Sept. 22, 1936. J. B. STRAUSS 2,054,995

BRIDGE TOWER CONSTRUCTION

Filed March 2, 1935 2 Sheets-Sheet 1

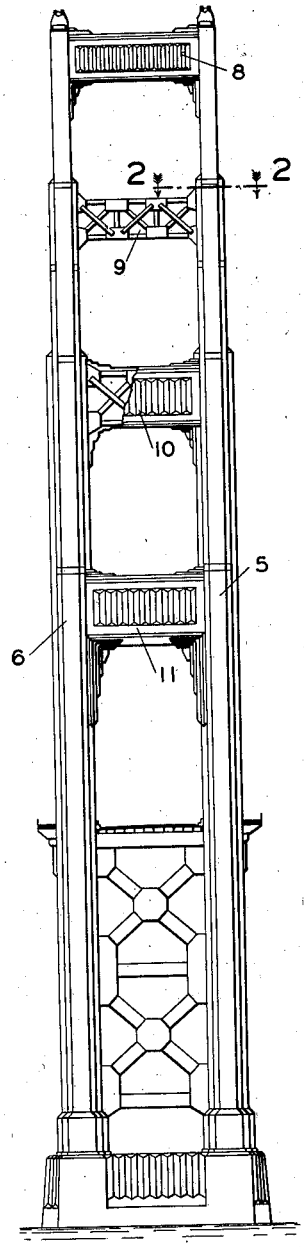

FIG. 1

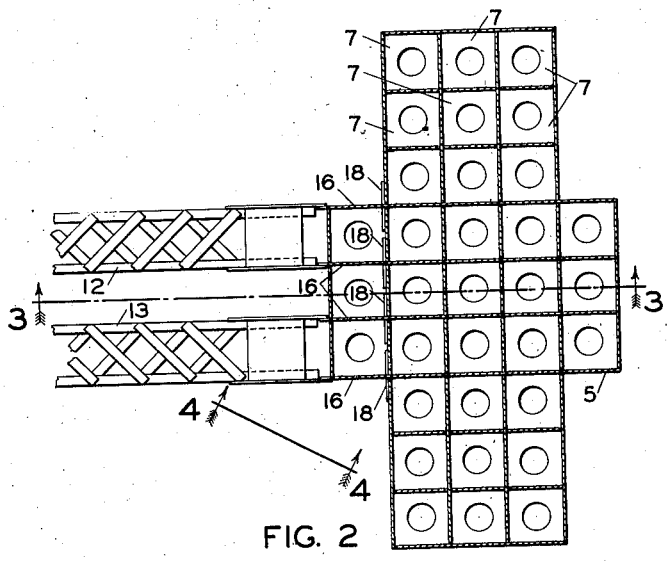

FIG. 2

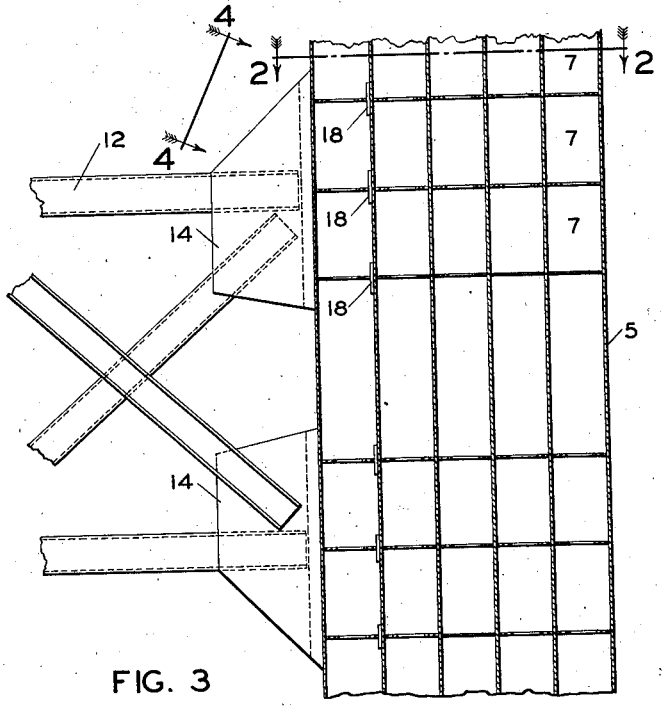

FIG. 3

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Fig. 4

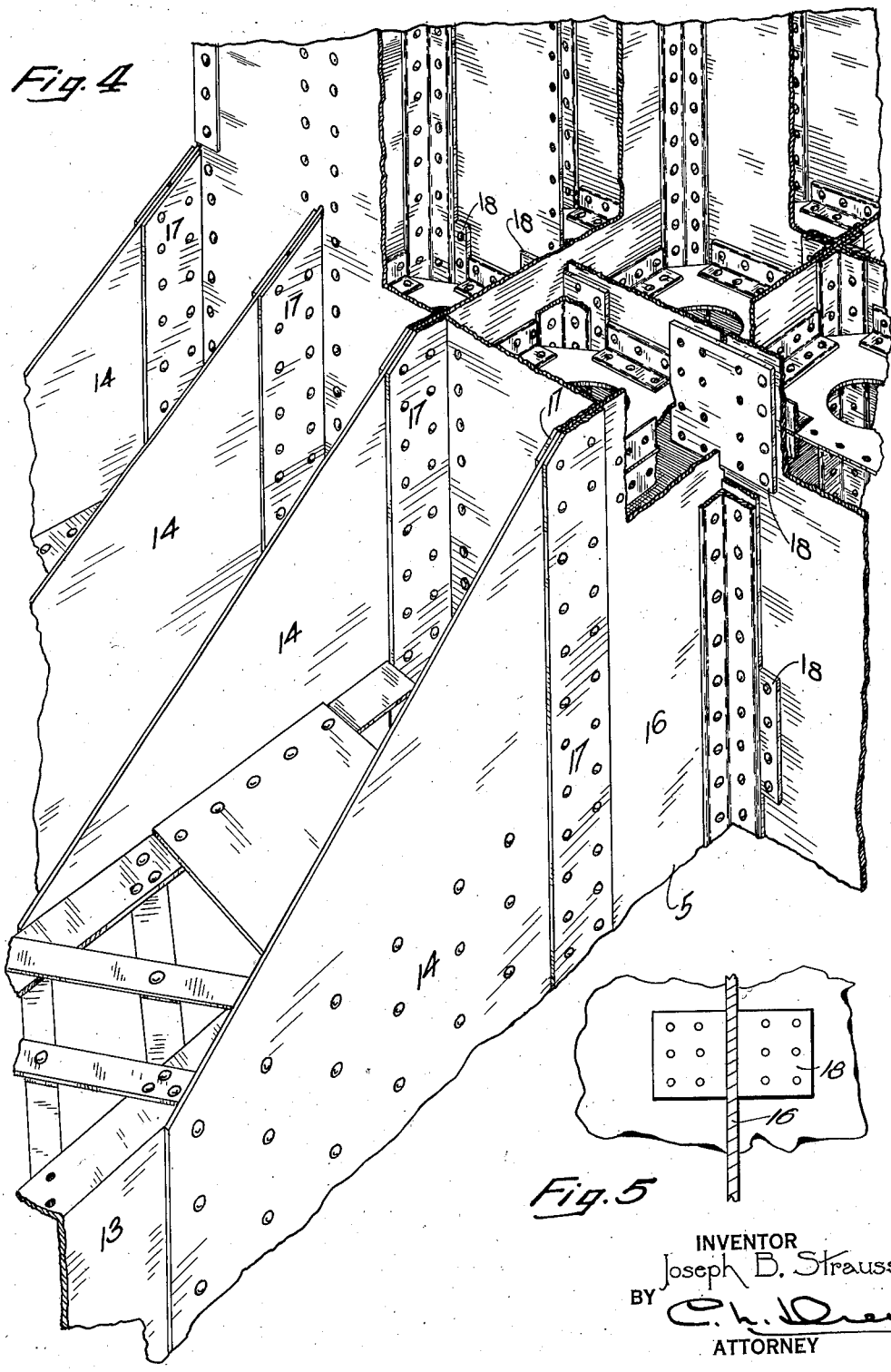

Fig. 5

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BRIDGE TOWER CONSTRUCTION

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Application March 2, 1935, Serial No. 9,047

4 Claims. (Cl. 14—21)

This invention relates to improvements in bridges and has particular reference to cross braces for the legs of the bridge tower.

The principal object of the invention is to provide means for connecting the cross bracing in such a manner as to distribute various stresses from the transverse members of the bridge tower to the cells composing the legs of the tower.

A further object is to produce a device of this character wherein the stresses will be transmitted both horizontally and laterally with respect to the transverse members without weakening the cellular construction at the point of connection.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is a side elevation of a bridge tower constructed in accordance with my invention,

Fig. 2 is an enlarged fragmentary cross sectional view on the line 2—2 of Fig. 1,

Fig. 3 is a cross sectional view taken on the line 3—3 of Fig. 2, and

Fig. 4 is a fragmentary perspective view partly in cross section and looking in the direction of the arrows 4—4 of Fig. 3.

Fig. 5 is a fragmentary detailed view showing the manner in which the tie plate is secured.

In building bridges it has been common to construct towers, which towers consist of a pair of spaced uprights or legs. These towers are usually connected together by lateral members commonly called cross braces. These cross braces are usually riveted to the uprights, and for ordinary small bridges sufficient strength is possible, but with exceedingly large bridges where great heights are necessary, it is very important that the cross braces shall be tied in to the legs of the tower in such a manner that the various stresses which may be caused by wind, earth shock and the like, will be properly dissipated throughout the entire structure so that no damage will occur to the bridge. I have, therefore, devised a means of tying the cross members into the legs of the tower in such a manner that no weakness will occur which might be detrimental and cause the bridge to be unsafe.

Referring to the drawings, it will be noted that the legs of my tower as a whole are designated by the numerals 5 and 6 and that each of the these legs is built up of a series of rectangular cells 7 arranged parallel with each other and one upon the other. This construction is covered in my Patent No. 1,967,381. Extending between the legs 5 and 6 are the transverse members 8, 9, 10, and 11. These transverse members are made up of preferably a series of parallel cross girders 12 and 13. These cross girders are in turn attached to gusset plates 14, which gusset plates are in turn secured to strain equalizer plates 16, which plates also form the side walls of the central cells. The gusset plates 14 are connected to these strain equalizer plates by overlapping joining plates 17, which are riveted as best shown in Fig. 4.

The construction thus far would only dissipate strains through the cells in a horizontal direction, as for instance, from right to left, or vice versa, as viewed in Fig. 2. In order to transmit the strains in a plane, at an angle of 90 degrees to the plates 16, it is necessary to tie the end cells of the tower leg to the central cells, but without weakening the structure. This I have accomplished by inserting tension plates 18 at spaced intervals through the plates 16. These plates are in turn riveted to the side walls of the adjacent cells and consequently when the plates 16 transmit strains from the tower to the transverse members, or vice versa, then these strains will be dissipated throughout all of the cells, which would not be possible without the employment of the plates 18, for the reason that the cells at the sides of the center portion of the tower would only be riveted to the cells in the center portion and consequently there would be a tendency for the rivet heads to pull off, while with my structure all of the strain upon the rivets holding the various cells together becomes a shearing strain, which the bolts or rivets are well able to stand. It is of great importance that in structures of great height, a certain resiliency must be provided but that the strains incident to this resiliency must be dissipated throughout the entire structure so that movement of the structure comes entirely from the resiliency of the material of the structure without causing undue strain at any particular point.

Referring to Fig. 1, it might be said that the only flexing of a tower of this character would be the movement of the top in bending toward or away from the observer. A side movement would be arrested by the cross pieces connecting the two legs of the tower. Now as these cross pieces are secured to the plates 16 all stresses tending to resist side sway will pass through these cross pieces and the plates 16, which plates are riveted to the center cells of the tower and so connected by the rivets that only a shearing action takes place, and while it is true that in the drawings

corner angles are shown, these angles are only used for building up the cell units in assembling and to keep out the weather when the cells are in assembled position in the towers. In order to provide for the flexing strain of the tower in the direction parallel to the bridge proper and to not introduce any pulling strain on the rivets connecting the cells in side to side relation and in a direction transverse to the plates **16** it is necessary to tie the sides of the cells that are on the same plane together through the plates **16**, and it is by the use of the plates **18** that I accomplish this tie. The plates **18** are riveted to the last mentioned sides of the cells and these rivets are under shearing strain when the tower flexes in the direction of the bridge proper. Therefore, it will be apparent that no matter in which direction the tower tends to move, the cells and connecting parts are held by rivets under a shearing strain only, thus taking off any tension strain which would otherwise be applied to rivets in the structure.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same and that various changes relative to the material, size, shape and arrangement of parts may be resorted to without departing from the spirit of the invention or scope of the subjoined claims.

Having thus described my invention, I claim:—

1. In a device of the character described, the combination of a pair of parallel cellular vertically disposed tower legs, transverse members connecting said legs at intervals, said transverse members comprising a plurality of cross girders centrally connected to said tower legs, and means for distributing stresses from the cells of said tower legs to the transverse members, whereby said tower legs and said transverse members act as a unit for distributing stresses.

2. In a device of the character described, the combination of a pair of parallel cellular vertically disposed tower legs, transverse members connecting said legs at intervals, said transverse members comprising a plurality of cross girders centrally connected to said tower legs, means for distributing stresses from the cells of said tower legs to the transverse members, whereby said tower legs and said transverse members act as a unit for distributing stresses, said means comprising a series of vertically disposed plates connecting the adjacent tower cells together, said plates being connected to said transverse members.

3. In a device of the character described, the combination of a pair of parallel cellular vertically disposed tower legs, transverse members connecting said legs at intervals, said transverse members comprising a plurality of cross girders centrally connected to said tower legs, means for distributing stresses from the cells of said tower legs to the transverse members, whereby said tower legs and said transverse members act as a unit for distributing stresses, said means comprising a series of vertically disposed plates connecting the adjacent tower cells together, said plates being connected to said transverse members, and tension plates extending through said last mentioned plates and connecting the adjacent cell sections one to the other.

4. In a bridge tower, a pair of spaced parallel legs, each of said legs including a plurality of vertically and horizontally disposed cell sections secured one to the other so as to form a unitary structure, transverse members spaced at intervals between said tower legs, plates connecting the adjacent faces of said tower legs with said transverse member, said plates extending between the centrally disposed cells of said legs, and tension plates disposed at right angles to said first mentioned plates and extending therethrough, said tension plates being connected to their engaging cell structure.

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