

No. 621,672.

Patented Mar. 21, 1899.

C. M. HORTON.
BRIDGE CONSTRUCTION.

(Application filed May 3, 1898.)

(No Model.)

5 Sheets—Sheet 1.

Fig. 1.

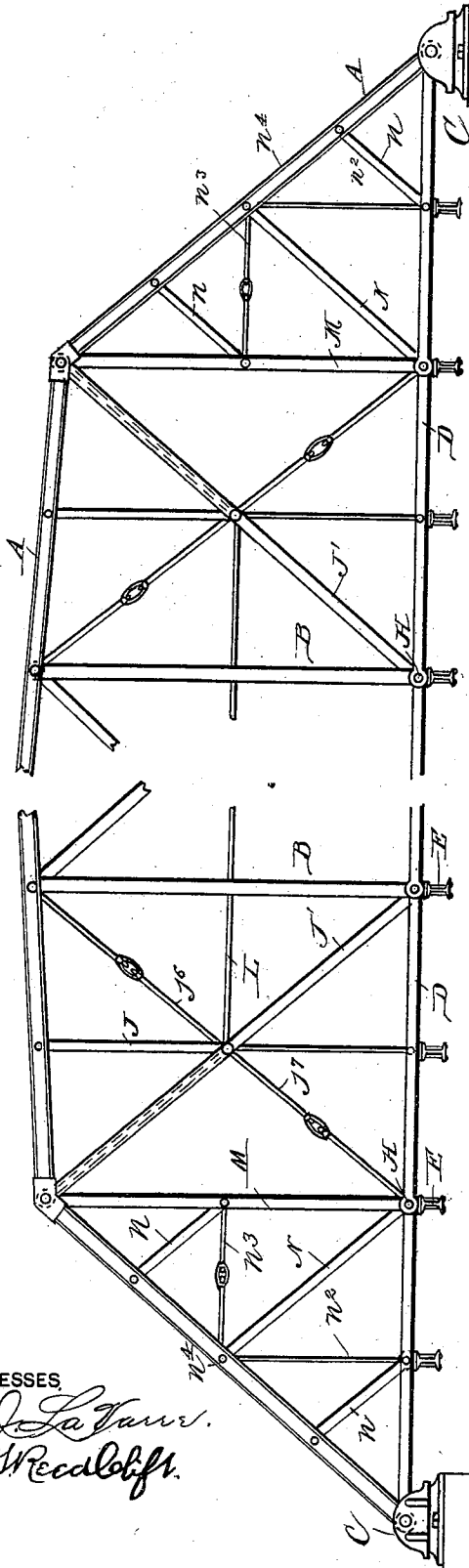
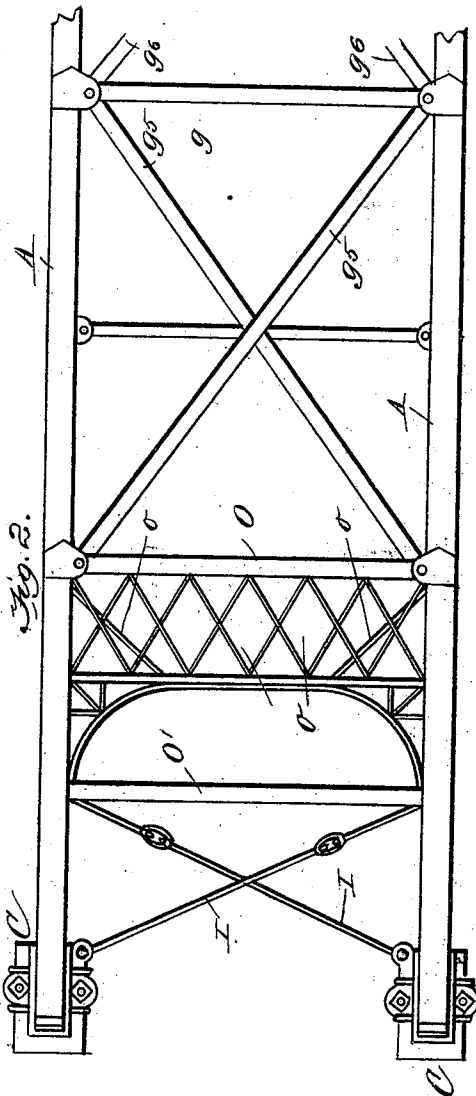


Fig. 2.



WITNESSES

W. J. La Fave.
W. Recalabft.

INVENTOR

Charles M. Horton
by his Atty
Wm. J. La Fave

No. 621,672.

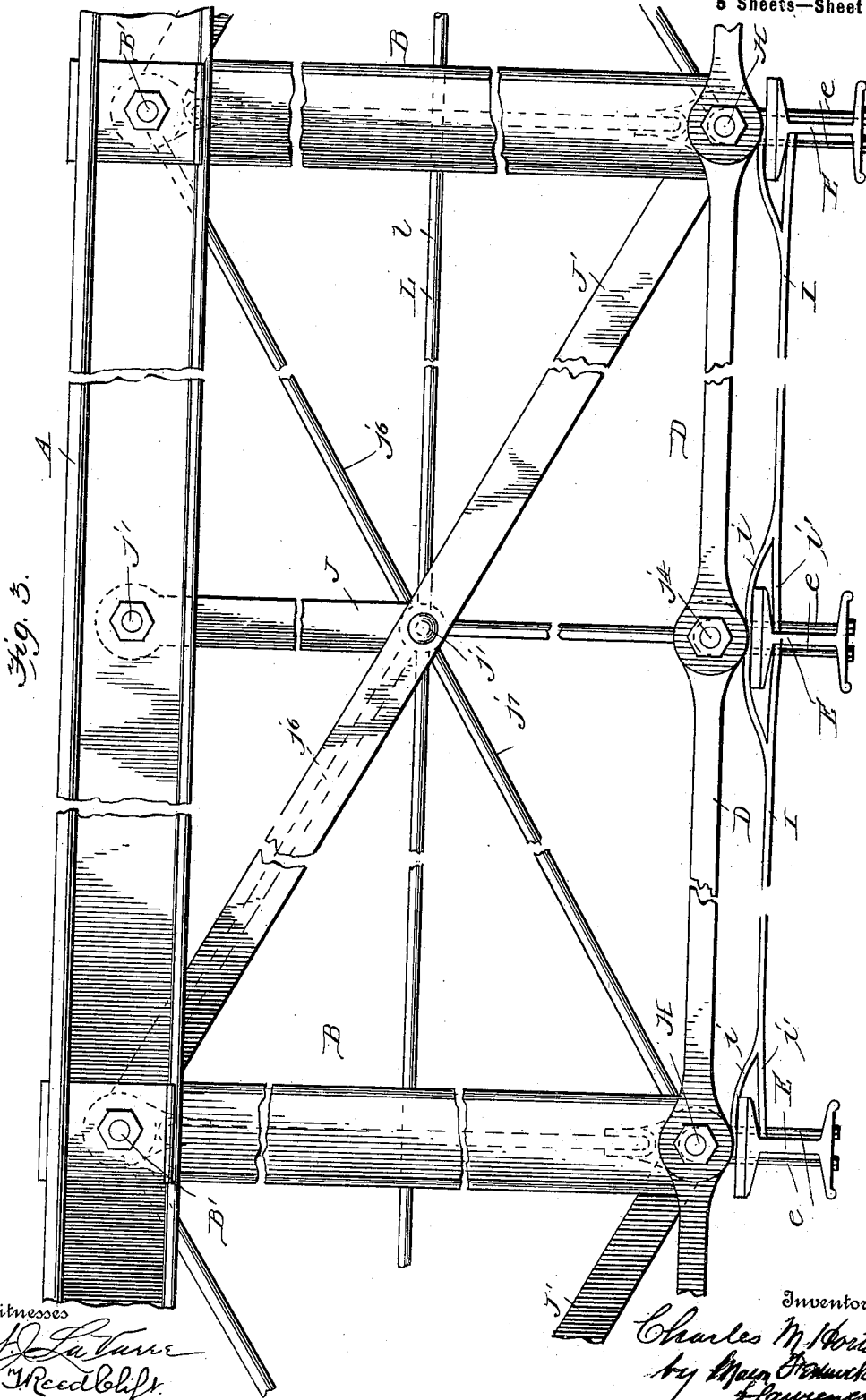
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5 Sheets—Sheet 2.



Witnesses

J. L. Lauer
W. Reedbliss

Inventor

Charles M. Horton
by *May B. Mumuck*
Lawrence
his Attorneys

No. 621,672.

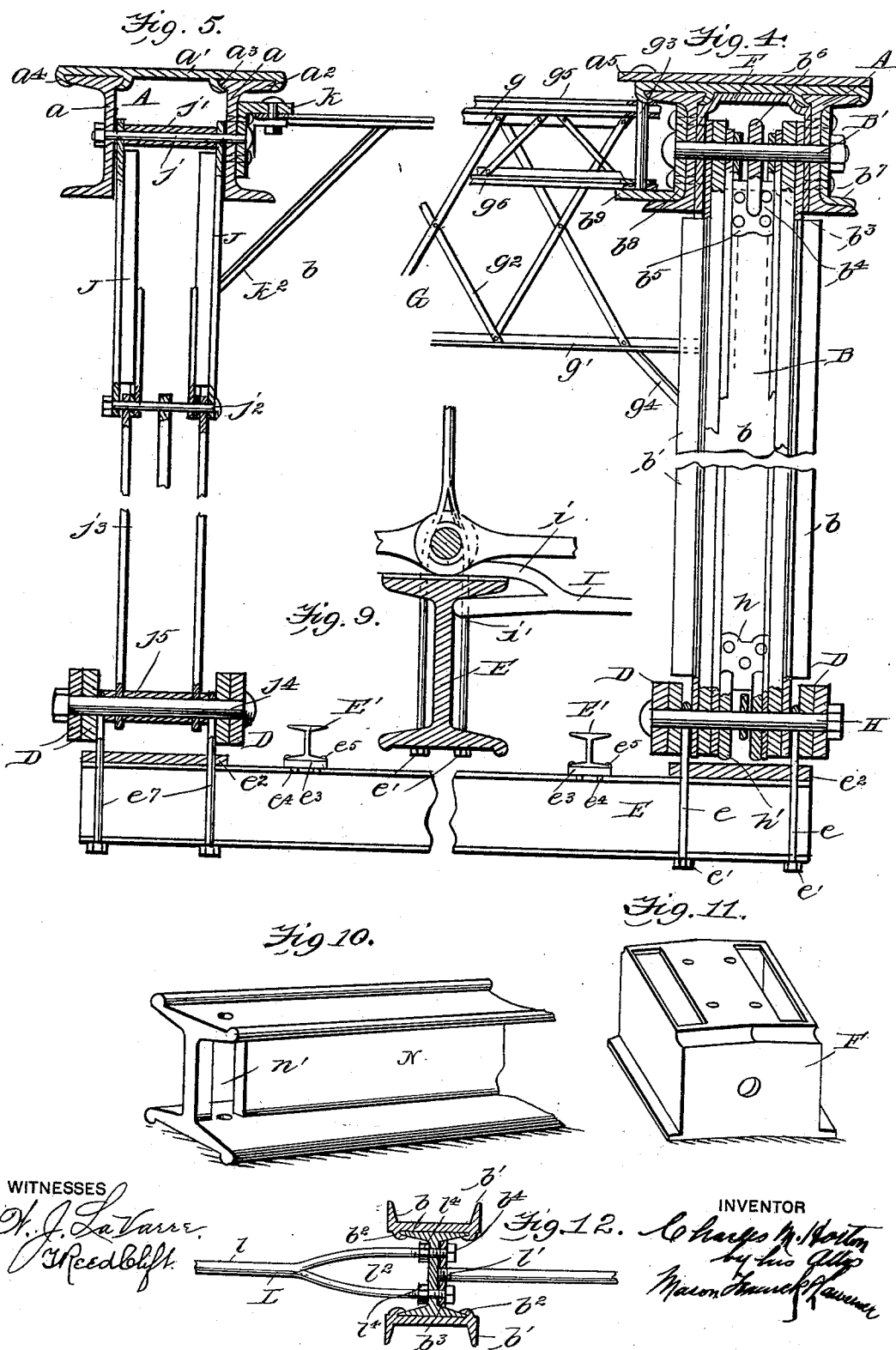
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(No Model.)

5 Sheets—Sheet 3.



WITNESSES

H. J. LaVarr.
W. Reedbliff

INVENTOR

Charles M. Horton
by his atty
Mason Hancock

No. 621,672.

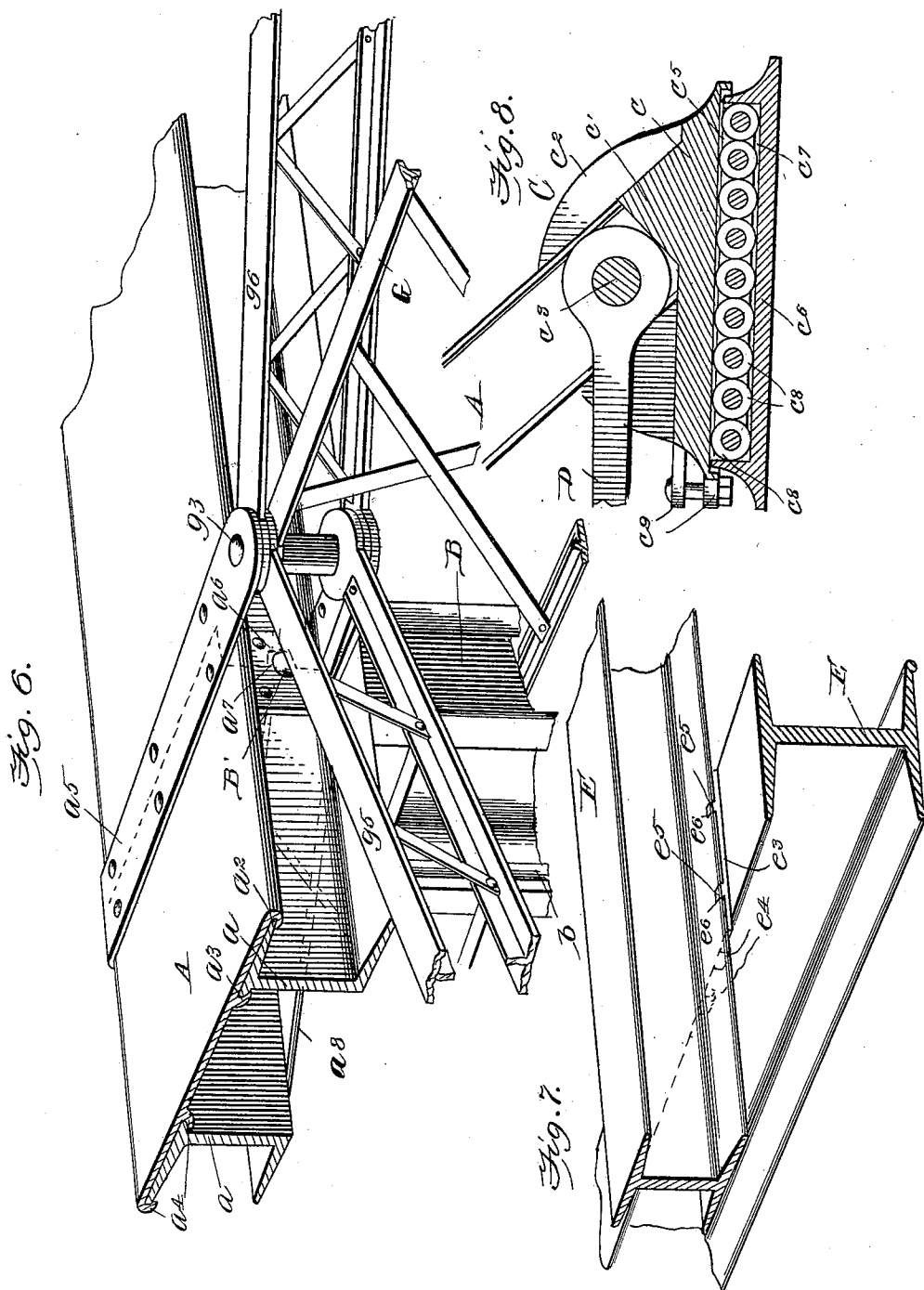
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(Application filed May 3, 1898.)

(No Model.)

5 Sheets—Sheet 4.



WITNESSES

H. L. Lamm
W. C. Read

INVENTOR

Charles M. Horton
by his Atty
Marion Fennick Lawrence

No. 621,672.

Patented Mar. 21, 1899.

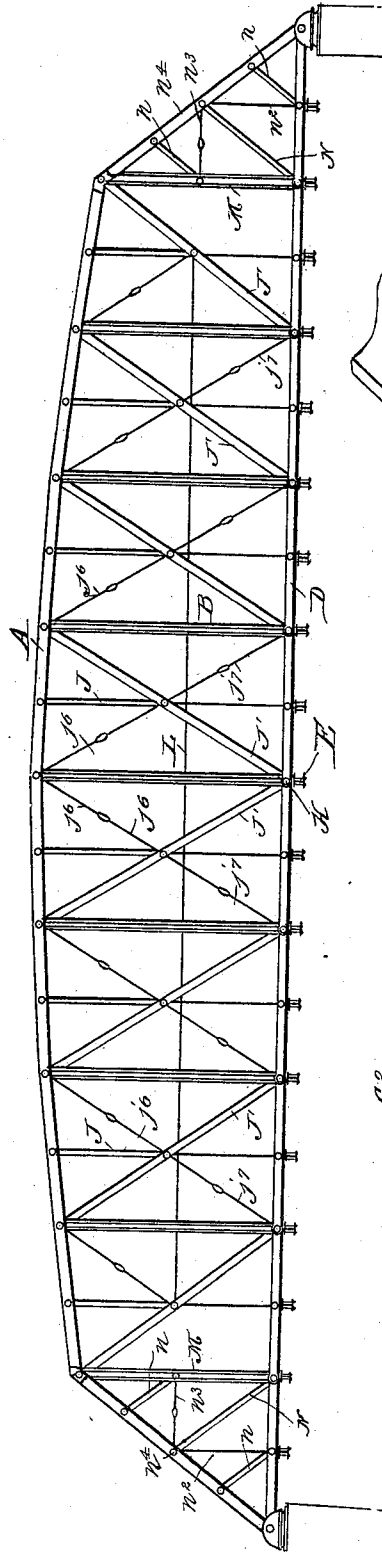
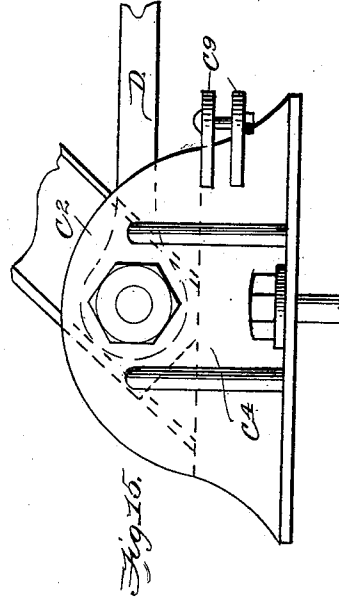
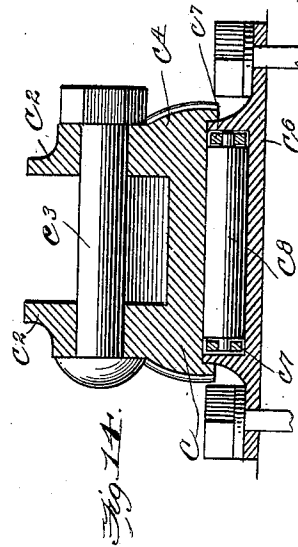
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(No Model.)

5 Sheets—Sheet 5.

Fig. 13.



Witnesses
H. L. L. L.
M. Reedblift

Inventor
Charles M. Horton
by *Angus Frank*
Hansen
his Attorney

UNITED STATES PATENT OFFICE.

CHARLES M. HORTON, OF SUPERIOR, WISCONSIN.

BRIDGE CONSTRUCTION.

SPECIFICATION forming part of Letters Patent No. 621,672, dated March 21, 1899.

Application filed May 3, 1898. Serial No. 679,614. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. HORTON, a citizen of the United States, residing at Superior, in the county of Douglas and State of Wisconsin, have invented certain new and useful Improvements in Bridge Construction; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in bridges, and has for its object the construction of bridge structures employing members which may be joined together without puncturing the metal to any great extent, thereby preserving the approximate full strength and efficiency of unpunctured metal.

It consists, in a bridge structure formed with suitable panel-posts and floor-beams, of a top chord-beam comprising longitudinal beams bound together by a longitudinal plate or bar having ribs thereon, the said ribs being rolled upon the flanges of the said beams for binding the parts together to form a box-beam, and means for bracing the parts together.

It also consists in certain other novel constructions, combinations, and arrangements of parts, as will be hereinafter described and claimed.

In the accompanying drawings, Figure 1 represents a side elevation of a bridge structure formed in accordance with my invention, the central portion of the said structure being broken away. Fig. 2 represents a top plan view of one end of the said structure. Fig. 3 represents a side elevation of a portion of my improved bridge structure, showing the arrangement of the main panel-posts and the intermediate panel-posts and connecting-braces. Fig. 4 represents a vertical section through one of the main panel-posts, the parts of the structure being shown in elevation. Fig. 5 shows a similar sectional view through one of the intermediate posts. Fig. 6 represents a perspective view of a portion of a top chord-beam, showing the diagonal braces and clip used at the top of one of the main panel-posts. Fig. 7 represents a perspective view showing the manner in which the stringer-beams are secured to the floor-girders. Fig. 8 represents a vertical longitudinal section

through one of the foot-boxes for receiving the shore ends of the top chord-beams. Fig. 9 represents a detail sectional view through one of the floor-girders, showing the manner of suspending the same to one of the intermediate posts and also showing one of the diagonal floor-braces. Fig. 10 represents a detail perspective view of a tie beam or member, showing the manner in which the securing-bolt is adapted to pass through the same. Fig. 11 represents a perspective view of a stiffening box-brace for use interiorly of the top chord-beams. Fig. 12 represents a horizontal sectional view through one of the main panel-posts, showing how the longitudinal tension-rods are secured thereto. Fig. 13 represents a reduced side elevation of a bridge-span, illustrating the general arrangement of the top and bottom cross and bracing bars and rods. Fig. 14 represents a transverse vertical section through a foot-box for receiving the shore end of the top chord-beam, and Fig. 15 represents a side elevation of a modified form of foot-box.

In the drawings, A represents a top chord-beam. B represents main panel-posts; C, foot-boxes for receiving the shore ends of the chord-beams; D, bottom chord-bars, and E floor-girders.

In constructing bridges I find that it is advisable to do away with the necessity of perforating the main bridge-irons as much as possible, as the perforation of the metal tends greatly to weaken the same.

In carrying out the feature I construct the top chord-beams preferably of box-beams comprising channel bars or irons $a a$, which are held together by means of channel plates or bars, as a' . The upper edges of the channel-irons $a a$ are preferably provided with outer flanges a^2 and inner smaller flanges a^3 . The channel or binding plate a' is provided with longitudinally-arranged lugs or ribs, as $a^4 a^4$, which form channels upon the plate a' and are adapted to receive the flanges of the beams $a a$. The members are preferably applied together when the channel-plate is hot, and the beams are then passed through rolls, and the flanges or ribs $a^4 a^4$ are rolled down while in a heated condition upon the flanges $a^2 a^3$ of the beams $a a$. By this method I am enabled to produce a box-beam which is joined

together throughout without the use of bolts or perforating-ribs. In applying these box-beams to bridge constructions I preferably use them as top chord-beams and arrange them so that the binding or channel plates a' will be on top, leaving the space between the beams a open at the bottom. The top chord-beams may be made in sections of any desired length, and of course where the span is a very short one they may be made of one piece; but where the bridge-span is of great length it is preferable to form the top chord-beams of a number of box-beams placed end to end. The meeting ends of the said top chord-beams fit snugly against each other and are held together by means of clips or splicing-plates, as a^5 . The clip or splicing-plate a^5 is preferably made of sufficient width to extend over both meeting ends of the top chord-beams and is preferably bolted to both of them. The inner ends of the splicing-plates are preferably extended beyond the edge of the top chord-beams for supporting diagonal and cross bracing, as will be hereinafter described. The meeting ends of the top chord-beams which support the main panel-posts may be provided with a socket, as at a^6 , and a tongue or projection, as at a^7 , adapted to fit in the said recess or socket a^6 . This provides a good bearing, as shown in Fig. 6 of the drawings, for the lateral supporting-bolt which holds the upper end of the panel-post. The beams a of the top chord-beams may be laterally braced, if desired, by means of diagonal lattice-work, as shown at a^8 in the drawings. The shore-sections of the top chord-beam are preferably inclined, as shown in Fig. 1 of the drawings, the lower ends of the said shore-beams being received and supported by the foot-boxes C. These foot-boxes each comprise a base-plate, as c , having an abutment or shoulder, as c' , formed thereon, and side walls c^2 , which extend upwardly upon either side of the lower end of the chord-beam and prevent its lateral movement. A bolt or pin, as c^3 , passes through the side lugs or walls c^2 and the lower end of the top chord-beam for securing the latter in place. The side walls or legs c^2 are strengthened by a central abutment, as at c^4 , which tapers from the base upwardly, as shown in Fig. 14 of the drawings. The base-plate c is provided with a recess, as at c^5 , upon its under side, which is adapted to inclose a supporting-base, as at c^6 . This supporting-base c^6 comprises, preferably, a plate having a central cavity, as c^7 , upon its upper side, adapted to receive a series of rollers, as c^8 c^8 . The rollers are of sufficient diameter to extend above the upper edge of the supporting-base c^6 and to receive the weight of the foot-boxes C. These rollers are preferably spaced apart, so as not to touch each other, by means of connecting-plates C' , having suitable bearings, which engage journals, as C^2 , upon the opposite ends of each roller, as clearly seen in Figs. 8 and 14 of the drawings. The over-

hanging flange of the foot-boxes completely incloses the upper edge of the supporting-base, so that water or ice cannot get to the bearing-rollers or the cavity in which they are placed. The base c^6 is adapted to be bolted to masonry or other such support by means of bolts or in any other suitable manner. Each of the boxes C is provided with parallel lugs or lips, as c^9 , which are adapted to receive the diagonal floor-braces of the bridge structure, as will be hereinafter described.

At suitable intervals along the span main panel-posts are suspended from the top chord-beam, as at B B. These panel-posts B may be made of any suitable T or channel irons; but I preferably form them of structural beams, as illustrated in Fig. 12 of the drawings. Each of these structural beams comprises a central I-beam, as b , having channel-irons, as b' , secured to its flanges. The channel plates or bars b' are provided with flanges or ribs, as b^2 , forming channels upon the faces of the said plates, which are adapted to receive the flanges of the I-beam b . These flanges or ribs are rolled upon the edges of the I-beam, preferably while in a heated condition, so as to securely fasten them to said beam and make the structure practically an integral one without the use of bolts or rivets. As shown in Fig. 4 of the drawings, the upper end of each panel-post B has its web portion cut away, as at b^3 , the channel-irons forming a portion of the said beams also being cut away to a point below the lower edge of the top chord-beam. The upper end of the beam thus prepared is inserted into the opening or groove upon the under side of the top chord-beam and a supporting-bolt, as B' , is passed through the flanges of the I-beam b and through the webs of the top chord-beam. In order to further support the panel-posts B upon the bolt or rivet B' , a clip, as b^4 , adapted to receive between its flanges b^5 the web of the panel-posts, is secured thereto by means of bolts or rivets. The clip b^4 is also provided with an upwardly-extending eye portion, as b^6 , through which the bolt B' also extends. It will thus be seen that the panel-post is firmly secured to the top chord-beam. Sufficient room still remains between the eye b^6 and the flanges of the panel-post to permit of the diagonal brace rods and bars being also secured upon the said bolt B' . At this point in the top chord-beam I also preferably apply a stiffening-box, as F, which is formed of such a contour as to fit snugly into the inner face of the top chord-beam, as seen in Fig. 4 of the drawings. This stiffening plate or box is also illustrated in perspective in Fig. 11 of the drawings. The bolt B' passes through the walls of the stiffening-box F and holds the same in position. The stiffening-box F is also preferably applied at all points in the top chord-beam where the sections thereof are spliced together. In order to further strengthen the beams at the points where

the bolt B' passes through the webs of the top chord-beam, angle pieces or plates, as $b^7 b^8$, are applied to the outer sides of the said webs, the said bolt B' passing through the same and holding them snugly against the top chord-beam. The said angle-plates may also be further secured to the top chord-beam as may be found expedient. The inner angle-irons b^3 are also provided with a projecting flange, as b^9 , which, together with the top splicing clip or plate a^5 , forms a means for attaching the diagonal and cross braces of the bridge. As seen in Fig. 4 of the drawings, cross-braces, as G, are interposed between the panel-posts upon each side of the structure, the said braces comprising a lattice-work having an upper and lower angle-iron $g g'$ and intermediate diagonally-arranged bars g^2 . The upper angle-iron g is engaged at its end by a bolt, as g^3 , which passes through the inner projecting ends of the top clip a^5 and the angle-plate b^8 . The lower angle-iron g' rests against the panel-posts B and is further braced in place by means of a diagonal angle-iron, as at g^4 . Diagonally-arranged brace structures, as $g^5 g^6$, are also secured in place at the head of the panel-posts by means of the vertical bolt g^3 . These are constructed of lattice-work similar to the braces G, but are preferably made much narrower. The webs of the lower ends of the panel-posts are cut away in the same manner as at the upper end, and a suspending-clip, as h , is bolted to the web of the said panel-posts in the same manner as the suspending-clip b^4 is applied at the upper end. The clip h is preferably provided with two downwardly-extending eyes, as at h' , which engage a suspending-bolt, as H, at the bottom of the panel-post, the said bolt also passing through the flanges of the panel-post proper. The bolt H thus suspended to the bottom of the panel-posts in turn supports the floor-girder E by means of yokes, as e .

The yokes e preferably consist of U-shaped bars, as illustrated more particularly in Fig. 9 of the drawings, which pass over the bolt H and then downwardly through the flanges of the floor-girder E upon either side of the web thereof and are secured in place by means of nuts, as e' , applied beneath the said floor-girder E. A strengthening-plate, as e^2 , is preferably interposed between the top of the floor-girder and the lower end of the panel-post, the yokes $e e'$ also passing through the said plate. The diagonal braces of the bridge are also secured at their lower ends to the said bolt H, as well as the lower chord beams or bars D. Diagonal brace-rods are preferably secured to the ends of the floor-beams E, the said brace-rods I extending from the end of one floor-beam to the opposite end of the next adjoining floor-beam and having bifurcated end portions, as at i , which are adapted to embrace the upper flanges of the floor-beam E. The bifurcated ends of said beams are also provided with eyes, as at i' , through which the yokes e pass to secure them firmly in place to said floor-girders. Intermediate panel posts or braces are suspended from the top chord-beam about midway between the main panel-posts B and comprise, preferably, T-irons, as J, which extend into the open under side of the top chord-beam. The legs of the T-beams J are cut away at their ends for a short distance, and spacing-blocks, as j' , are interposed between the ends of the said T-irons to hold them against the inner surfaces of the top chord-beam. The lower end of the T-irons j support a pin or bolt j^2 , upon which are suspended eye bars or rods, as $j^3 j^3$, the lower ends of the said bars extending down to one of the floor-girders and supporting a bolt or bar, as j^4 . Yokes $e^7 e^7$ pass through the flanges of the floor-beams E and over the bolts j^4 for supporting the ends of the floor-girders upon the intermediate panel-posts. The yokes e^7 are secured and pass through the flanges of the floor-girders in the same manner as above described in connection with the yokes e . The bottom chord bars or beams D also engage the said bolts j^4 , connecting them with the bolts H of the main panel-post. From the central bolt j^2 diagonal brace-rods, as j^6 , extend upwardly to the tops of the next adjoining main panel-post and are secured upon the supporting-bolts B' thereof. Beginning with the central panel-post of the bridge structure, diagonal brace rods or bars, as J', extend from the lower end of the said central panel-post to the upper ends of the next adjoining shoreward posts upon either side thereof. Upon each side of the central posts corresponding bars J' extend from the bottom of each panel-post to the top of the next shoreward panel-post until each end of the span is reached. So, also, beginning with the intermediate panel-posts which are nearest the center, brace-rods, as j^7 , extend from the central supporting-bolts j^2 thereof each way from the center toward the shore ends of the span to the bottom of the next adjoining main panel-posts. Similar bars extend from each bolt j^2 toward the next shoreward panel-post to the end of the span. This arrangement of diagonal upwardly-extending brace-bars and diagonally downwardly-extending rods can be easily seen by reference to Fig. 13 of the drawings.

Cross-brace structures, as at K, are also interposed between the intermediate panel-posts, extending from one side of the bridge structure to the other side, the said brace structure being supported by an angle-plate k , secured to the inner side of the top chord-beam by means of the upper supporting-bolt j . Other rivets or bolts may be used as additional means for securing the said angle-plate to the top chord-beam. The brace structure K comprises, preferably, an angle or T iron, which extends across the bridge. The said brace K is further braced and strengthened by means of a diagonal brace-rod or

angle-iron, as k^2 , extending from the said brace K to the intermediate panel-post J.

Tension-rods, as l , are preferably secured to the panel-posts to aid in holding the structure together as an entirety. These tension-irons comprise rods, as l , one end of each rod being screw-threaded, as at l' , and the other end being provided with a bifurcated portion, as at l^2 , the ends of which are screw-threaded. The screw-threaded end l' is adapted to engage a plate, as l^3 , which bears against one side of a main panel-post. The bifurcated screw-threaded ends l^2 extend through the web of the main panel-posts and through the said plate l^3 and are held in position by means of nuts, as l^4 . The rods l , which are nearest the shore end of the span, are preferably provided with eyes upon their shore ends for engaging the last shoreward bolts or rods $j^2 j^2$. In order to take up any slack in the rods l , they may be provided with turnbuckles at any point intermediate their ends.

As seen in Fig. 7 of the drawings, the floor-stringers E' of the bridge rest upon the floor-girders at right angles thereto, and in order to attach them to the said girders connecting-plates, as e^3 , are interposed between the said stringers E' and the girders E . The plates e^3 are provided with downwardly-projecting lugs, as e^4 , which engage corresponding notches formed in the flanges of the girders E , and thus secure the plate against lateral and longitudinal movement upon the said girder. The piece or plate e^3 is also provided with upwardly-extending lugs, as e^5 , which engage notches, as at e^6 , formed in the lower flanges of the stringers E' . The stringers are thus held firmly in place upon the girders E . Flooring or other suitable structure may be applied to said stringers in any usual or well-known manner.

The shore ends of the structure are preferably modified to adapt them to the downwardly-bent portions of the top chord-beams. The last panel next to the shore end is preferably formed of four eyebars arranged in pairs, as at M, the upper ends of the said eyebars being supported upon a bolt passing through the top chord-beam and the lower end of the said eyebars supporting a pin, to which the floor-girder is secured by means of yokes, as heretofore described. A diagonal member or beam, as N, connects the lower end of these eye-beams with the center of the downwardly-bent shore end of the top chord-beam, as at n^4 . T-bars parallel with the said strut or bar N further brace the end sections, as at $n n$. The strut or bar N is preferably approximately I-shaped in cross-section, as illustrated in Fig. 11 of the drawings, and is provided with holes in its flanges near the ends of the said bar to receive the bolts which connect it with the bridge structure, the web of the said bar being cut away, as at n' , to permit the bolts to pass through. Other strengthening-bars, as at $n^2 n^3$, are also provided to further

strengthen the end sections of the structure. As shown in Fig. 2 of the drawings, the end sections are connected from side to side by means of T or angle bars, as O O'. A lattice structure, as o , is also interposed between the top chord-beams of the end structure and serves as a further brace to this portion of the bridge. This lattice-work may be formed of angle or T irons and arranged in any manner which is found most effective for guarding against lateral movement. The end lattice-work $o o$ upon the shore ends of the bridge may be also provided with inwardly-extending diagonal braces or struts, as $o' o'$, which connect the said lattice-work with the last panel-posts at each end of the bridge structure, as seen in Fig. 2 of the drawings.

The floor-braces I, which are used on the shore end panels, are provided with eyes which are adapted to extend between the lips $c^9 c^9$, formed upon the foot-boxes C, as heretofore described. It will be apparent that washers and spacing-sleeves and turnbuckles may be used in this structure where it may be found expedient without departing from the spirit of my invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a bridge, the combination with suitable panel-posts and floor-beams, of a top chord-beam comprising longitudinal beams bound together by a longitudinal plate or bar having ribs thereon, said ribs being rolled upon the flanges of the said beams for binding the parts together to form a box-beam, and means for bracing the parts together, substantially as described.

2. In a bridge structure, the combination with a top chord-beam, and panel-posts suspended therefrom, of downwardly-bent shore ends forming a part of the top chord-beam, bottom chord-beams, foot-boxes adapted to receive and have the shore ends of the top chord-beam rest upon them, the said foot-boxes comprising an integral base-plate and side limiting-lugs, a shoulder formed on the base-plate between the limiting-lugs forming an abutment for the end of the top chord-beam and means for securing the chord-beams in the said boxes, substantially as described.

3. In a bridge structure, the combination with panel-posts and floor-girders, of a top chord-beam for supporting the same, the shore ends of the said beam being bent downwardly, bottom chord-beams, foot-boxes for receiving the said shore ends comprising parallel limiting-walls, an abutment formed between the said limiting-lugs upon the bottom of the box for receiving the end thrust of the top chord-beam, and a bolt for holding the said chord-beam in place, substantially as described.

4. In a bridge structure, the combination with a top chord-beam and bottom chord-beams, of foot-boxes for supporting the shore ends thereof, an abutment formed upon the bottom of the foot-boxes for receiving and

supporting the end thrust of the top chord-beams, integral side walls or limiting-lugs for limiting the lateral movement of the beam, a strengthening-abutment formed on the outer sides of the said side walls or limiting-lugs, and means for holding the said foot-boxes in place, substantially as described.

5. In a bridge structure, the combination with a top chord-beam and bottom chord-beams, of foot-boxes for receiving and supporting the shore ends thereof, a base-plate formed upon its upper side with a socket or recess, rollers mounted in the said socket and adapted to support the foot-boxes proper and means connecting the rollers for spacing them properly, the construction being such that the expansion and contraction of the metal of the structure will be compensated, substantially as described.

6. In a bridge structure, the combination with a top chord-beam and bottom chord-beams, of a foot-box for supporting the same, parallel lugs formed upon the said foot-box for receiving the shore ends of brace-rods for bracing the structure laterally, and means for securing the said foot-box to the shore, substantially as described.

7. In a bridge structure, the combination with panel-posts and floor-beams, of a top chord-beam comprising longitudinal beams and a longitudinal binding-plate having ribs which are rolled upon the said longitudinal beams for holding them together, splicing-plates secured to the binding-plate of the said chord-beam, the said splicing-plates extending inwardly beyond the edge of the plate and engaging bracing structures for holding the chord-beam in proper place, substantially as described.

8. In a bridge structure, the combination with panel-posts and floor-girders, of top chord-beams each comprising longitudinal beams and a binding-plate having ribs which are rolled upon the said longitudinal beams for holding them together, splicing clips or plates secured to the said binding-plate for holding its adjoining ends together, the said plate extending beyond the inner edge of the said plate, an angle-plate also secured to said chord-beam, the construction being such that lateral bracing structures may be secured to the said top chord-beam between the said angle-plate and the said splicing-plate, substantially as described.

9. In a bridge structure, the combination with a top chord-beam having a channel in its under side, of panel-posts extending into the said channel, a stiffening-box fitting the inner contour of the said channel and receiving the upper end of said panel-posts for strengthening the joints, substantially as described.

10. In a bridge structure, the combination with a top chord-beam having a channel in its under side, of panel-posts entering said channel, a bolt for securing the said panel-

posts to the said chord-beam, a suspending-clip having bifurcated flanges secured to the web of each panel-post and provided with an upwardly-extending eye at right angles to the said flanges for engaging the said bolt and rendering an additional support to the said panel-posts, substantially as described.

11. In a bridge structure, the combination with a top chord-beam, of panel-posts suspended therefrom, bolts passing through the lower end of the said panel-posts, suspending-clips having bifurcated flanges secured to the web of the said panel-posts and provided with downwardly-extending eyes at right angles to the said flanges for engaging the said bolt, and means for suspending floor-girders from the said bolt, substantially as described.

12. In a bridge structure, the combination with top chord-beams, of main panel-posts, floor-girders supported thereby, intermediate panel-posts comprising bars or angle-irons, suspended from the said top chord-beams, eyebars suspended from the said angle-bars and connecting them with floor-beams and brace-rods for holding the said angle and eye bars in place, substantially as described.

13. In a bridge structure, the combination with top chord-beams, of panel-posts suspended therefrom, floor-girders supported by the said panel-posts, stringers connecting and resting upon said floor-girders, securing-plates interposed between the said stringers, and the said girders having downwardly-extending lugs for engaging notches in the said girders and upwardly-extending lugs for engaging notches in the said stringers, the construction being such that the stringers and the girders are securely fastened together, substantially as described.

14. In a bridge structure, the combination with top chord-beams, of end sections bent downwardly therefrom to form shore-engaging portions, panel-posts supported by the said top chord-beams, struts or diagonal beams connecting the middle of the said downwardly-bent chord-beams with the bottom of the first main panel-post, and parallel T-irons also parallel with the said struts for further supporting the said end structure, substantially as described.

15. In a bridge structure, the combination with top chord-beams, of end portions bent downwardly for engaging the shore, struts or diagonal beams for bracing the said end portions, the said struts being provided with bolt-receiving apertures in their ends and having their web portions cut away to allow a passage of the said bolts, and bolts passing through the said apertures and cut-away portions for securing the parts together, substantially as described.

16. In a bridge structure, the combination with top chord-beams, of panel-posts suspended therefrom, diagonal braces for bracing the said panel-posts with respect to each other, tension-bars extending from panel-post to

panel-post, and attaching-plates upon the said tension-bars for engaging the webs of the said panel-posts, substantially as described.

17. In a bridge structure, the combination
5 with top chord-beams, of panel-posts suspended therefrom, tension-bars having screw-threads upon one end and provided with bifurcated portions upon their other ends, the said screw-threaded ends engaging plates applied to the sides of the panel-posts, and the
10 bifurcated ends passing through the web of the panel-posts and the said plates, and nuts for securing them therein, substantially as described.

15 18. In a bridge structure, the combination with top chord-beams, of panel-posts suspended therefrom, intermediate panel-posts also suspended from said top chord-beams, and lateral braces interposed between the chords
20 adjacent to the intermediate panel-posts upon opposite sides of the structure, and angle-

plates bolted to the sides of the said top chord-beams and securing the ends of the said lateral braces in place, substantially as described.

19. In a bridge construction, the combination with top chord-beams, of end sections bent downwardly and engaging the shore for supporting the said bridge structure, lateral braces connecting the said end sections and
30 lattice-work interposed between the said lateral braces and the said end sections of the top chord-beams, and diagonal struts or braces for further bracing the lattice-work and lateral braces with respect to the end panel-
35 posts, substantially as described.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

CHARLES M. HORTON.

Witnesses:

JAMES T. WATSON,

CHARLES H. BRADLEY.