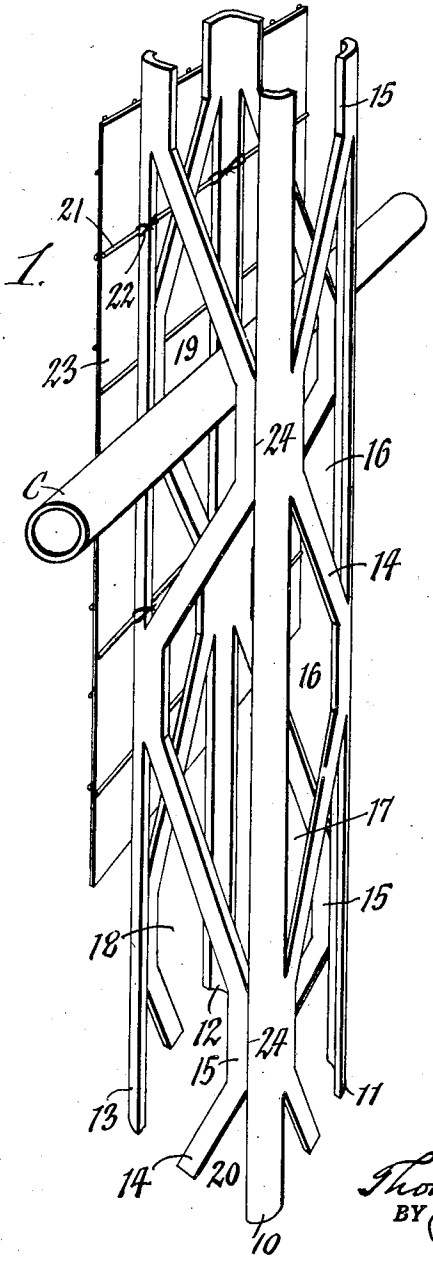
Sept. 25, 1934. T. H. McKAIG 1,974,430

METAL STRUCTURE

Filed Oct. 25, 1932 2 Sheets-Sheet 1

Fig. 1.



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METAL STRUCTURE

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Fig. 2.

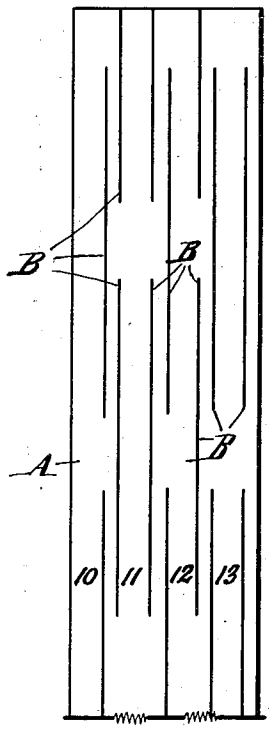


Fig. 3.

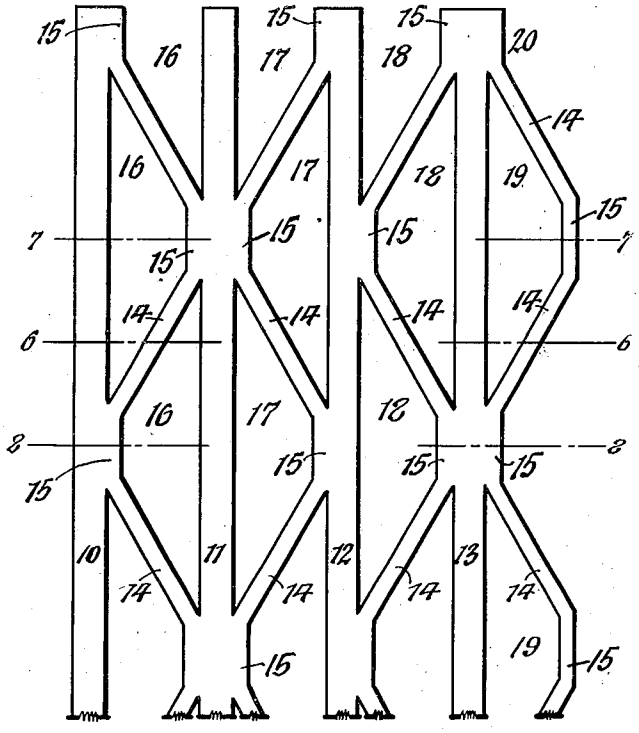


Fig. 4.

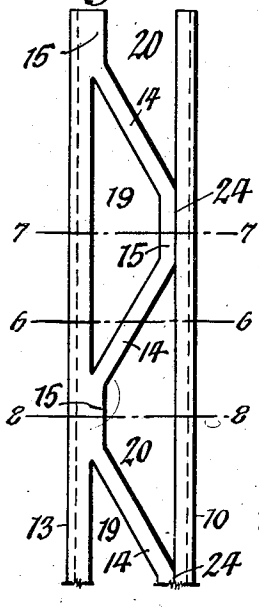


Fig. 5

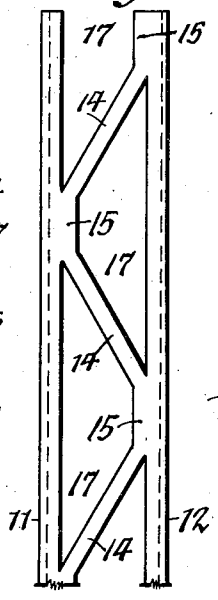


Fig. 6.

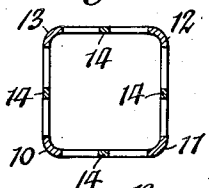


Fig. 7.

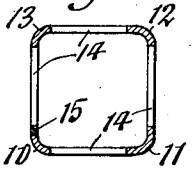
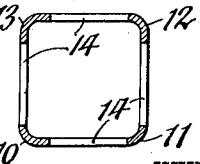


Fig. 8



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Patented Sept. 25, 1934 1,974,430

UNITED STATES PATENT OFFICE

1,974,430

METAL STRUCTURE

Thomas H. McKaig, Buffalo, N. Y.

Application October 25, 1932, Serial No. 639,439

1 Claim. (Cl. 189—38)

This invention relates to a metal structure which is more particularly intended for use as an upright column or post in a building, but the same may also be employed advantageously as a horizontal beam in buildings, bridges and the like, and also for other purposes.

It is the object of this invention to provide a metal structure for this purpose which is very economical in the amount of metal used for carrying a predetermined load which permits of readily and conveniently attaching thereto lathing for plastering purposes, which provides a maximum area of unobstructed transverse passages through the body of the structure for the reception of pipes or conduits for carrying water, gas or electric wiring or the like, and which can be made strong and durable with ease and facility and at comparatively low cost.

In the accompanying drawings:

Figure 1 is a perspective view showing this invention embodied in the column of a building which is adapted to support a plastered wall and to be penetrated by a horizontal pipe adapted to carry water, gas, electric wires or the like.

Figure 2 is a plan view of a sheet of metal which has been slitted preparatory to effecting the subsequent operations for converting the same into a metal structure forming the subject of this invention.

Figure 3 is a plan view showing the slitted blank expanded in a direction transversely of the length of the same.

Figure 4 is a fragmentary side elevation of the finished metal structure viewed from that side on which the longitudinal edges of the body of the same are connected with each other.

Figure 5 is a similar view showing this metal structure viewed opposite that shown in Fig. 4.

Figures 6, 7 and 8 are horizontal sections taken on the correspondingly numbered lines in Fig. 4.

Similar characters of reference indicate like parts in the several figures of the drawings.

In its general construction the body is of tubular form and preferably of rectangular form in cross section. The corners 10, 11, 12, 13 of this structure consists each of a longitudinal bar of metal which is continuous throughout the entire length of the structure and is of angular form in cross section, so that the several corners of the structure form the main supporting members of the tube, particularly when the same is employed as a column, post or strut of a building in which these corner bars take the compression strains of the load imposed upon the column.

When this metal structure is used as a beam in a building or bridge-work these longitudinal corner members serve as chords in which the upper ones take the compression strains and the lower ones the tensile strains.

The four sides of this rectangular tubular body are constructed to form flat panels which are of open work form and in the preferred construction each of these panels comprises a plurality of inclined braces, strips or stands 14 which are arranged in zig-zag form relative to the adjacent longitudinal bars. The angular trend of the inclined braces of each panel of the tubular body is in a direction opposite to that of the angular trend of the inclined braces in the adjacent panel of the tubular body and the corresponding bonded points 15 between the several inclined braces, and the respective longitudinal bars are all transversely in line with each other.

The longitudinal bar 10, which for convenience will be referred to hereafter as the first bar, is arranged at one of the longitudinal edges of the metal blank from which the tubular body is made. The inclined braces of each of the panels between the first and second longitudinal bars 10 and 11, between the second and third longitudinal bars 11 and 12, and between the third and four longitudinal bars 12 and 13 are each connected integrally at their opposite ends with two of the longitudinal bars, but the inclined braces 14, 14 on the outer side of the fourth longitudinal bar 13 are only connected integrally at their inner ends with the last-mentioned bar, while the outer ends of these inclined braces are only integrally connected in pairs by the several bond points 15 between the adjacent outer ends of the pairs of inclined braces.

By this means the last-mentioned inclined braces 14 and their outer bond points 15 form a longitudinal series of loops on the outer side of the longitudinal bar 13, and the outer bond points 15 of these loops form the opposite longitudinal edge of the partially completed structure which is ultimately converted into tubular form.

This partially completed structure is shown in Fig. 3 and the same is produced from a sheet metal blank A which is provided with longitudinal slits B which are staggered longitudinally relative to each other so that when this blank is expanded or spread apart, transverse V-shaped openings or voids 16 will be produced between the braces of the first panel and the first and second longitudinal bars 10 and 11, similar V-shaped openings 17 will be produced between the braces of the second panel and the second and third longitudinal bars 11 and 12, similar V-shaped openings 18 will be

produced between the braces of the third panel and the longitudinal bars 12 and 13, completely enclosed openings 19 of V-shape form will be produced within the loops on the outer side of the fourth bar 13, and semi-openings 20 of similar form will also be produced on the outer side of the last-mentioned longitudinal bar.

After the blank has been expanded or distended into the shape shown in Fig. 3, in which its longitudinal bars are separated and the braces are moved into an inclined position so as to form V-shaped openings therebetween, this blank is bent into rectangular tubular form by any suitable means so that each of the longitudinal bars assumes an angular shape with the concave side thereof facing inwardly and the outermost bond points of the loops 15 on the outer side of the fourth longitudinal bar 13 engaging with the outer longitudinal edge of the first longitudinal bar 10, as shown in Figs. 4, 5, 6, 7 and 8.

In this position of the parts the outer longitudinal edge of the first longitudinal bar 10 is connected with the outer bond points 15 of the loops on the opposite longitudinal edge of the blank, which connection is preferably effected either by gas or electric welding so that the metal of these two edges is fused together and practically forms an integral joint between the same at a plurality of points, as shown at 24, which are all arranged on the same line lengthwise of the tubular body, and thus forms a strong and durable structure.

The engagement of the front or first longitudinal bar 10 with the apices of the loops on the opposite longitudinal edge of the blank serves to convert the partial openings or voids 20 into complete openings, as shown in Fig. 4.

When the body of the tube is thus bent into rectangular form in cross section the several inclined braces 14 between the first and second longitudinal bars 10 and 11 are parallel or register in line with the inclined braces of the panel between the third and fourth longitudinal bars, and the inclined braces of the second panel between the second and third longitudinal bars register or are in line with the inclined braces 14 of the panel between the first and last longitudinal bars. By this means a plurality of passages or openings of maximum capacity are formed through the column, beam or tubular body through which it is possible to pass pipes or conduits C for conducting water, gas, electric wires or the like in a direction at right angles to the length of the tube, as shown in Fig. 1, and of a size which is only limited by the dimension of the respective voids or openings in the several panels.

It is thus possible to pipe a building equipped with such columns or tubular members without suffering any inconvenience due to the presence of these columns, because they do not obstruct the normal passage of such pipes nor occupy any space where these pipes would be most conveniently located. These pipes can be passed through the tubular column or beam in either of the directions which are at right angles to each other inasmuch as the openings in the panels on the opposing sides of the tubular body are in complete register and thus permit the passage of such pipes transversely therethrough in the required direction to suit a particular installation.

When a structure of this character is used as a column of a building, a wall of any suitable character can be mounted on any one of its four flat sides with ease and facility and thus materially reduce the cost of the buildings, for example, as shown in Fig. 1 wire lathing 21 may be conveniently attached to one of the flat sides of the tubular column or post by means of clips 22, and this lathing may support a backing 23 which of itself may either serve as a partition or the foundation for a plaster coating, or any other form of finishing that is desired.

I claim as my invention:—

A metal structure having a body which is of tubular form and rectangular in cross section and comprises a plurality of longitudinal bars each of which is arranged at one of the corners of the tubular body, and a plurality of oblique braces connecting adjacent longitudinal bars and forming open work panels on the several sides of the structure, all of said longitudinal bars and braces being constructed from a single sheet of metal which is slitted lengthwise in the areas forming the panels of the structure and in which the longitudinal bars are not stretched but the slitted areas are expanded in the plane of the sheet to stretch the braces and form openings therebetween, and one longitudinal edge portion of the sheet forming a marginal longitudinal bar of said sheet and the other longitudinal edge portion of the sheet forming marginal braces of the respective panel of the sheet, and said marginal bar and marginal braces being connected at one corner of the structure.

THOMAS H. McKAIG.