(No Model.) 2 Sheets—Sheet 1.

J. E. GREINER.

CONSTRUCTION OF BRIDGES, ROOFS, &c.

No. 528,940. Patented Nov. 13, 1894.

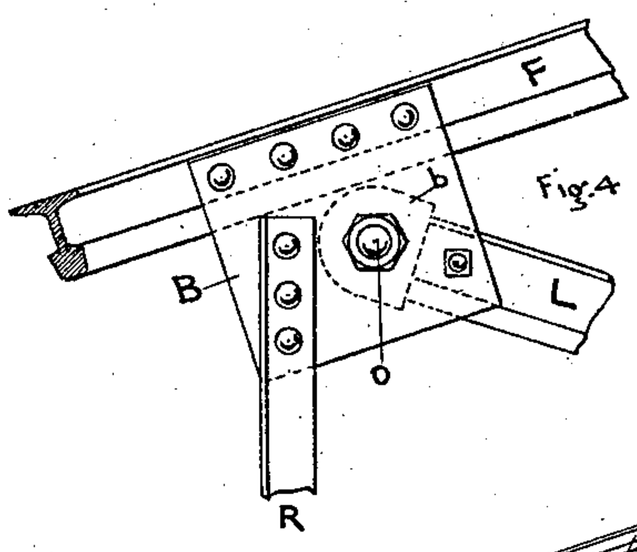

Fig. 4

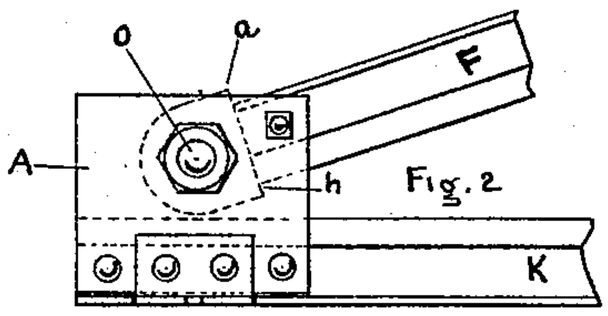

Fig. 2

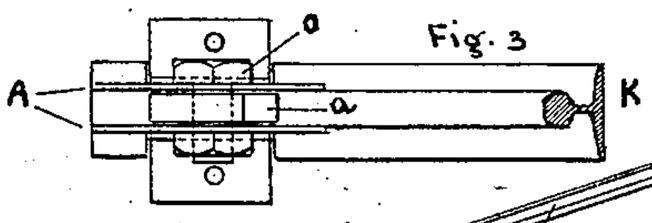

Fig. 3

Fig. 1

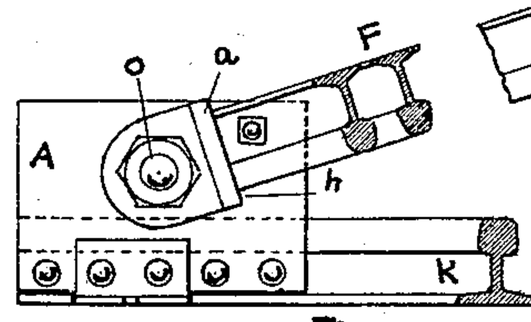

Fig. 5

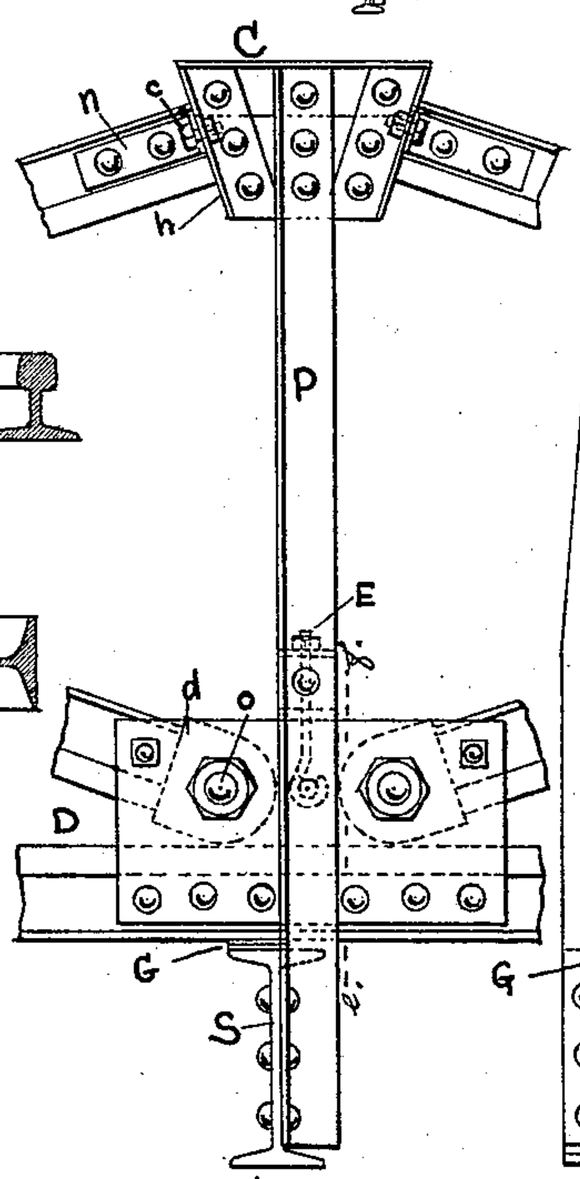

Fig. 8

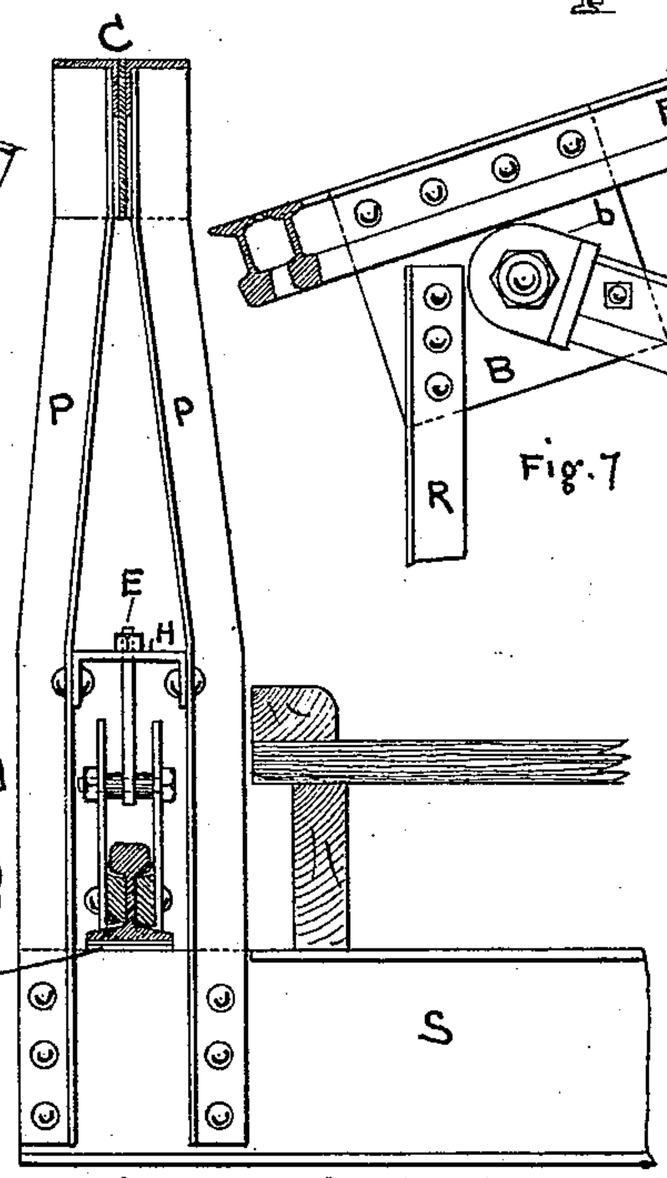

Fig. 9 Sec. thro' e. f.

Fig. 7

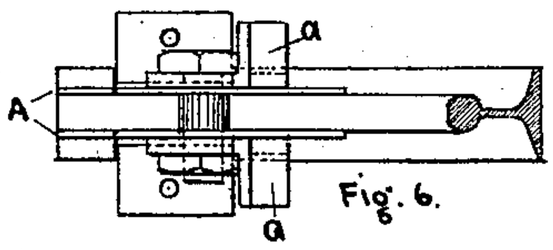

Fig. 6.

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(No Model.) 2 Sheets—Sheet 2.

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No. 528,940. Patented Nov. 13, 1894.

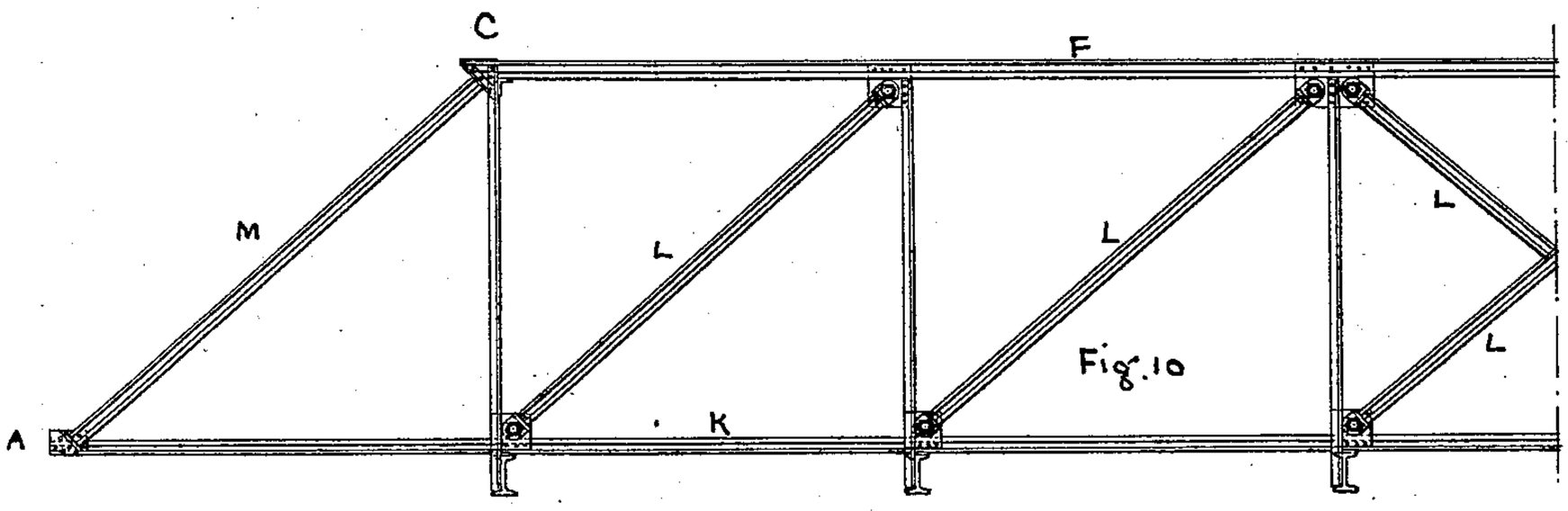

Fig. 10

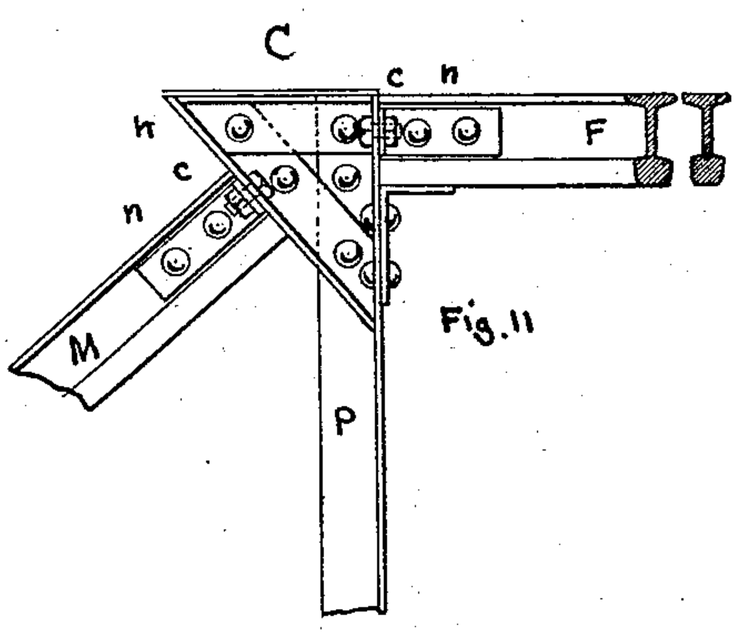

Fig. 11

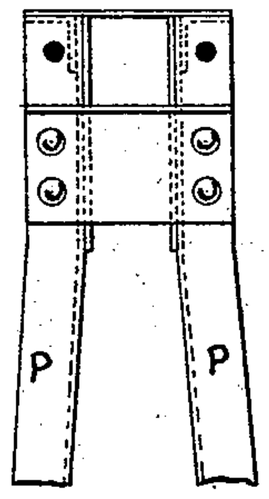

Fig. 12

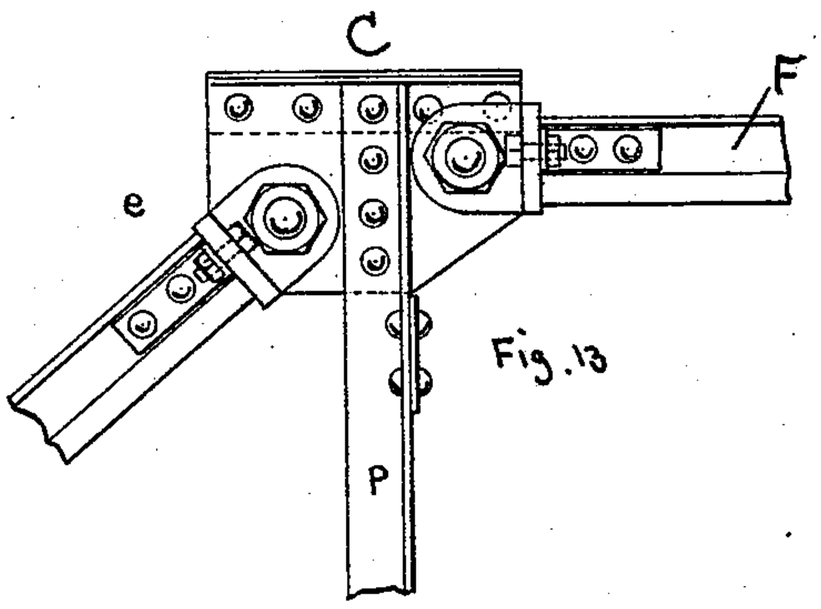

Fig. 13

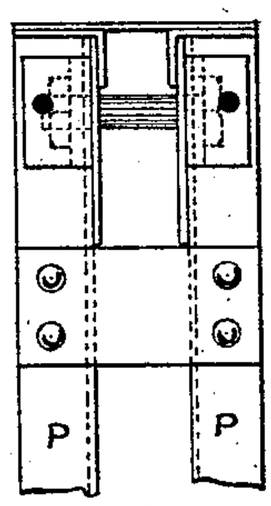

Fig. 14

WITNESSES:
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UNITED STATES PATENT OFFICE.

JOHN EDWIN GREINER, OF BALTIMORE, MARYLAND.

CONSTRUCTION OF BRIDGES, ROOFS, &c.

SPECIFICATION forming part of Letters Patent No. 528,940, dated November 13, 1894.

Application filed February 14, 1894. Serial No. 500,112. (No model.)

To all whom it may concern:

Be it known that I, JOHN EDWIN GREINER, of Baltimore, Maryland, have invented certain new and useful Improvements in Bridges, Roofs, or other Structural Work; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to improvements of bridges, roofs, or other structures in which it is desired to transmit strains occasioned by the imposed loads to the different members of the truss; and the object of my improvement is to arrange, construct and connect the abutting members of the truss in a way that will effectively transmit and provide for all the strains that are liable to be brought on any or all members, and at the same time to provide a new and effective means of adjustment which will bring the different members to a firm bearing and hold them so permanently. I attain these objects by the mechanism and arrangements illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of a part of a truss showing hinge bearings at A, B, and D, lower chord "K" composed of one rail or shape and the upper chord "F" of two rails or shapes spread so as to lap over the sides of the single shape lower chord or over the sides of the cheek plates "A" connected thereto. This figure also shows in proper positions brace "L," stiff hangers "P" and "R," hinged bearings *a*, *b*, and *d*, wedge bearing C, cheek plates A, B and D, floor beams S, hanger bolt E, connection lugs *n*, bearing surfaces *h* and pins *o*. Fig. 2 is a large scale elevation view of one end of a truss having a single rail in both upper and lower chords. Fig. 3 is a plan view of Fig. 2, the upper chord being removed. Fig. 4 is an elevation view on large scale, showing a single rail chord and the intermediate cheek plate B with connections. Fig. 5 is an elevation of one end of the truss showing a double shape iron top chord. Fig. 6 is a plan view of Fig. 5 with the top chord removed. Fig. 7 shows intermediate cheek plates B and connections, top chord composed of two rails. Fig. 8 is a side view of the bottom chord, center connection, showing the stiff hanger or post, the bottom chord, floor-beam, hinge blocks, and adjusting screw bolts. Fig. 9 is a transverse elevation of Fig. 6.

Viewing Fig. 1 which represents two panels of the truss at the intersections of the members, there are provided blocks *b* and *d* placed between the cheek plates B and D and blocks or angle iron "*a*" placed on outside of cheek plates A. These blocks are bored to receive pins *o*, which pass through the cheek plates A, B, D. The blocks *a*, *b*, *d* move freely about the pins *o*, but are confined laterally by the side or cheek plates A, B, D or by head and nut of the pins *o*. The front edges *h* of the hinge blocks *a*, *b*, *d* form abutting surfaces for the compression members to bear against, and as each block is allowed a certain amount of oscillatory movement, the two surfaces, that of the bearing edge of the block and that of the abutting member, can adjust themselves so as to be brought into intimate contact and thereby make a perfect bearing.

The enlarged views of the hinge bearing blocks shown in Figs. 2, 3, 4 and 5, represent some of the various means of connecting the blocks to the plates and the plates holding these blocks to the members of the truss. These connections may be for single members as at A in Fig. 2, B in Fig. 4 or D in Fig. 8 for double members as at A in Fig. 5 or for more members when found necessary.

The upper chord F simply bears against the block "*a*" and is not fastened thereto, but is simply bolted to the cheek plates. The upper chord bears against the wedge C on surface *h* and is shown connected thereto by means of bolts passing through angle lugs *n*. A similar connection may be made to angle blocks "*a*" if desired.

The cheek plates A in Fig. 2, are simply bolted to sides of rail K but in Fig. 5, these cheek plates are set into a notch cut into the flange of the rail for a part of their length, the other part bearing against the upper surface of the rail flange whereby the horizontal component of the strain in inclined top chord, is transmitted to the bottom chord through the projecting edge which fits into the notch cut into the rail flange, and the vertical component of said strain is transferred from the cheek plates to the upper surface of the flange of

rail against which these cheek plates partly bear. The bolts connecting these cheek plates to the rail, are intended merely to hold the plates firmly in position.

Brace L bears against blocks "*b*" and "*d*" and is not secured thereto, but is bolted to the cheek plates.

Referring to Figs. 8 and 9, the stiff hangers P are securely connected to a wedged bearing C which can be made of wrought or cast iron or steel, against which the chords F abut on surface *h* and are held in position by bolt *c*. The hangers are spread at the lower ends so as to clear the bottom chord and so as to give lateral stability. The bolt E takes hold of the cheek plates which are connected to the bottom chord and passes through a strap or saddle H connected to a stiff hanger P or R. This bolt can also be made to pass under and around the lower chord or to take direct hold of the same, and may be made to pass up and through the wedge bearing "C." By screwing down the nut on the bolt E, the wedge marked C, is drawn to a firm bearing against the upper chord and the lower chord is drawn upward, thereby bringing the brace F to a bearing at *h*. After the bottom chord has been raised above the floor beam by screwing down the nut on the bolt E, fillers or packing pieces G, are inserted between the chord and the floor-beam, which when bolted or riveted together, the whole truss will be in perfect adjustment and require no future attention. The bolt E having served its purpose, *i. e.*, drawn the parts into proper adjustment, could be removed if desired.

Fig. 10 represents a somewhat different construction of truss, but in which practically the same principles claimed by me as new, are involved. This truss has a horizontal upper chord F and an inclined end post M, composed of two rails or shapes, which bear against the wedge bearing C and hinged bearings *a*. The two rails forming this end post, are spread so as to lap over the sides of the single bottom chord rail, or over the sides of the cheek plates A.

Fig. 11 shows side view of wedge C as used for the truss in Fig. 10.

Fig. 12 is the back view of Fig. 11 with chords F removed.

Fig. 13 shows hinged bearing blocks *e* attached to the top of the hanger P which may be used instead of the wedge bearings C and for the same purpose.

Fig. 14 is a back view of Fig. 13 with chords F removed.

The superiority of my invention over trusses used in bridges as usually constructed, is as follows:—First, it will give a firm and substantial structure with little or no vibration; second, the ends of all compression members, will come to a true and even bearing whether they be cut square or on an angle, and they need not be faced off, the ordinary shearing cut given at the mills, being sufficient; third, after being once adjusted, the bridge will remain so as there are no ties and counter ties to get out of adjustment; fourth, by having riveted floor beam connections to stiff suspenders, these suspenders will act as knee braces for holding the upper chord in position when under stress; fifth, my system of truss embodies great strength and rigidity with the least cost.

Having now particularly described and ascertained the nature of this my invention and in what manner the same is to be performed, I would here state that I have in setting out the nature of the invention, shown certain special arrangements or connections, using certain shapes of rolled iron or steel and special modes of arrangements for making connections between the parts attached to the system. I wish it to be understood however, that although these forms, modes and arrangements illustrated, may be used with advantage, yet I do not limit my invention to these special things, as the improvement may be carried out in many ways and in connection with different forms of trusses and the connections of their members without departing from its spirit and scope, and that it is susceptible of many modifications, and will necessarily have to be varied in many ways to suit the various purposes and conditions of its application, and

I declare what I claim in respect of the herein described invention is—

1. In the construction of trusses for bridges or other structures, the herein described hinge bearing blocks *a*, *b*, *d* held in position by pins *o* passing through cheek plates A, B, D, as shown and described and for the purposes set forth.

2. In the construction of trusses for bridges or other structures, the cheek plate A, Figs. 5 and 6, having lugs projecting below the lower edge and which fit snugly into notches cut into the rail; the lower edge of cheek plate on each side of lugs to bear against the upper surface of the rail flange all as shown and described and for the purpose set forth.

3. In the construction of trusses for bridges or other structures the adjusting device shown in Figs. 8 and 9 which consists of a bolt E either directly or indirectly connected to the lower chord, and at upper end to any part of the hangers P by means of either a bridge plate as H Fig. 9 or by passing through and connecting to the wedge C, all as shown and described and for the purposes set forth.

4. In trusses for bridges, roofs or other structures, the combination of hinged bearings with rigid braces independent of, yet bearing against the hinged bearing and the combination of an adjusting device, consisting of a lifting screw, bridge plate and hangers with a rigid suspender, all as shown and described and for the purpose set forth.

5. In the construction of bridges or other structures, the herein described truss consist-

ing of top and bottom chords, braces, rigid suspension members in combination with the hinged bearing blocks *a*, *b*, *d*, held in position by pin *o*, secured to cheek plates A, B, D and the adjustable device consisting of a bolt attached to lower chord and hangers as shown and described and for the purpose set forth.

6. In the construction of trusses for bridges and other structures the hinged bearing block *a*, and the adjusting device consisting of a bolt attached to lower chord and hanger as shown and described and for the purposes set forth.

7. In the construction of trusses for bridges or other structures, the combination of hinged bearings with rigid braces independent of yet bearing against the hinged bearing and the combination of an adjusting device consisting of a lifting bolt, bridge plate and hangers with a rigid suspender, all as shown and described and for the purposes set forth.

8. In the construction of trusses for bridges or other structures, the hinged block *a*, free to oscillate confined in position by pin *o* and cheek plates A in combination with the abutting braces F, wedge C, the rigid hangers P, the adjusting bolt E with its attachments and packing pieces, all as described and set forth in the accompanying drawings and specification.

9. The stiff hanger P in combination with the wedge bearing C as in Fig. 8 all as described and set forth for the purposes specified.

JOHN EDWIN GREINER.

Wtnesses:

JAMES A. MERCIER,

PHILIP AYLETT.