(No Model.) 2 Sheets—Sheet 1.

S. A. BUCHANAN.

BRIDGE.

No. 389,951. Patented Sept. 25, 1888.

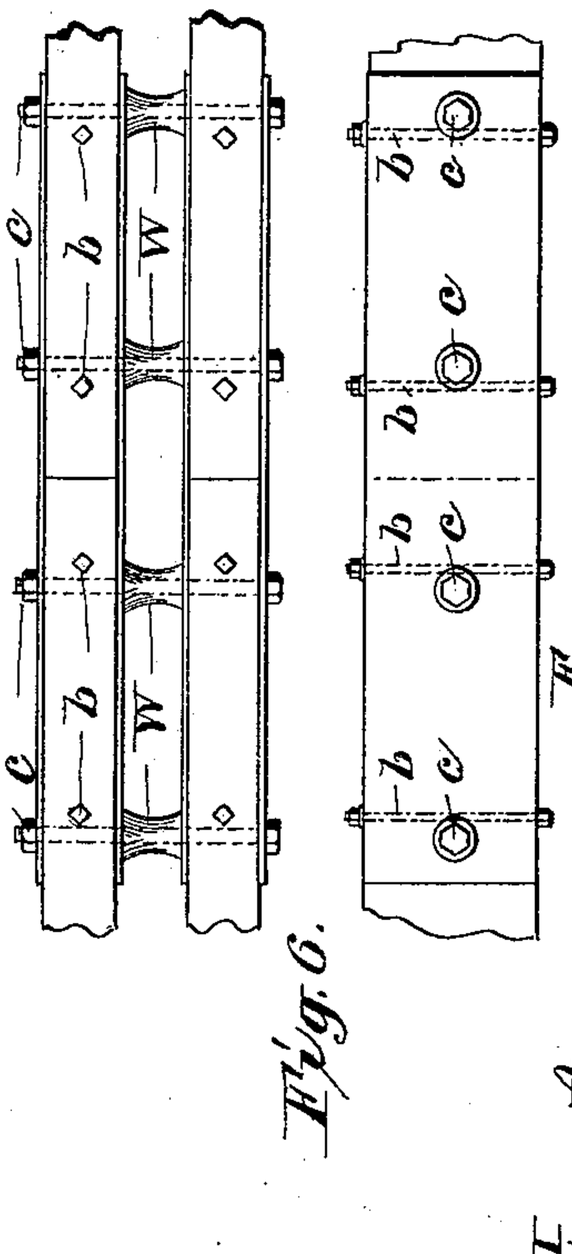

Fig. 6.

Fig. 5.

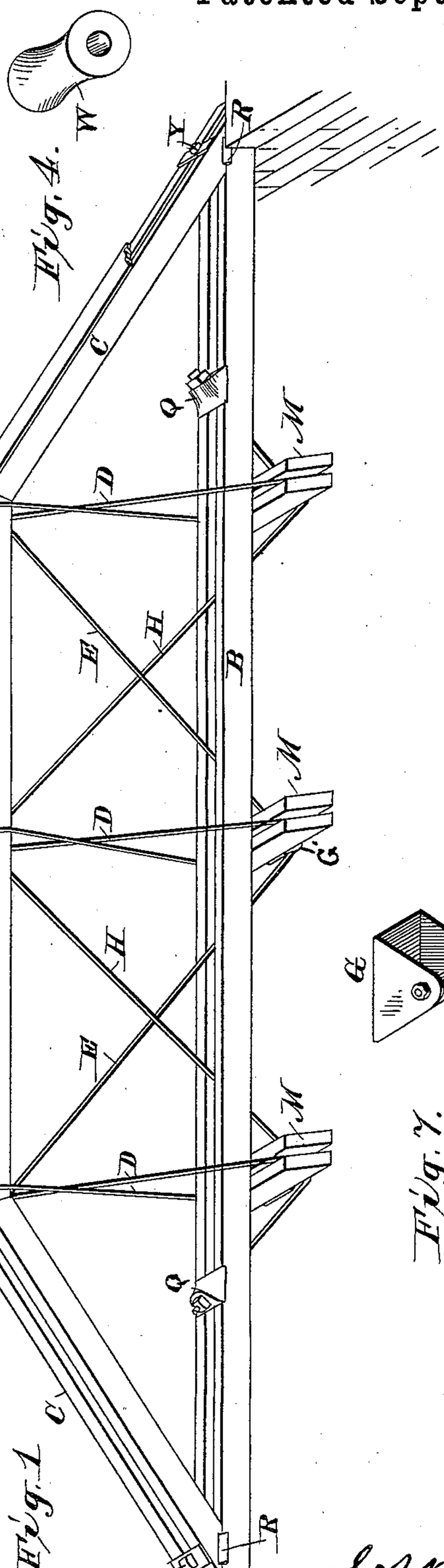

Fig. 4.

Fig. 7.

Witnesses
Chas. Hood
Ed Stough

Inventor
S. A. Buchanan
Per C. D. Campbell Atty

(No Model.) 2 Sheets—Sheet 2.

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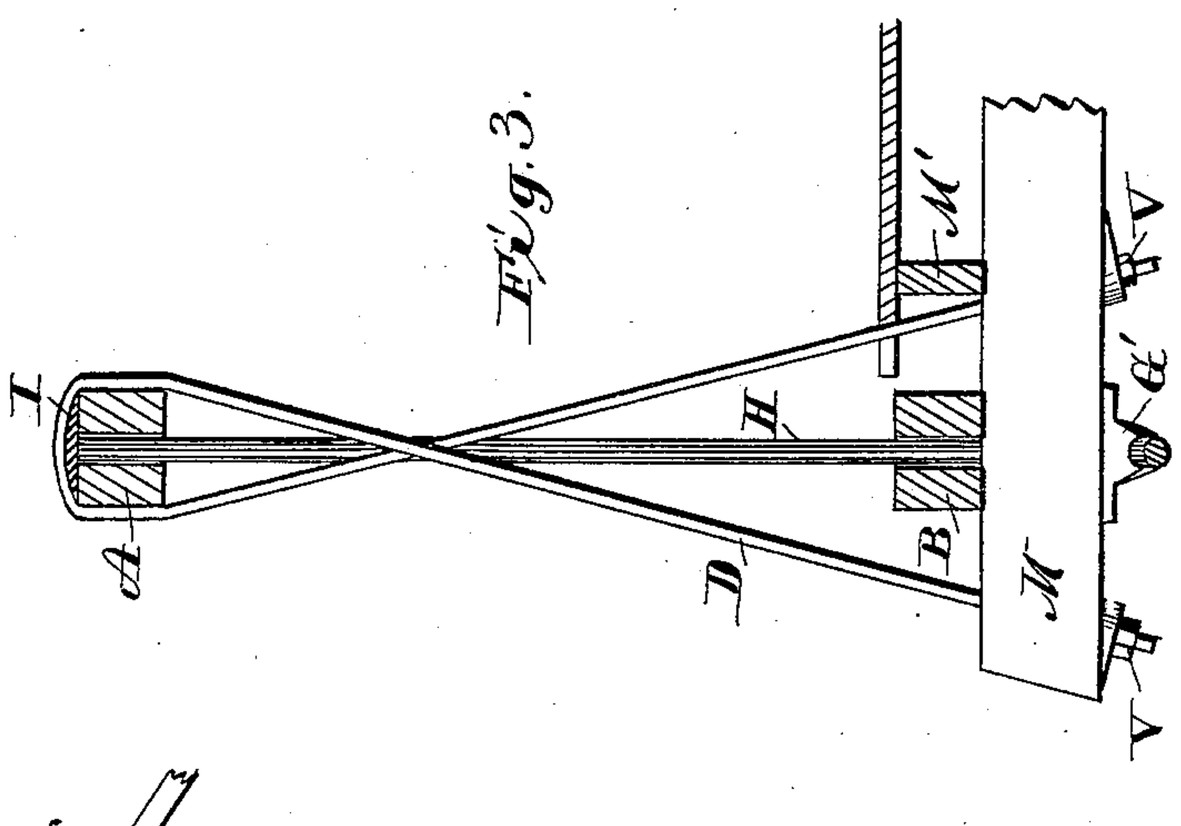

Fig. 3.

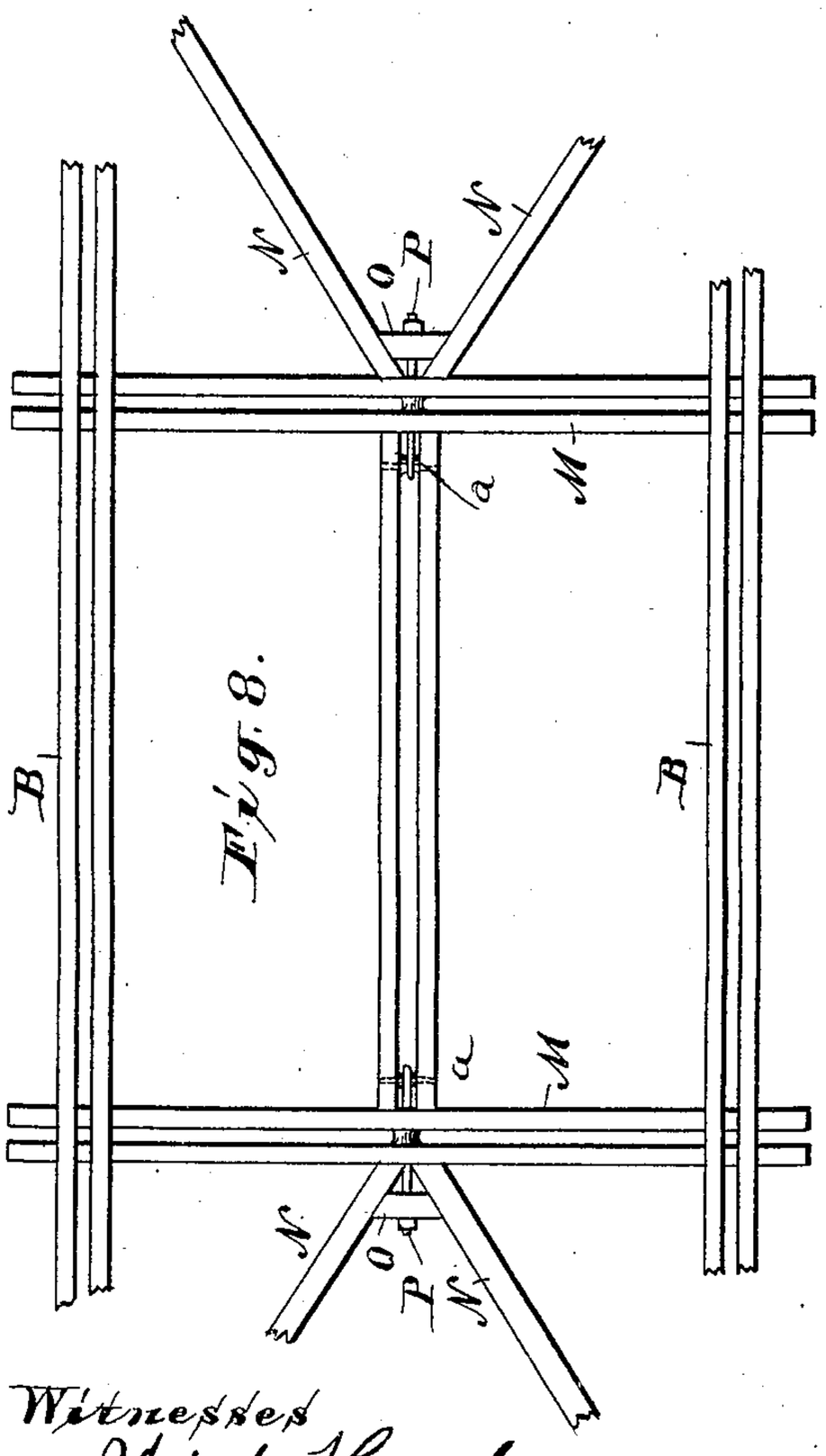

Fig. 8.

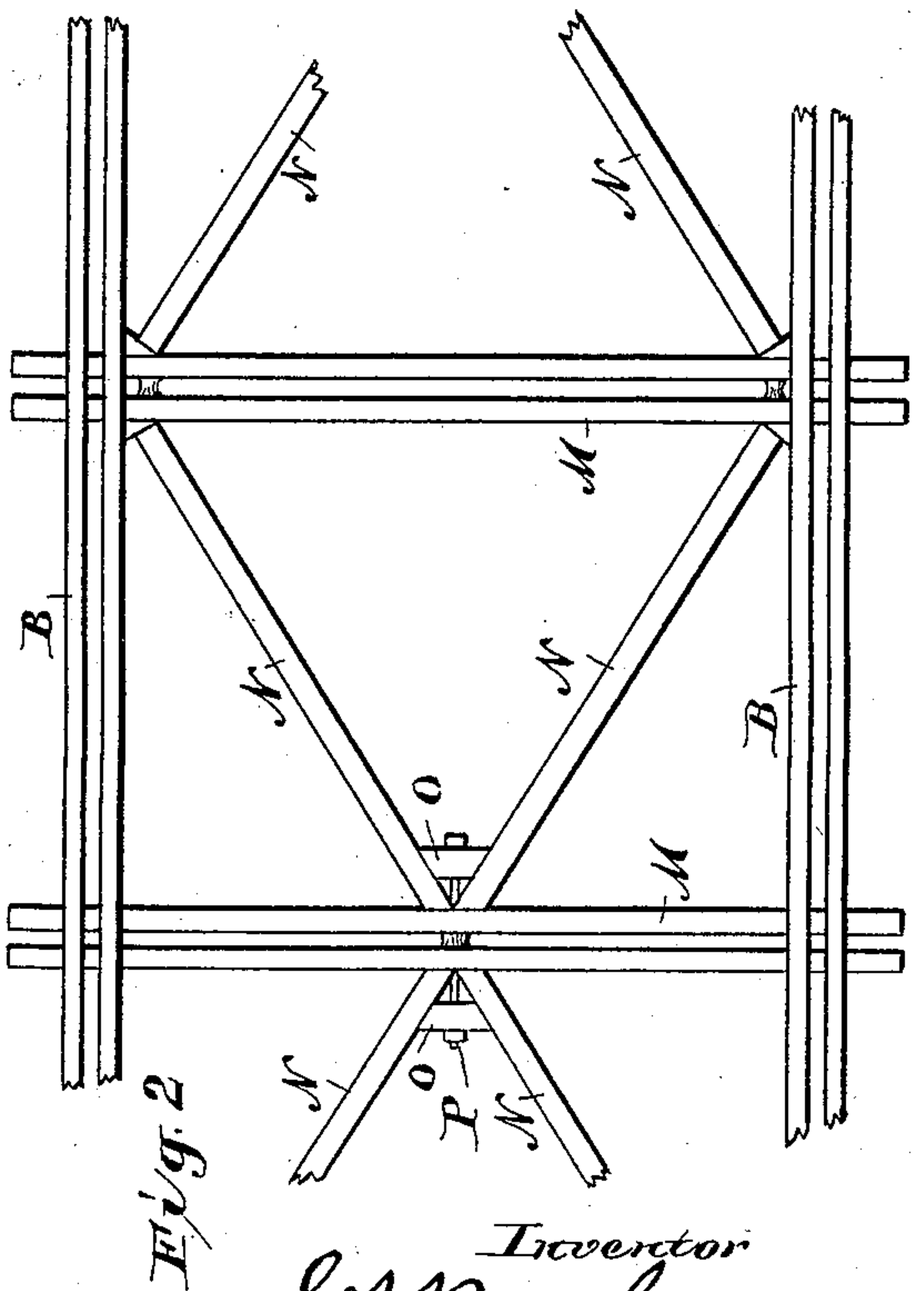

Fig. 2

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UNITED STATES PATENT OFFICE.

SAMUEL A. BUCHANAN, OF BELLEFONTAINE, OHIO.

BRIDGE.

SPECIFICATION forming part of Letters Patent No. 389,951, dated September 25, 1888.

Application filed September 10, 1887. Serial No. 249,372. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL A. BUCHANAN, a citizen of the United States, and a resident of Bellefontaine, in the county of Logan and State of Ohio, have invented new and useful Improvements in Bridges, of which the following is a specification.

My invention relates to improvements in wooden bridges and in the construction of the same.

Figure 1 is a perspective of one truss of my bridge; Fig. 2, a bottom view of a portion of the bridge; Fig. 3, an end view of the top chord and king plate; Fig. 4, a detached perspective of my iron packing-ring; Fig. 5, a perspective view of my king-plate. Fig. 6 is an elevation and a plan of my improved splice; Fig. 7, a perspective of my pin-socket; Fig. 8, a bottom view of the sway-braces in a three-panel bridge.

A is the top chord of a bridge; B, the bottom chord; C C, end posts; D D D, suspension-loops; E, main diagonal; F, hip-casting; G, pin-socket; G′, grooved casting; H, counter-tie; I, plate to which counter-tie is attached; L, nuts attached to the ends of the main diagonals and bearing on the hip-castings; M M, floor-beams; N N, sway-braces; O O, adjusting-blocks; P, adjusting bolts or screws; Q, plates to which the outer ends of the counter-ties are attached; R, king-plate; S, shoulders thereon; T, inclined edge or water-shed; U, hole in the plate for passage of the king-bolt Y; V V′, nuts on the ends of the suspension-loops; W, iron packing-ring; *a*, bolts that bind the parallel braces together; *b*, the vertical bolts in the chord-splice; *c*, the horizontal bolts in this splice.

The principal improvements in my invention are, first, making the suspension-loops adjustable, so as to be able to true up and aid in keeping the top chord in line and crossing them to give greater bearings; second, the ready adjustment of the sway-braces; third, the hip-castings on the ends of the upper chord and end posts, which support the main diagonals and suspension-loops, and which may also form a rain-hood for the end of the planks that cover the top chords and end posts; fourth, the use of my iron packing-rings in splicing and uniting the timbers, doing away with the scarf-blocks and packing-blocks; fifth, my king-plate for uniting the end posts and bottom chords.

The construction of my bridge and the difference between it and other bridges of this class are as follows: In the ordinary manner of constructing wooden bridges the main timbers are the end posts, top and bottom chords, and the struts that receive the strain from vertical rods and convey the same diagonally from upper to lower panel-points, the strain being delivered at the top of the end posts. In my construction I suspend the load of intermediate floor-beams on the main diagonal rods E and counters H, passing from the top of the top chord under the floor-beams and carrying the weight to the upper chord and end posts. This plan covers any desired number of panels.

Instead of the usual style of mortising the end of the bottom chord for the foot of the end post to rest in, I form mortises in the bottom of the post and top of the bottom chord, in which I insert an iron king-plate, R, having either tenons or ribs that fit in the mortises in the post and chord, and bolt the post and bottom chord together by a king-bolt passing through the king-plate and binding on iron bearings above the post and beneath the chord. This king-plate has an inclined flange at each bearing-edge of the post and chord-timbers designed to turn the rain from the edges and prevent its entrance between the timbers and king-plate. The object of my king-plate is to form a more durable connection between the chord and end post by protecting the same as far as possible from injury by the weather and doing away with the pocket for collecting rain, that is always made where the end of the end post is mortised into the bottom chord.

One great trouble with wooden bridges is that the wood in seasoning, or from the effects of the weather, becomes warped, causing the upper chord to buckle or go out of line, thus weakening the bridge. To obviate this I suspend my floor-beams from the top chord by means of the crossed suspension-loops D, which have the nuts V V′ on their lower ends. Now, should the top chord be thrown out of line by warping, settling, or other cause, by loosening the nut V and tightening up the nut V′, or vice versa, as desired, the top chord can be drawn into line again and held in place by

the loop. The loop may be made in two pieces when preferred, the upper ends being attached to a bolt passing through the upper chord.

My main diagonals may be made of one piece passing from the top of the upper chord under the floor-beam. The lower end of the counter-tie is passed underneath the floor-beam and up to the top of the bottom chord, where it is attached to a plate, Q, re-enforcing the suspension-loop at that panel and keeping the floor-beam in position.

In making the splice in my lower chord the scarf-block, usually mortised into the spliced ends and filling the space between the timbers, is done away with, instead of which I insert my iron packing-rings having large outside or end surfaces that abut against the sides of the timbers B B, but which are only large enough at their middle to allow the passage of the bolts that unite the timbers and sustain the pressure. This shape of the packing-rings causes them to turn all rain falling on them away from the timbers and gives a larger bearing-surface with the use of a small amount of metal. Bolts are inserted through the timbers, through the packing-rings, and through the splice-plates, binding all firmly together. Other bolts are inserted through the timbers vertically, bearing against the sides of the horizontal bolts. These vertical bolts are to prevent splitting of the timbers and to prevent the horizontal bolts shearing through the timbers by excess of tensile strain of bottom chord.

Instead of the usual mode of fitting and bolting the sway-braces in position underneath the bridge rigidly, I fit them in place and pass a bolt through the floor-beams between the ends of the braces. On one or both ends of this bolt, as necessary, I fit a wedge-shaped block, O, that is beveled to fit between the sway-braces. Under the old plan, as the bridge-timbers seasoned or settled, the braces soon ceased to fit in position, failed to do their work properly, and were liable to split where nailed or bolted on. As soon as my braces become loose from the seasoning of timber, the shrinkage can be taken up by a turn of the nuts on the bolt P, forcing the blocks O up and spreading the braces until they come to a taut bearing.

My manner of adjusting the sway-braces when used in a three-panel bridge is as follows: In the end panels the braces are arranged in the manner shown in Fig. 2. The outside ends are separated the width of the bridge, or as far as desired, while the inside ends are brought together against the floor-beams. Between the floor-beams in the center panel I place two parallel braces, held apart by my packing-rings at each end, through which rings the bolts *a* pass, that bind the pieces together. My wedge-blocks are placed between the sway-braces in the end panels in the usual way and adjusted by the screw-bolt, except that the ends of these bolts in the middle panel have hooks or eyes on them that fit around the packing-rings on the bolts *a*, holding the two parallel braces together. The tightening up of the wedge-blocks draws the floor-beams and parallel braces taut together at the same time that it takes up any looseness of the sway-braces in the end panels, tightening up the whole system uniformly.

In construction I employ a middle post at I alongside of the suspension-loop, between the top and bottom chords, but have left it out of the drawings to prevent confusion, as I have only sought to show the construction of the main diagonal, counter-tie, suspension-loops, top and bottom chords, and end posts.

What I claim is—

1. The chords A B, posts C, main diagonal E, passing under and supporting the floor-beam M, and counter-tie H, passing under the floor-beam and sustained by the chord, as and for the purpose set forth.

2. The chord A, floor-beams M, and the one-piece adjustable crossed suspension-loop D, passing over and around the chord and suspending the floor-beam, as and for the purpose set forth.

3. The king-plate R, the lugs, and the water-sheds or flanges Z, as and for the purpose set forth.

4. The sway-braces N, one end resting freely in the corner where the chord and cross-beams or joists meet, or in a pocket provided for it, the other end resting freely against the side of the cross-beams or joists, the bolt P, and wedge-blocks O, that hold the separated ends of the braces against the cross-beams or joists, all combined substantially as shown and described.

5. The bottom chord-splice, composed of the timbers B B′, iron packing-rings W, and bolts *b c*, as and for the purpose set forth.

6. The combination of the parallel braces with the packing-rings W, as and for the purpose set forth.

7. The combination, with double floor-beams, braces, posts, chords, or other parts of a bridge, of the packing-rings W, as and for the purpose set forth.

SAMUEL A. BUCHANAN.

Witnesses:
J. A. McILVAIN,
L. E. PETTIT.