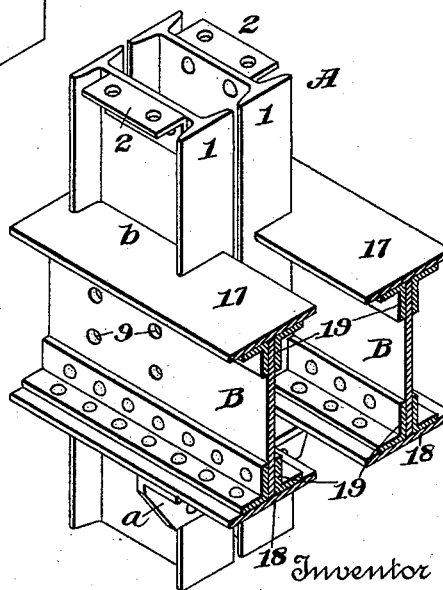
Fig. XIX.



Witnesses

J. A. Cornell Jr.
Geo. M. Whitney.

Fig. XX.



18 Inventor

John M. Cornell
by *W. L. Egan*,
Attorney

UNITED STATES PATENT OFFICE.

JOHN M. CORNELL, OF NEW YORK, N. Y.

CONSTRUCTION OF BUILDINGS.

SPECIFICATION forming part of Letters Patent No. 523,425, dated July 24, 1894.

Application filed May 12, 1894. Serial No. 511,034. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. CORNELL, a citizen of the United States of America, and a resident of New York, in the State of New York, have invented a new and useful Improvement in the Construction of Buildings, of which the following is a specification.

This invention relates to the construction of the metallic frame-work of tall buildings as now commonly built with iron or steel girders supported wholly or in part by metallic columns, and the object of the invention is to interlock such girders and columns with each other so as to render the angles which they form perfectly rigid, and thus to prevent the swaying of tall buildings or their getting out of plumb.

The present invention consists in notching the flanges of I-beam girders and bolting the girders and columns tightly together at each intersection so as to lock the columns in vertical position, with or without provision at the notches for rendering the columns plumb by wedging where such adjustment or correction is required.

Five sheets of drawings accompany this specification as part thereof.

The figures on Sheet 1 represent the combination of a pair of I-beam girders with a triple I-beam column; Figure I being an elevation, Figs. II and III respectively a sectional elevation and a sectional plan projected from Fig. I, and Fig. IV a perspective view of a notched girder-end. The figures on Sheet 2 represent the combination of a pair of I-beam girders with a double I-beam column; Fig. V being an elevation, Figs. VI and VII respectively a sectional elevation and a sectional plan projected from Fig. V, and Fig. VIII a perspective view of a notched girder-end. Figs. IX, X and XI, Sheet 3, represent, in connection with said Fig. VIII, the combination of a pair of I-beam girders with a single I-beam column, Fig. IX being an elevation, and Figs. X and XI respectively a sectional plan and a sectional elevation projected from Fig. IX; and Figs. XII and XIII are perspective views representing the combination of pairs of I-beam girders with columns of other descriptions, as hereinafter set forth. Figs. XIV to XVII inclusive, Sheet 4, are perspective views illustrating respectively the

combination of pairs of I-beam girders with metallic columns of other descriptions, as hereinafter specified; the dotted lines in Fig. XV representing an additional modification hereinafter described. Figs. XVIII, XIX and XX, Sheet 5, are perspective views illustrating respectively the provision for rendering columns true by wedging hereinbefore mentioned, a modified mode of notching the girders, and the employment of composite girders, as hereinafter more particularly described.

Like letters and numbers refer to like parts in all the figures.

For the purposes of this invention the metallic columns, represented at A in the accompanying drawings, may be of any approved material and construction, provided they have laterally projecting flanges or are substantially rectangular in cross-section; and the I-beam girders, represented at B in the drawings, may be of iron or steel, and either solid or composite. In each of the various embodiments of the invention represented by the drawings, the column A is provided with a bracket *a* fixedly attached thereto by rivets or rivets and tap-bolts where the column is of wrought iron or steel, as in Figs. I to XIV and XVII to XX, or cast thereon in the case of cast-iron columns, Figs. XV and XVI; and the lateral flanges of each of the girders B are provided with notches *b* to interlock with the column or with vertical flanges thereon as hereinafter more particularly set forth; and the columns and girders are further connected by horizontal screw-bolts *c*; cast-iron separators *d* being interposed in line with the bolts where the column is of wrought iron or steel, in customary manner.

In the arrangement represented by Figs. I to IV inclusive as above, the column A is composed of three I-beams 1, in beam-lengths, connected by knees 2 and splice-plates 3 riveted fast to the outermost beam-webs and their flanges and to an interposed plate 4 at each joint. In the erection of each length of the column, the middle beam is first set up, with a bracket *a* riveted fast thereto; the girders B having notches *b* at both sides, as in Fig. IV, are supported upon the bracket, and interlocked with the flanges of said middle beam; the two outer beams, with knees 2

riveted fast thereon, are then erected, and the bracket *a* riveted thereto; the bracket being so proportioned as to project laterally beyond the outer flanges of said outer beams; and the bolts *c* are then inserted and tightened; the separators *d* having been put in position and the bolt-holes drilled in the beams in customary manner. Before the next length is erected, preliminarily drilled splice-plates 3 and an interposed plate 4 are put in position, and the former are riveted fast to the upper end of the lower length of the column. The construction of the column then proceeds as above.

In the arrangement represented by Figs. V to VIII inclusive, the column A, like the one above described, is composed of I-beams 1, knees 2, splice-plates 3, and interposed plates 4, with two beams side by side in each section. In this arrangement more than one length of the column can be completed before placing the girders in position, if this is desired. The columns are erected without the brackets *a*, which are then attached to the inner flanges of the beams 1 by tap-bolts and to their outer flanges in like manner, or by rivets, as in Figs. V and VI. The girders B, provided with notches *b* at their inner sides, are then placed upon the bracket *a* and interlocked by said notches *b* with the outer flanges of said beams 1, and the bolts *c* are then inserted and tightened, the separators *d* having been placed in position and the bolt-holes drilled in customary manner.

In the arrangement represented by Figs. VIII to XI, the column A is composed of like I-beams 1, knees 2, splice-plates 3, and interposed plates 4, with a single beam to each length, and the girders B are or may be identical with those employed in connection with double I-beam columns as above. In this case, however, the bracket *a* may be attached before the column is erected. In order to attach the same by a sufficient number of rivets to support the pair of girders, the bracket is conveniently reinforced and practically elongated along the beam by a knee 5 of T-iron, which is riveted fast, together with the bracket and a washer-plate 6, as in Figs. IX and X.

In the arrangement represented by Fig. XII, the column A is composed of channel-beams 7 and flat plates 8, together with suitable splicing or joint-pieces, including knees 2, and is erected with said knees and its bracket or brackets *a* in position; after which the girders B, notched as in Fig. VIII, are interlocked by their notches *b* with the flanges formed by those of the channel-beams together with the plate edges riveted thereto, and are then bolted fast, as represented by the bolt-holes at 9 in Fig. XII.

In the arrangement represented by Fig. XIII, each length of the column A is composed of four Z-irons 10 and a center-bar 11, together with splicing or joint pieces, represented by knees 2, and is provided with a

bracket *a* riveted fast as above; and the girders B, notched as in Fig. VIII, are interlocked by their notches *b* with the outer flanges of said Z-irons 10, and are then bolted fast, as represented by bolt-holes at 9.

In the arrangement represented by Fig. XIV, each length of the column A is composed of four side-plates 12 and four angle-irons 13, in connection with suitable splicing or joint pieces, represented by knees 2, and is provided with a bracket *a* riveted fast as above; and the girders B, notched as in Fig. VIII, are interlocked by their notches *b* with the outer flanges of the angle-irons and the plate-edges riveted fast to said outer flanges, and then bolted fast, as represented by the bolt-holes at 9.

In the arrangement represented by full lines in Fig. XV, a flanged cast-iron column A, having a bracket *a* cast thereon as above, is interlocked by its flanges with a pair of girders B, notched as in Fig. VIII, and bolted fast, as represented by the bolt-holes at 9. The dotted lines are referred to in connection with a figure subsequently described. The successive column lengths, portions of which are shown in the figure, are bolted together at 14 in customary manner.

In the arrangement represented by Fig. XVI, the flat sides of another pattern of cast-iron column A interlock with notches *b*, as broad as may be required, in the inner flanges of the girders B, which are supported on a bracket *a* cast fast on the column as above, and bolted to the sides of the column, as represented by the bolt-holes at 9. Flanges 15, cast on the column-lengths, and drilled for bolts, provide for bolting the column-lengths together in a customary way.

In Fig. XVII, A represents an ordinary lattice-column provided with a bracket *a* and knees 2 as above, and combined with a pair of girders B having broad notches *b* in their inner flanges fitted to the flat sides of the column, and bolted against said flat sides as represented by bolt-holes at 9.

For rendering the columns true by wedging in case they are not exactly plumb, as above, the notches *b* are cut larger than the width of the column or the thickness of its flanges may require, and vertical hook-wedges *e* are introduced between column and girder within the notches, as in Fig. XVIII, and tapped respectively until the column is true. The girders are then fastened by means of the bolts *c*, as represented by the bolt-holes at 9. Otherwise the column and girders shown in Fig. XVIII are those represented by Figs. V to VIII, and the species thus represented is selected for my specific claims herein.

Where it is desirable to avoid extending the girders beyond the backs of the columns, as in Fig. XIX, a single notch *b*, in each inner flange of the girders, engaged by a laterally projecting flange on the column, may suffice to lock the column and girders together in connection with through-bolts as above, which

are represented by the bolt-holes at 9. Otherwise the arrangement represented by Fig. XIX is the one above described with reference to said Figs. V to VIII inclusive. If the flanged column be of cast-iron, as in Fig. XV, the rear flanges may conveniently be extended across the ends of the girders, as represented in dotted lines at 16 in the figure last referred to.

When composite girders B are employed, as in Fig. XX, their top and bottom plates 17 may be notched to admit the whole side of the column, whatever its shape may be, to a sufficient extent to bring the vertical flanges of the inner angle-irons 19 into contact with the sides of the column or with the laterally projecting flanges of the column-beams 1. The composite beams are bolted fast in the same manner as the ordinary or solid beams shown in the other figures, as represented by bolt-holes at 9. The particular column represented at A in Fig. XX is the double I-beam column common to Figs. V to VII and Figs. XVIII and XIX.

The girders B are preferably employed in pairs in all cases, as shown in the accompanying drawings, but one or three girders may be interlocked with a double I-beam column, or four girders instead of two with a triple I-beam column, by obvious modifications of the arrangement represented by Figs. I to IV; in either of these modifications there may be but one notch in each girder-flange if preferred, as above described with reference to Fig. XIX;

and other like modifications will suggest themselves to those skilled in the art.

Having thus described the said improvement, I claim as my invention and desire to patent under this specification—

1. The combination with metallic columns of I-beam girders having notches in their lateral flanges, interlocked by said notches with the columns or with lateral flanges thereon, and bolted to the columns by through-bolts, substantially as hereinbefore specified.

2. The combination, substantially as hereinbefore specified, of metallic columns provided with brackets, I-beam girders supported upon said brackets and provided with notches in their lateral flanges to interlock with the columns or with flanges thereon, and vertical correcting wedges interposed between column and girder within said notches.

3. The combination of a metallic column having laterally projecting longitudinal flanges and provided with a bracket projecting laterally beyond said flanges, and a pair of I-beam girders supported beneath by said brackets, having notches in their inner flanges to interlock with said flanges of the column, and drawn together by bolts extending through girders and column, substantially as hereinbefore specified.

JOHN M. CORNELL.

Witnesses:

LEWIS M. SWEET,
EDWIN MARSHALL.