H. C. BRUNDAGE.

Truss Bridge.

3 Sheets—Sheet 1.

No. 100,254.

Patented March 1, 1870.

Fig. 1.

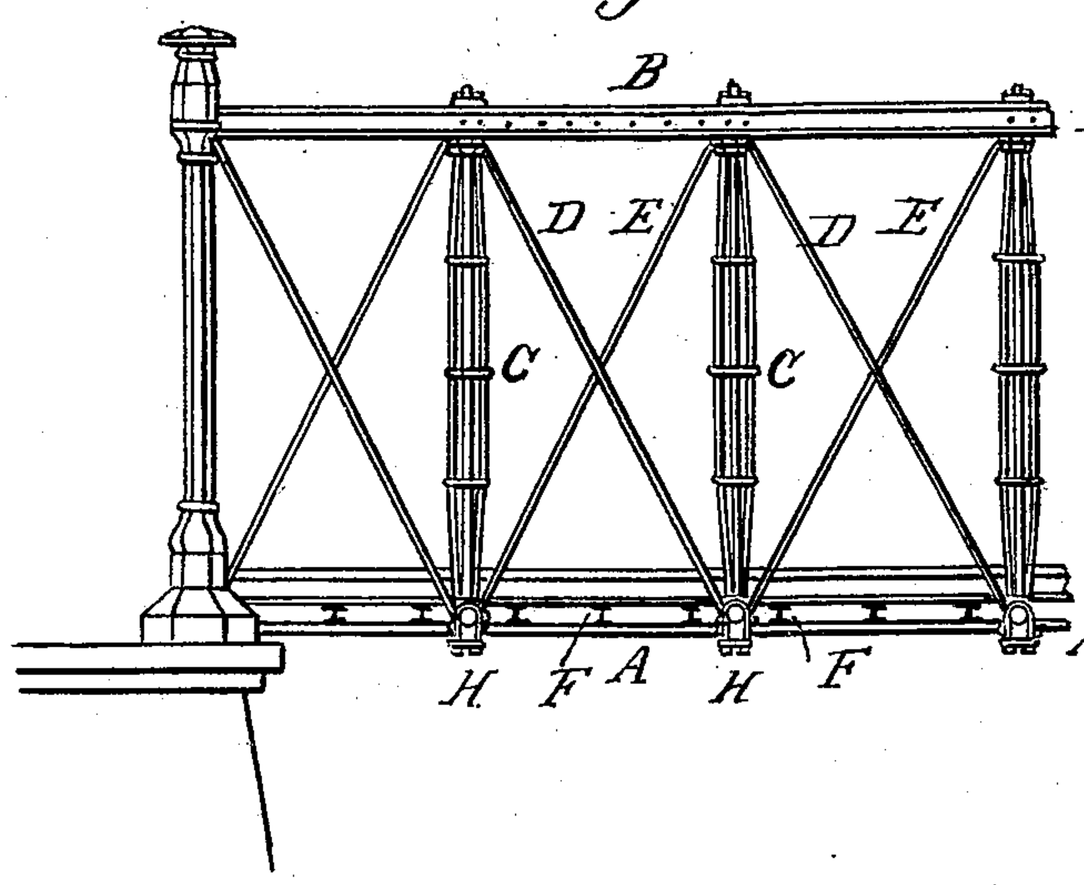


Fig. 2.

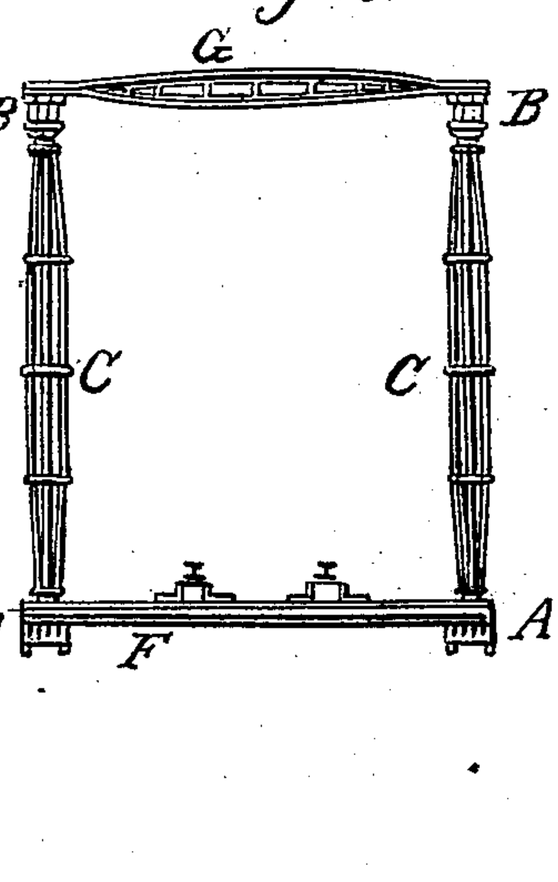


Fig. 3.

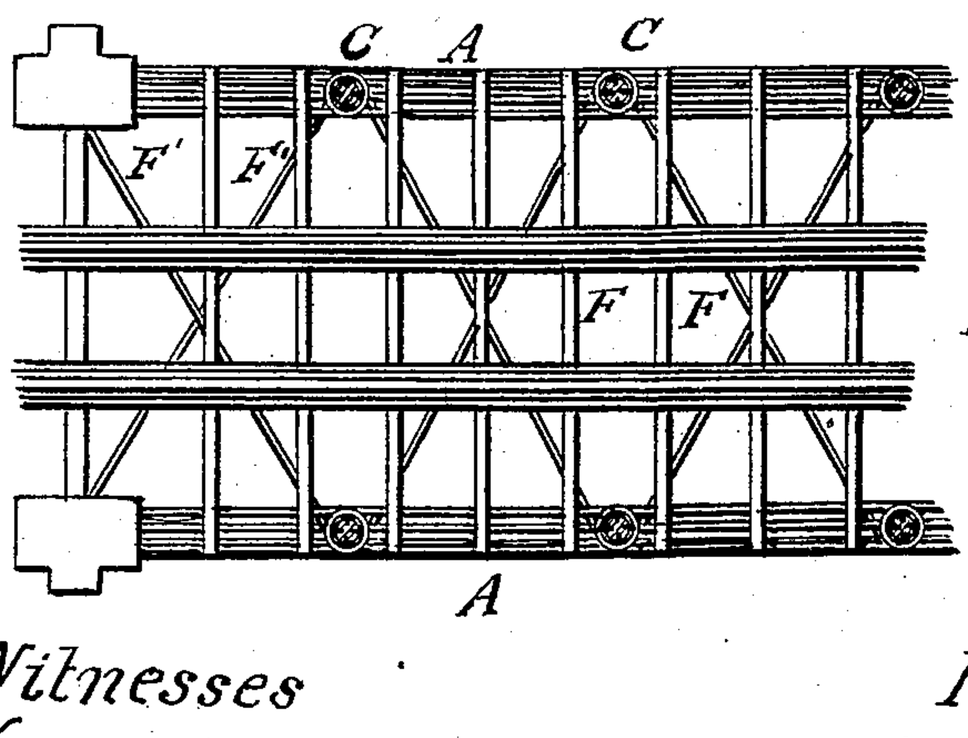
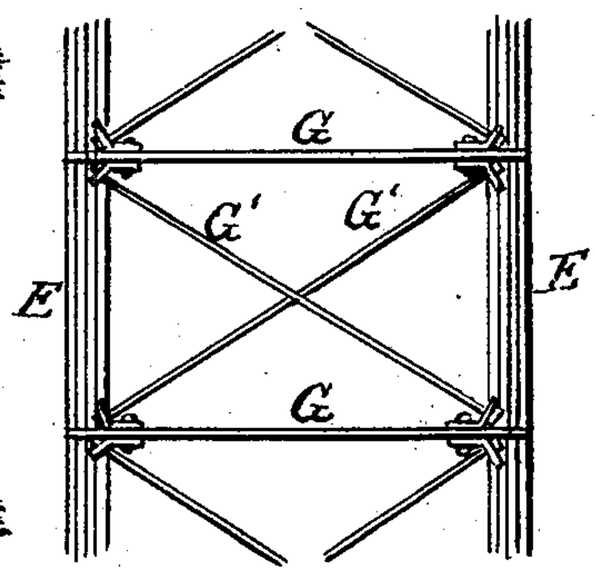


Fig. 4.



Witnesses

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3 Sheets—Sheet 2.

H. C. BRUNDAGE.

Truss Bridge.

No. 100,254. Patented March 1, 1870.

Fig. 5.

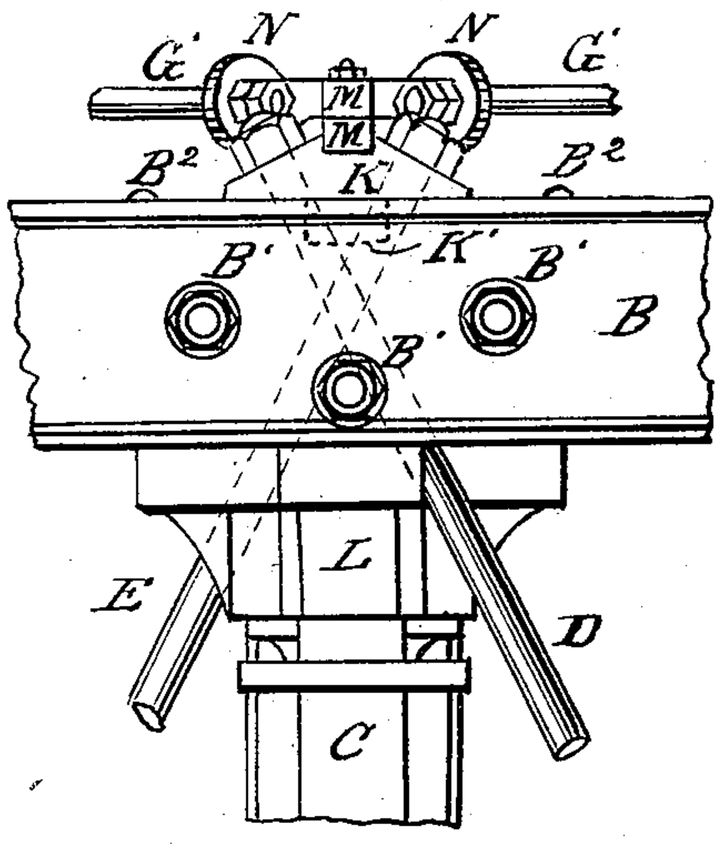


Fig. 6.

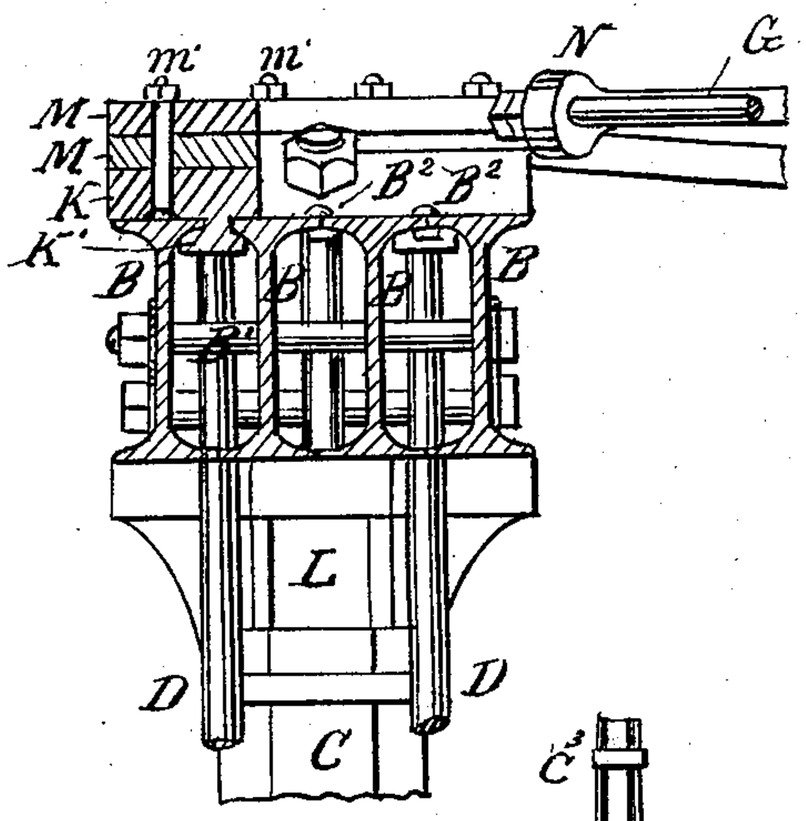


Fig. 7.

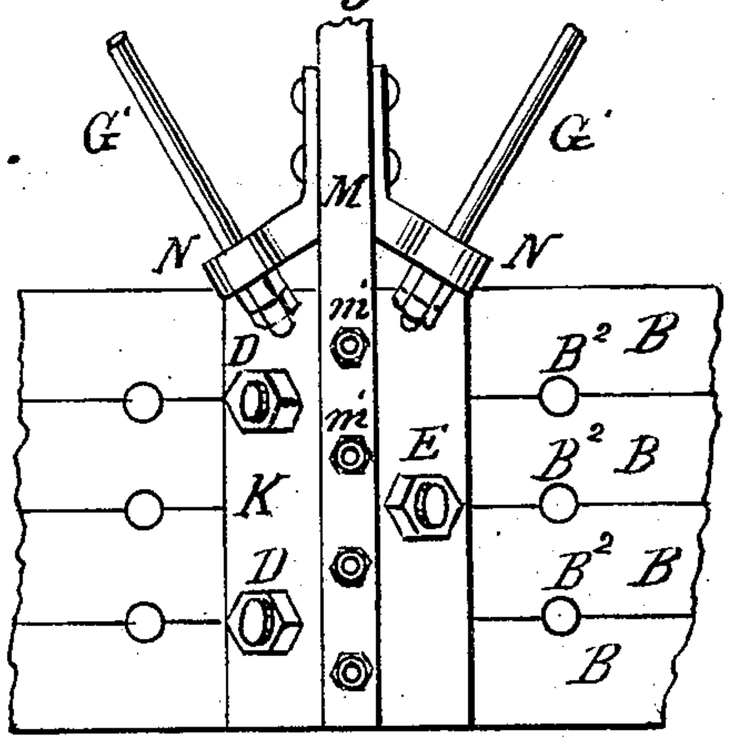


Fig. 8.

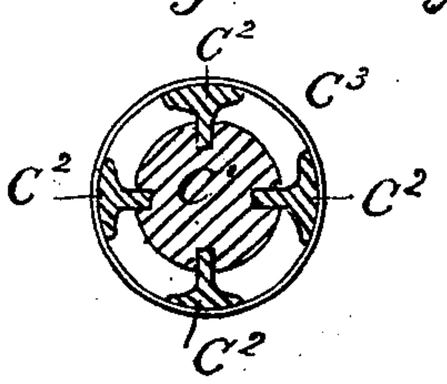
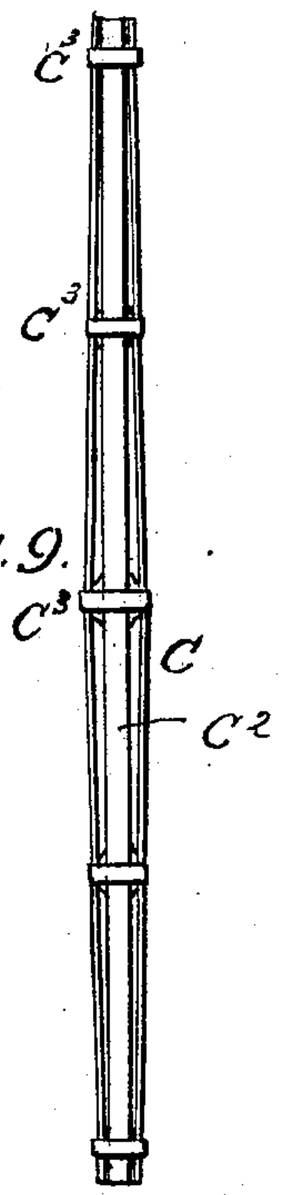


Fig. 9.



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3 Sheets—Sheet 3.

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Truss Bridge.

No. 100,254. Patented March 1, 1870.

Fig. 10.

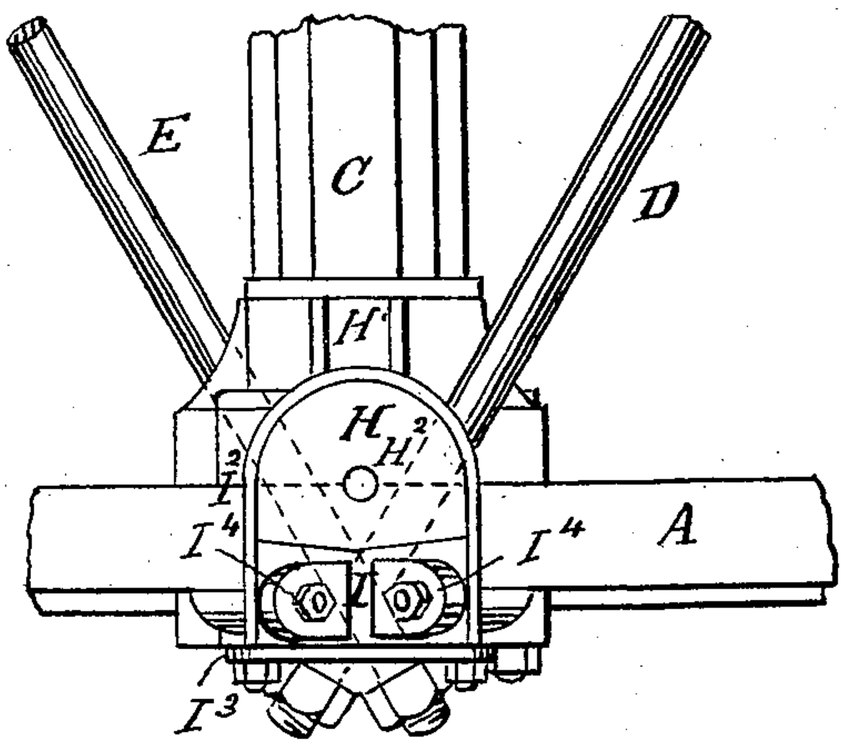


Fig. 11.

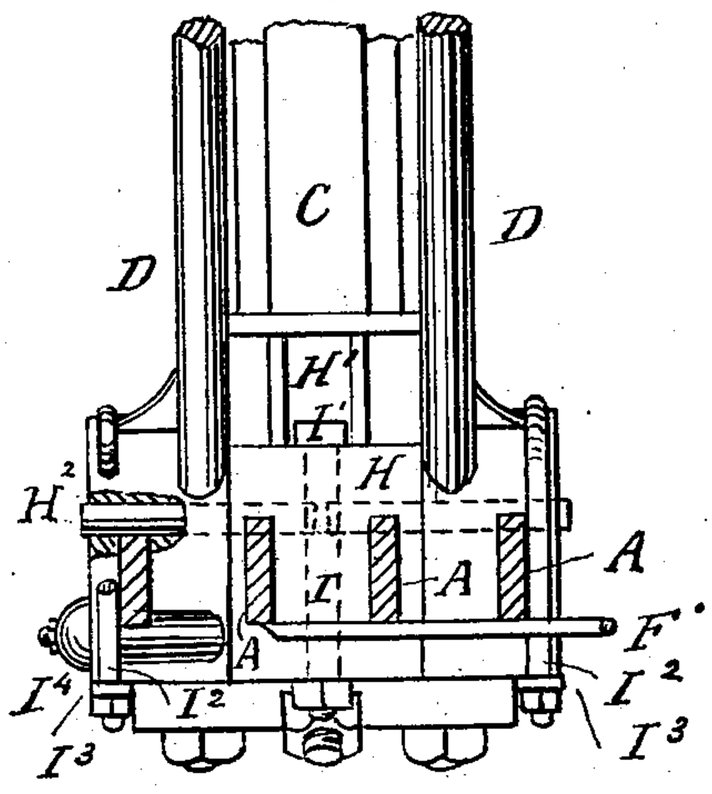
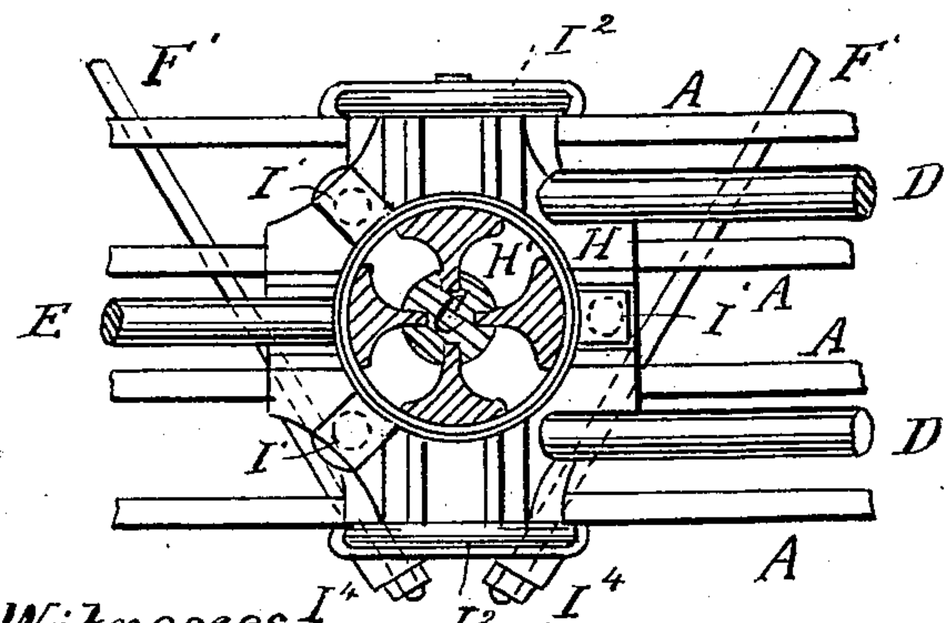


Fig. 12.



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United States Patent Office.

HENRY C. BRUNDAGE, OF BUFFALO, NEW YORK.

Letters Patent No. 100,254, *dated March* 1, 1870.

IMPROVEMENT IN IRON BRIDGES.

The Schedule referred to in these Letters Patent and making part of the same

I, HENRY C. BRUNDAGE, of the city of Buffalo, in the county of Erie, and State of New York, have invented certain Improvements in Iron Bridges, of which the following is a specification.

My improvements relate to the means for uniting in trussed bridges, the panel-posts, and diagonal tension and counter-tension rods to the upper and lower chords, and also to the construction of the panel-posts and upper chords.

The nature of my invention consists—

First, in the use, in connection with the combined bearing and angle block, of a key inserted in a seat cut partially in the upper side of the chord and partially in the bearing block, to hold the latter against longitudinal movement upon the chord.

Second, in constructing a top chord by uniting two or more I-beams, placed side by side with their flanges in contact, by means of lateral bolts passing through their webs, and rivets passing through their contiguous flanges, so that both lateral and vertical flexure of one beam without the others is prevented, thus adding to the strength and rigidity of the chord.

Third, in providing the top chord angle blocks, which receive the diagonal tension rods, with lugs projecting from their under sides into two corresponding recesses cut in the contiguous flanges of the chord beams, thereby securing them against longitudinal movement on the chords.

Fourth, in providing said angle blocks with seats so receive the ends of the upper tie-beams, and securing them together by bolts with countersunk heads inserted from the under side of the blocks, the same being a simple, convenient, and strong mode of fastening.

Fifth, in constructing panel-posts or columns of T-shaped bars of wrought, combined with a central core of cast-iron, the webs of the T-bars fitting in longitudinal grooves in the core, and the parts being bound together by hoops applied at proper intervals, which construction secures graceful appearance, lightness, and strength.

In the accompanying drawings, forming part of this specification—

Figure I is a side elevation of several panels of an iron-truss bridge, embodying my said improvements.

Figure II is a cross sectional elevation thereof.

Figure III is a plan of lower chords and floor-beams.

Figure IV is a plan of upper chords and tie-beams.

Figure V is a side elevation of a portion of top chord, panel-post, and diagonal tension rods.

Figure VI is an elevation of same, taken at right angles to Fig. V, and

Figure VII is a plan of same.

Figure VIII is a cross-section of panel-post or column, and

Figure IX is an elevation of same.

Figure X is a side elevation of a portion of lower chord, panel-post, and diagonal tension rods.

Figure XI is an elevation of same, taken at right angles to Fig. X.

Figure XII is a plan of same.

Like letters refer to like parts in each of the figures.

A A are the lower chords; B B, the upper chords; C C, the panel-posts; D D, the principal diagonal tension rods; E E, the counter tension rods, all together constituting a truss-frame, embodying common and well-known principles in bridge construction.

F F are the floor-beams resting on the lower chords and spanning the space between the side trusses, and supporting the roadway.

G G are the tie-beams uniting the top chords.

F′ F′ are the lower, and G′ G′ the upper lateral tension rods, which give lateral stiffness to the structure.

H H are the bearing blocks applied to the lower chords to receive the panel-posts. Each block is provided with a socket, H′, into which the end of the post fits, and has longitudinal grooves on the under side, which fit the several bars A A forming the lower chord. These bars may be two or more in number, and are placed side by side, but with sufficient space between them for the passage of the diagonal tension rods. The grooves in the bearing blocks maintain the proper intervals between the chord bars, and at the same time retain the blocks against lateral movement upon the chord.

I I are the angle blocks applied to the chords, immediately under the bearing blocks. Each block is grooved to fit the chord bars, the same as the bearing blocks, and is united to its corresponding bearing block by through bolts I^1, which serve, also, to clamp them both firmly to the chord bars. As a further means of uniting the bearing and angle blocks, yoke-bolts I^2 and cross-bars I^3 are applied to the ends thereof, as represented. The particular arrangement of the bolts I^1 I^2 are not essential, further than they should firmly unite the parts.

The diagonal tension rods D D and counter rods E pass obliquely through the bearing and angle blocks and between the chord bars, crossing each other in their passage, and have nuts on their projecting ends which bear against the angle faces of the blocks, and transmit to the rods their appropriate strains.

Each angle block I is further provided with angle faces I^4 on its outside, from which extend oblique holes for the reception of the lateral tension rods F′ F′, passing just below the chord bars.

The securing nuts are thus brought upon the outside, where they are conveniently accessible, and the desired connection is obtained in the cheapest and most simple manner.

H^2 is the retaining key, inserted between each bearing block and the chord, its seat being cut partially in the block and partially in the chord bars. The union of the bearing and angle blocks enables these keys to be driven tightly into place, thereby rigidly securing said blocks against longitudinal movement on the chord, which is very important to the security of the structure.

The upper chords shown at B B are each composed of two or more I-beams, placed side by side, (see Figs. VI and VII,) with their contiguous flanges in contact. They are held together laterally by bolts B^1 passing through their webs at intervals, and drawing their flanges tightly together.

Rivets B^2 are also inserted through holes formed by semicircular notches cut in the adjacent flanges, by which means each beam is secured against vertical flexure without the others, and the greatest possible strength and rigidity in the chord obtained.

K K are the angle blocks applied to the top chords, one over each panel-post.

The tension rods D D and E pass through the upper chord, between the webs of I-beams, and crossing each other, are secured to the angle block by nuts, the same as to the lower angle blocks. The flanges of the chord beams are notched for the passage of the tension rods through them.

Lugs K′ are cast on the under sides of the angle blocks, and corresponding recesses are cut in the flanges of the beams to receive them, thereby preventing longitudinal movement of the blocks upon the chords.

L L are the upper chord-bearing blocks or capitals of the panel-posts. Each block is socketed to receive its post, the same as the lower block, and is held in place on the chord by lugs, the same as the angle blocks K, or by bolts screwing into the chord. The tension rods B, D, and E also pass through it, and serve to retain it in place.

M M are the upper tie-beams. They are formed of two bars of wrought-iron, joined at the ends, but spread at the center by a skeleton frame of cast-iron inserted between them, to give them lateral stiffness. Each angle block K has a grooved seat, to receive the ends of its tie-beam, and the beam and block are united by the bolts *m′*, inserted from the bottom, before the angle blocks are applied to the chord, and having countersunk heads, as shown, so as not to interfere with the perfect seating of the blocks on the chords.

N are angle lugs bolted to the sides of the tie-beams, near their ends. These lugs receive and secure the ends of the lateral tension rods G′ G′.

The panel-posts C are composed of the central cast-iron core C^1 and wrought-iron T-bars C^2. These bars may be three or more in number, and are disposed about the center core at regular intervals with their webs radiating from the center, and their flanges to the outside. Longitudinal grooves are cut in the center core, to receive the webs of the T-bars, by which means they are held against lateral movement, and wrought-iron hoops C^3 are applied at intervals to bind the parts together, and secure the bars against radial movement. The core is enlarged at the center, and gradually tapers to the ends, and the T-irons are made to follow this form by the banding hoops, so that great stiffness against flexure is secured. At the points where the hoops are applied the core is enlarged, so as to entirely fill the spaces between the T-bars to a full circular section, and the same at the ends. The core may be made cylindrical in cross-section, and either hollow or solid.

This mode of combining the two materials makes the column easy of construction, light and strong, and symmetrical in appearance, and well adapted not only for use in bridges, but for many purposes for which columns are employed.

I claim, as my invention—

1. The key H^2, in combination with the united bearing and angle blocks and chord bars, substantially as hereinbefore described.

2. A compression or top chord composed of I-beams, united by lateral bolts B^1 and rivets B^2, as hereinbefore described.

3. The arrangement of the angle-bearing block K, with its lugs K′ and the diagonal rods D and E, passing through the notched flanges of the upper chord beams and the column capital L, substantially as hereinbefore set forth.

4. The grooved seat and countersunk bolts *m′*, as a means of uniting tie-beams M and angle blocks K K.

5. The combination of center core C^1, of cast-iron, with T-bars C^2 of wrought-iron and banding hoops C^3, to constitute a post or column, in the manner substantially as hereinbefore set forth.

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