

Oct. 16, 1945.

J. J. FOX

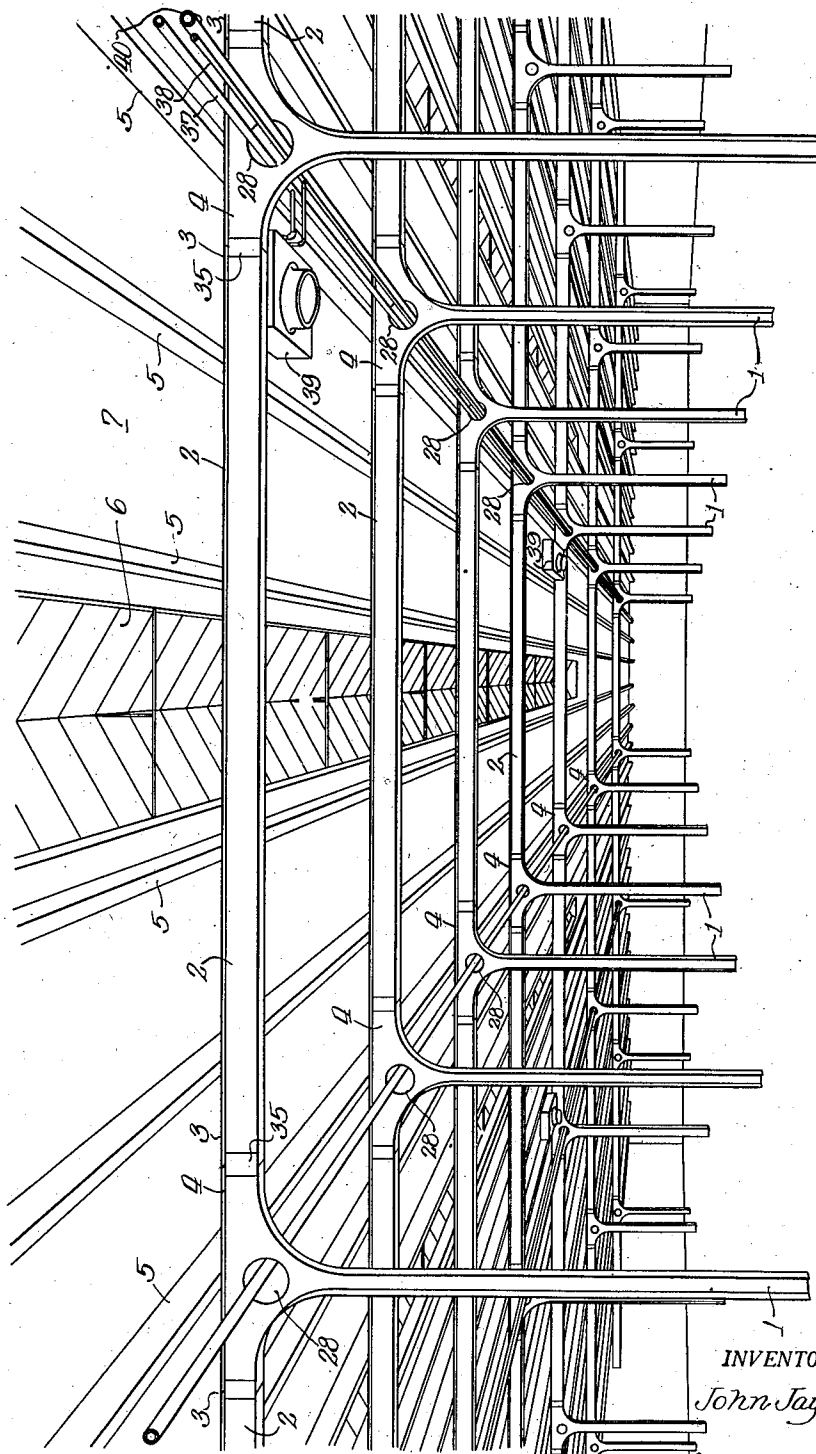
2,387,134

METHOD OF FORMING T-HEAD COLUMNS

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3 Sheets-Sheet 1

Fig. 1.



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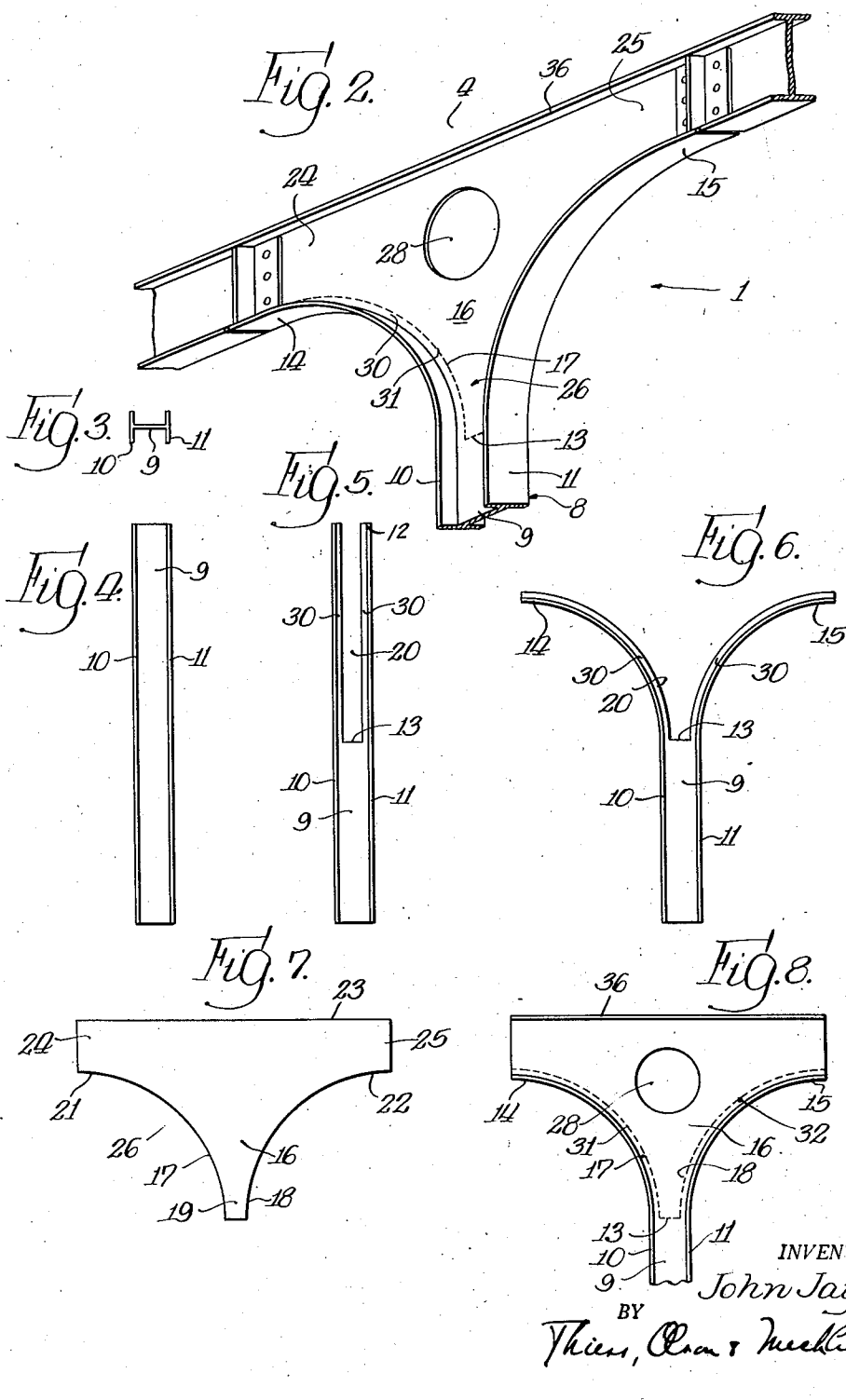
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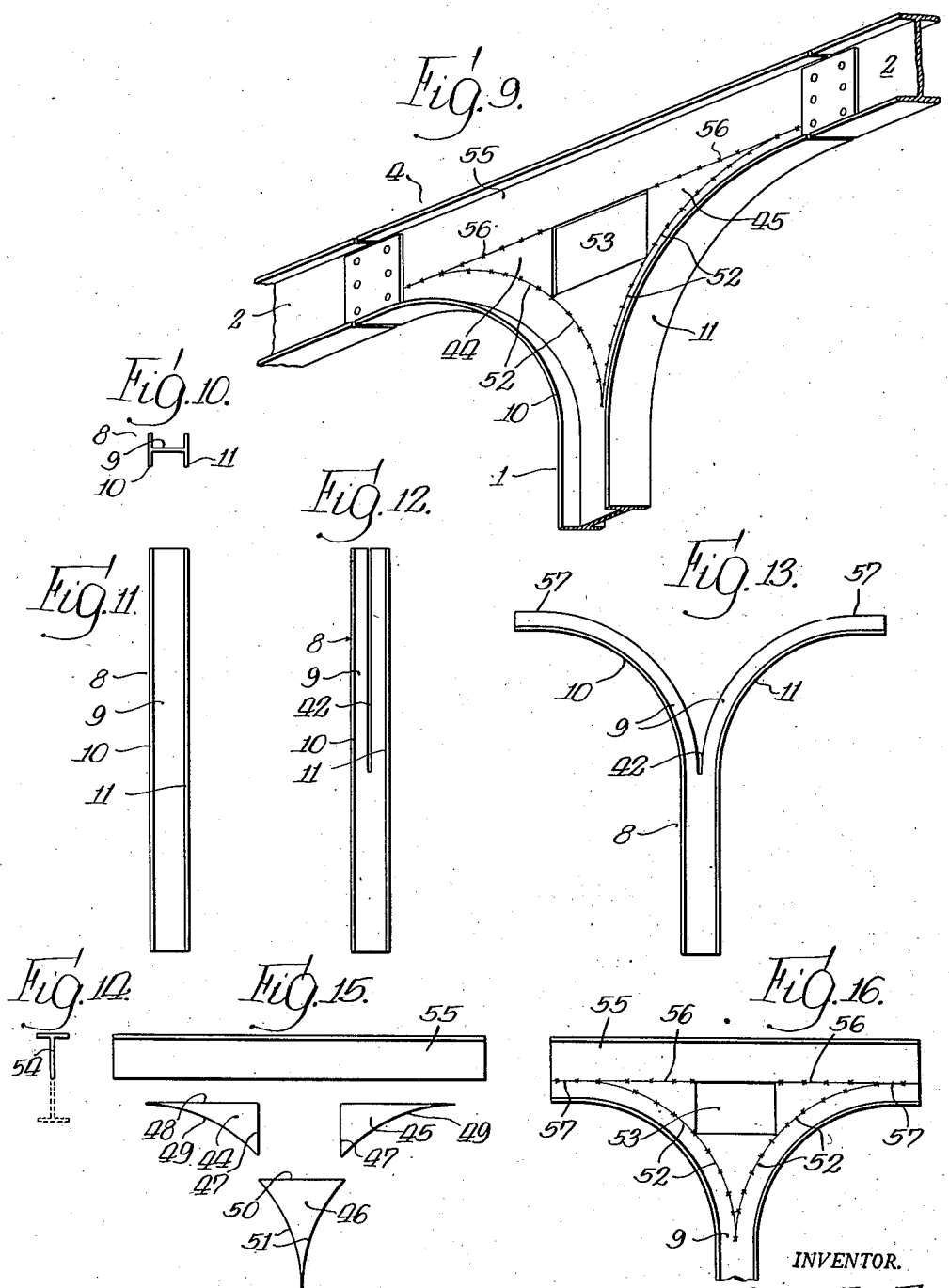
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METHOD OF FORMING T-HEAD COLUMNS

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UNITED STATES PATENT OFFICE

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METHOD OF FORMING T-HEAD COLUMNS

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Original application January 16, 1941, Serial No. 374,618. Divided and this application December 21, 1943, Serial No. 515,115

4 Claims. (Cl. 29-155)

This application is a division of my copending application, Serial No. 374,618, filed January 16, 1941.

This invention relates to the building art and more particularly to certain improvements in making columnar structures for supporting the roof or deck of a factory or like building.

The invention is directed to a new and novel method of constructing a T-head column adapted for use in the erection of structural steel buildings. This improved method results in a more efficient type of T-head column that can be constructed at less cost and in a very practical manner.

The T-head column herein disclosed is to be distinguished from fabricated structures made up of a number of plates, angles and like members. In effect, it comprises a single piece that can be standardized and furnished as such to the job. It minimizes the number and size of connecting parts necessary and simplifies the arrangement and construction of the cross beams forming the supported structure. The new and novel method disclosed makes possible the construction of a T-head in a practical way and permits the inclusion of an additional feature of disposing of such overhead piping as heater headers and returns and sprinkler mains in alignment with the columns and generally in the space of the rows in which the columns are disposed.

This additional feature, although simple, is important in the erection of steel structures. It prevents the sprawling of various overhead piping in the building and permits an orderly disposition of individual space heaters and in a manner securing efficient circulation of the heating medium throughout the building. It also allows more efficient distribution of machinery and overhead power transmission lines for driving the same to the end of securing maximum use of floor space throughout the building.

Other objects of the invention will be readily apparent from the following description when taken in connection with the accompanying drawings, which form a part hereof.

In the drawings:

Fig. 1 illustrates the interior of a building employing T-head columns embodying the invention, there also being illustrated the manner of disposing the heating pipes and the sprinkler main in alignment with the columns and in the space of the column rows whereby space heaters may be supported in overhead relation upon certain of the cross beams;

Fig. 2 is an enlarged detail view of the head portion of a column;

Fig. 3 is an end view of an H-beam used in the construction of the column;

Fig. 4 is a side view of this H-beam;

Figs. 5 to 8, inclusive, illustrate the various steps of the method disclosed herein;

Fig. 9 illustrates the head portion of a column made by an alternative method;

Fig. 10 is an end view of an H-beam used in making the column illustrated in Fig. 9;

Fig. 11 is a side view of this H-beam; and

Figs. 12 to 16, inclusive, are views illustrating the different steps of this alternative method.

The interior steel framing of a building, as shown in Fig. 1, includes columns 1 arranged in spaced rows and parallel cross beams 2 connecting at 3 to the ends of heads 4 of the columns 1. The supported structure carried by cross beams 3 and heads 4 of the columns 1 comprise such members as longitudinal beams 5 forming the roofing or deck framing members which may or may not include skylights 6 or solid roof portions 7. Deck beams 5 are spaced along the parallel cross beams 2 at predetermined distances and centrally of column heads 4.

Each column 1 comprises an H-beam 8 provided with webbing 9 and side flanges 10 and 11, as shown in Figs. 3 and 4. In making these columns 1, webbing 9 is first cut away beginning at the upper end 12 of beam 8. This cutaway portion, designated 20, extends downwardly, say, to line 13. Side flanges 10 and 11 at the cutaway portion are then bent back, say, to the curvature shown in Fig. 6, which generally represents the formation desirable for the opposite lower sides 14 and 15 of the head 4 of the finished column. Line 13 may represent the base of this head 4 between the side flanges 10 and 11. The next step in the procedure is to form a plate 16, as by cutting or the like, until it has the general formation of head 4. Its lower curved sides 17 and 18 will correspond to opposite lower sides 14 and 15 of head 4, while its lower end 19 will fit between the curved side flanges 10 and 11 at the cutaway portion 20 and seat upon top edge 13 of webbing 9. The crosswise dimension of plate 16 will equal that intended for head 4 so that when plate 16 is seated between bent back portions of flanges 10 and 11 upon top edge 13 of webbing 9 of H-beam 8, its curved sides 17 and 18 will also seat against the curved bent back portions of flanges 10 and 11, or substantially so. It is not necessary that the curved portions of flanges 10 and 11 be bent back into a curvature

exactly corresponding to curved sides 17 and 18 of plate 16. These bent back flange portions may be subjected to a second shaping operation, if so desired. The outer ends 21 and 22 of curved sides 17 and 18 of plate 16 extend generally horizontally and parallel to the top edge 23 of plate 16. These ends form in effect opposed horizontal side arms 24 and 25, and the central lower part forms a downwardly extending arm 26 adapted to be firmly braced between the side flanges 10 and 11. An opening 28 is formed in plate 16. It is located with a substantial portion thereof below the plane of horizontal end edges 21 and 22.

In cutting webbing 9 away, I find it advantageous to leave a small strip 30 along the inside face of flanges 10 and 11. Curved sides 17 and 18 will seat upon these strips 30 when plate 16 is positioned within cutaway portion 20. Plate 16 is then brazed, welded or otherwise suitably secured within cutaway portion 20 to strips 30 and along edge 13. The line of brazing or welding is indicated at 31 and 32. In this manner, the bent back portions of flanges 10 and 11 become the under flanges of plate 16 so that the T-head column thus formed will have a continuous flange formation from along the vertical sides of the column up to and along the underside of head 4. Strips 30 have the further function of assuring the centering of plate 16 during welding or brazing, which is desirable as well as necessary in order to secure alignment of the ends of arms 24 and 25 with cross beams 2. If the face surfaces of arms 24 and 25 fail to align with the face surfaces of beams 2, plates 35 joining the same together cannot be bolted in place properly to secure the proper connection. The top flange of head 4 may be formed by brazing or welding angle irons 36 along top edge 23 of plate 16 in order to complete the formation of the T-head column.

As described above, columns 1 are erected in rows, this being shown in Fig. 1, so that cross beams 2 connect to ends 24 and 25 of heads 4 of columns of adjacent rows. Not only may the beams 2 be shorter and of lighter construction than heretofore by the use of the present invention, but the columns 1 with their heads 4 may be provided as standardized items of production, thereby making labor costs less in the erection of the steel structure. Also, the method herein disclosed reduces the cost of constructing columns 1 and furnishing the same as standardized items of production.

Deck beams 5 are disposed laterally of cross beams 2 and column heads 4. The arrangement provides for carrying a deck beam 5 upon heads 4 directly centrally of each row of columns. Disposing a substantial portion of openings 28 below lower horizontal end edges 21 and 22 of plates 16 permits carrying space heaters 39 in overhead relation in a simple and orderly manner upon the ends of certain of the cross beams 2, which arrangement effects a very efficient form of heating for the building and also allows the header pipes 37 and return pipes 38 of the heating system to lie within the space occupied by each row. The arrangement also allows the return pipes 38 to lie below the plane of the column flanges 10 and 11 where they connect to edges 21 and 22 of plates 16, and therefore, below the lower edges of cross beams 2. The headers 37 are therefore disposed above this plane so that the space heaters 39 may be attached to the ends of cross beams 2 and at the ends 24 and 25 of plates 16 in the manner shown and proper circulation of the

heating medium obtained. Any other piping, such as sprinkler mains 40, water pipes, electrical conduits, etc., may also be grouped with headers 37 and return pipes 38 so that they will run generally parallel to and under the cross beam 5 disposed centrally upon the heads 4 of each row of columns. Confining such piping over the center line of the columns eliminates interference with light and power transmission lines, thereby providing maximum efficiency in the distribution of machinery about the floor without loss of space or inefficient positioning thereof, or without imposing limitations with respect to the positioning of the machinery and power transmitting lines that may be extremely undesirable where line production methods are in use.

I find that this provides a very simple and efficient arrangement of such piping and keeps the same not only orderly placed to occupy a minimum of space in overhead relation in the building but locates the same to secure maximum efficiency with respect to the circulation of the heating medium and distribution of a water supply for the sprinkler system.

A modified method of constructing columns 1 is shown in Figs. 9 to 16, inclusive. The H-beam 8 is slitted at 42 downwardly through webbing 9 to a point approximately equal to that of the top edge 13 and the side flanges 10 and 11 are then bent back with the remaining portions of the webbing, as shown in Fig. 13. Plate segments 44, 45 and 46 are then cut in the forms shown in Fig. 15, the segments 44 and 45 having vertical straight edges 47, horizontal straight edges 48 and curved sides 49 corresponding to the curvature of the slitted edges of webbing 9 along each of the bent back portions of flanges 10 and 11. Similarly, segment 46 is formed with a straight top edge 50 and curved sides 51. These plate segments are then welded along lines 52 to the curved edges of webbing 9 so that the straight edges 47 and 50 form an opening 53. As shown in Fig. 14, an I-beam 54 is then cut lengthwise in two. One-half, designated 55, is positioned upon the outer ends 57 of the slitted portions of webbing 9 carried by the bent back portions of flanges 10 and 11 and is then brazed or welded thereto, the inner portions of lower edge of I-beam half 55 being also brazed or welded at 56 to top edges 48 of segments 44 and 45. Opening 53 will, therefore, be closed at the top and afford ample space through which piping 37, 38 and 40 may pass in the same relation as heretofore described. Hence, a portion of the slitted webbing 9 is united with the webbing of top member 55 and forms therewith the head of T-column. The central portion of the head is adequately reinforced by plate members 44, 45 and 46, so that a single standardized unit may be formed to provide maximum strength.

Both forms disclosed provide a simple and inexpensive method of constructing an efficient form of T-head column in a practical manner. The structure is light and strong. Less material is utilized than in built-up fabricated structures. Lighter cross beams 2 may be used and arranged systematically so that a lighter and more effective type of deck construction may be adopted. The strength of the head 4 is not affected by the openings 28 and 53, although of lighter construction, and hence, overhead heating pipes and sprinkler mains may be grouped to lie in the same general space occupied by the rows of columns. A maximum unobstructed overhead supported structure is thereby possible for ventilation

and light transmission through skylights and other roof parts carried thereby, and, as previously stated, a maximum use of floor space is obtained without sacrifice of space due to interference between light and power transmission lines with the heating pipes, sprinkler mains, or such other pipes, as the water and conduit pipes.

Without further elaboration, the foregoing will so fully explain the gist of my invention that others may, by applying current knowledge, readily adapt the same for use under varying conditions of service, without eliminating certain features, which may properly be said to constitute the essential items of novelty involved, which items are intended to be defined and secured to me by the following claims.

I claim:

1. The method of forming a built-up T-head column which comprises cutting away the webbing between the side flanges of an H-beam column for a distance downwardly from the upper end of the column, bending the side flanges on opposite sides of the column outwardly for substantially the distance of said cutaway web portion, forming a plate of substantially T-shape with opposed arcuate side edges to fit into the opening between said bent flanges, positioning said plate between said bent out flanges so that its lower end seats upon the upper edge of the uncut webbing in said column and the bent out flanges rest against the said arcuate side edges of said plate, welding said flanges to said arcuate side edges so that they form the flanges thereof, and welding a top flange along the upper edge of said plate.

2. The method of forming a built up T-head

column which comprises cutting away the webbing between the side flanges of an H-beam column for a distance downwardly from the upper end of the column, bending the side flanges on opposite sides of the column outwardly for substantially the distance of said cutaway web portion, positioning a plate of substantially T-shape between said bent out flanges so that its lower end seats upon the upper edge of the uncut webbing in said column and the bent out flanges rest against the said arcuate side edges of said plate, welding said flanges to said arcuate side edges so that they form the flanges thereof, and welding a top flange along the upper edge of said plate.

3. The method of forming a built-up T-head column which comprises slitting the upper end of an H-beam column, bending the slitted ends outwardly so that an opening is provided within the area of the webbing of the H-beam column, forming a head upon the upper end of said column by welding a plate to said slitted ends crosswise of said column so that the flanges of said slitted ends form at least a portion of the underflange of said plate, and securing a top flange along the upper edge of said plate thereof.

4. The method of forming a built-up T-head column which comprises cutting an H-beam column a predetermined distance inwardly from one end, bending the portions on opposite sides of the cut outwardly, and fixedly securing a plate like structure to said portions so that the flanges of said portions form the under flanges of the head, and fixedly securing a flange along the top edge of said plate.

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