

(No Model.)

3 Sheets—Sheet 1.

J. A. L. WADDELL & I. G. HEDRICK.  
SUSPENSION BRIDGE.

No. 605,153.

Patented June 7, 1898.

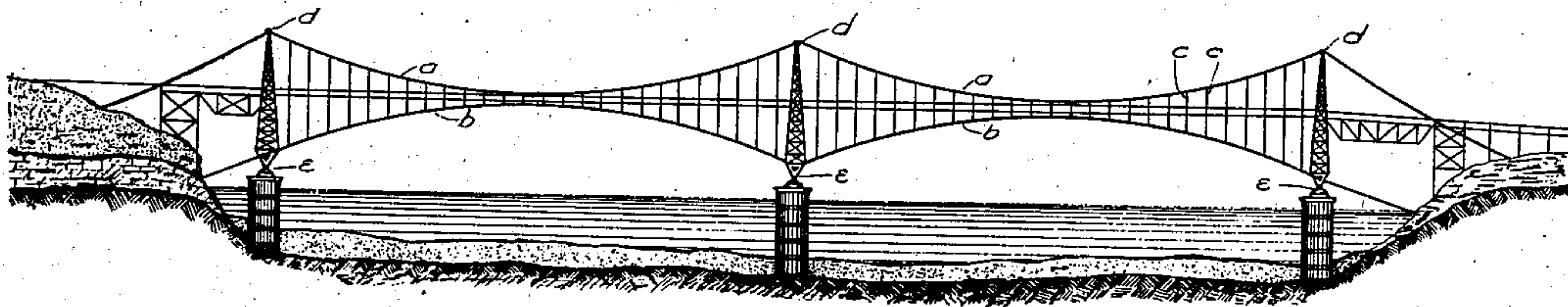


Fig. 1.

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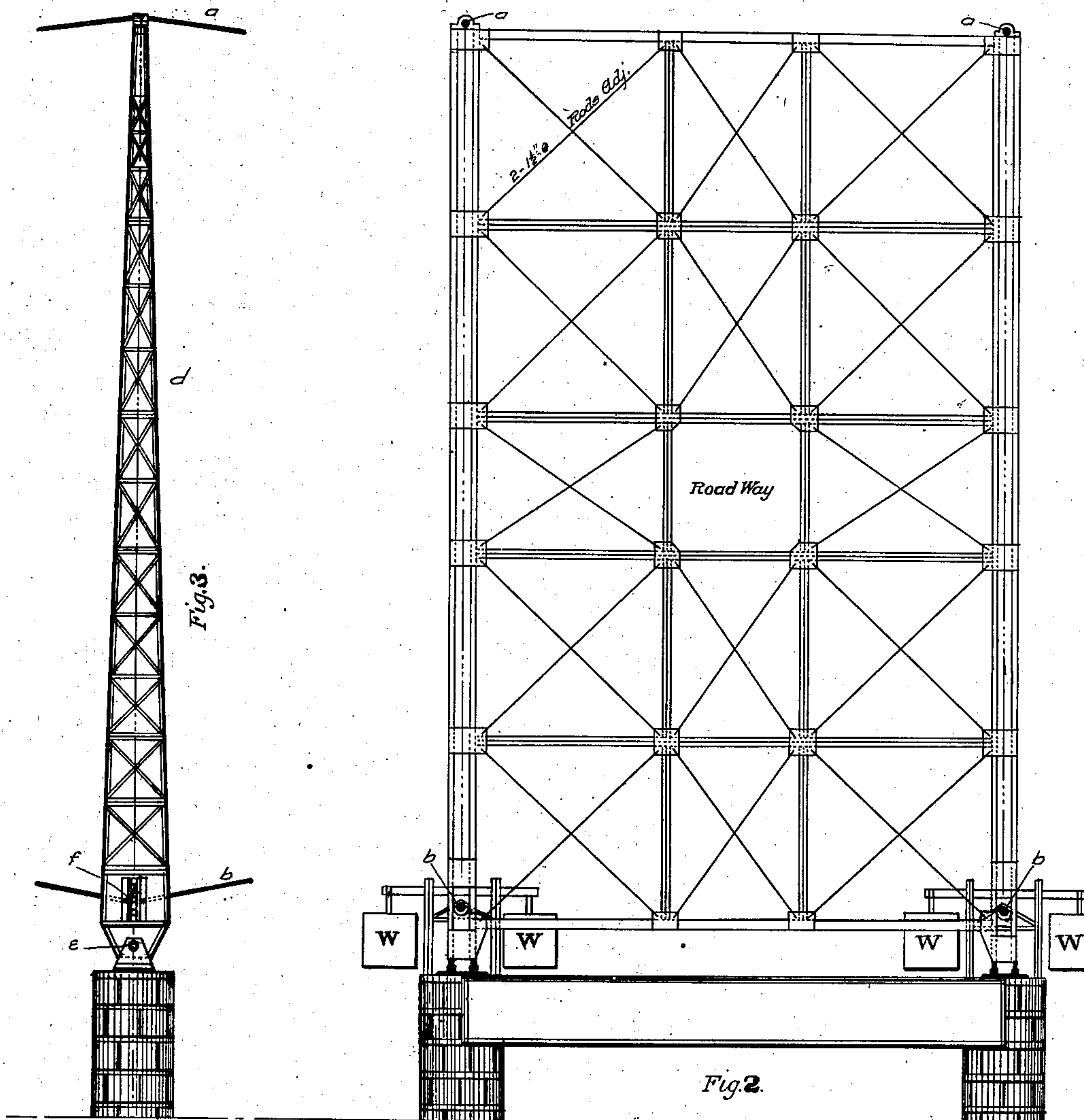
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No. 605,153.

Patented June 7, 1898.



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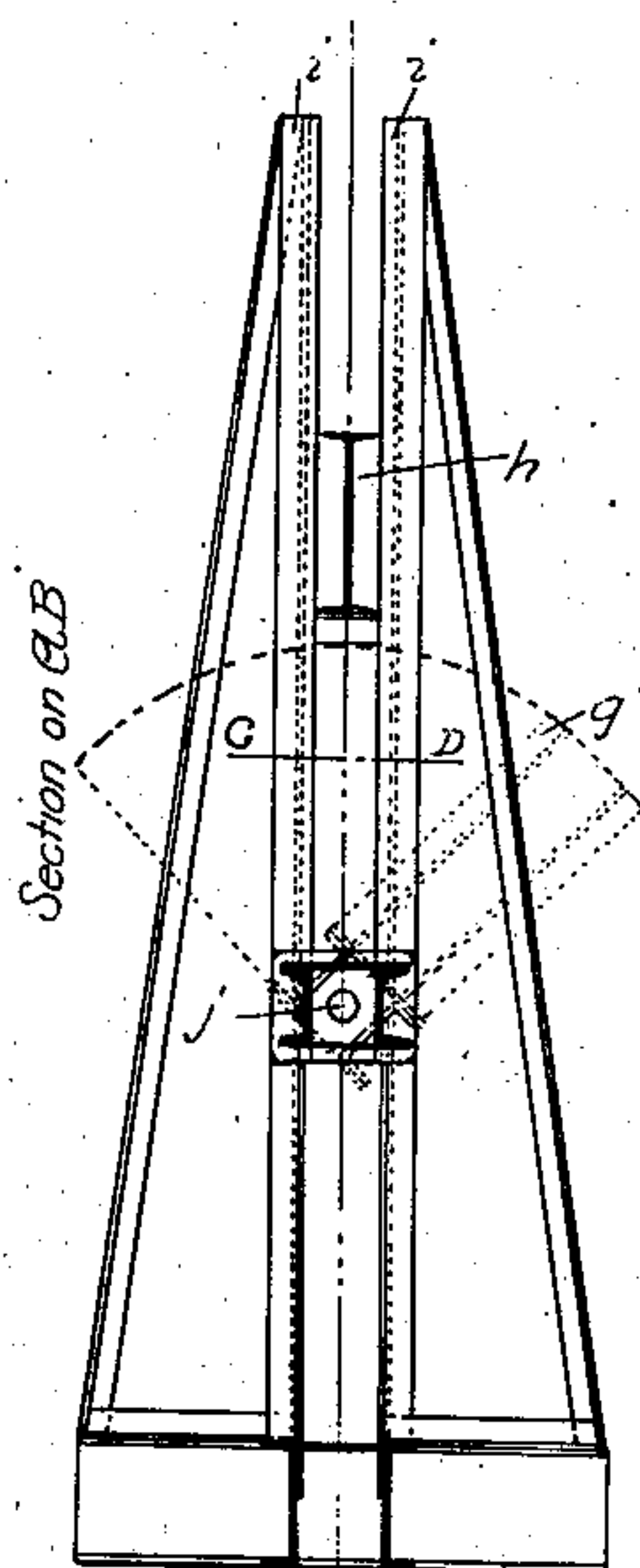
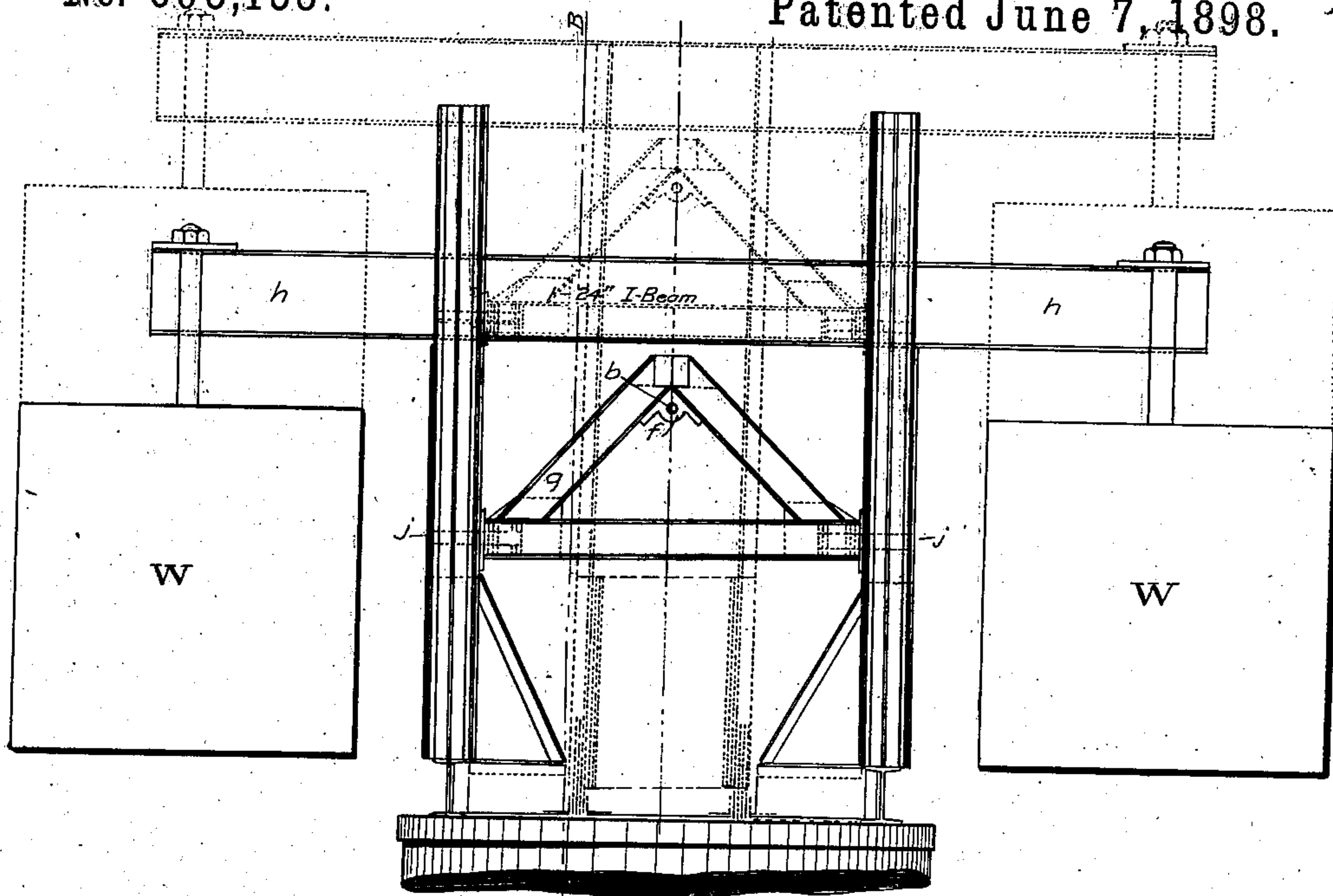


Fig. 5.

Fig. 4.

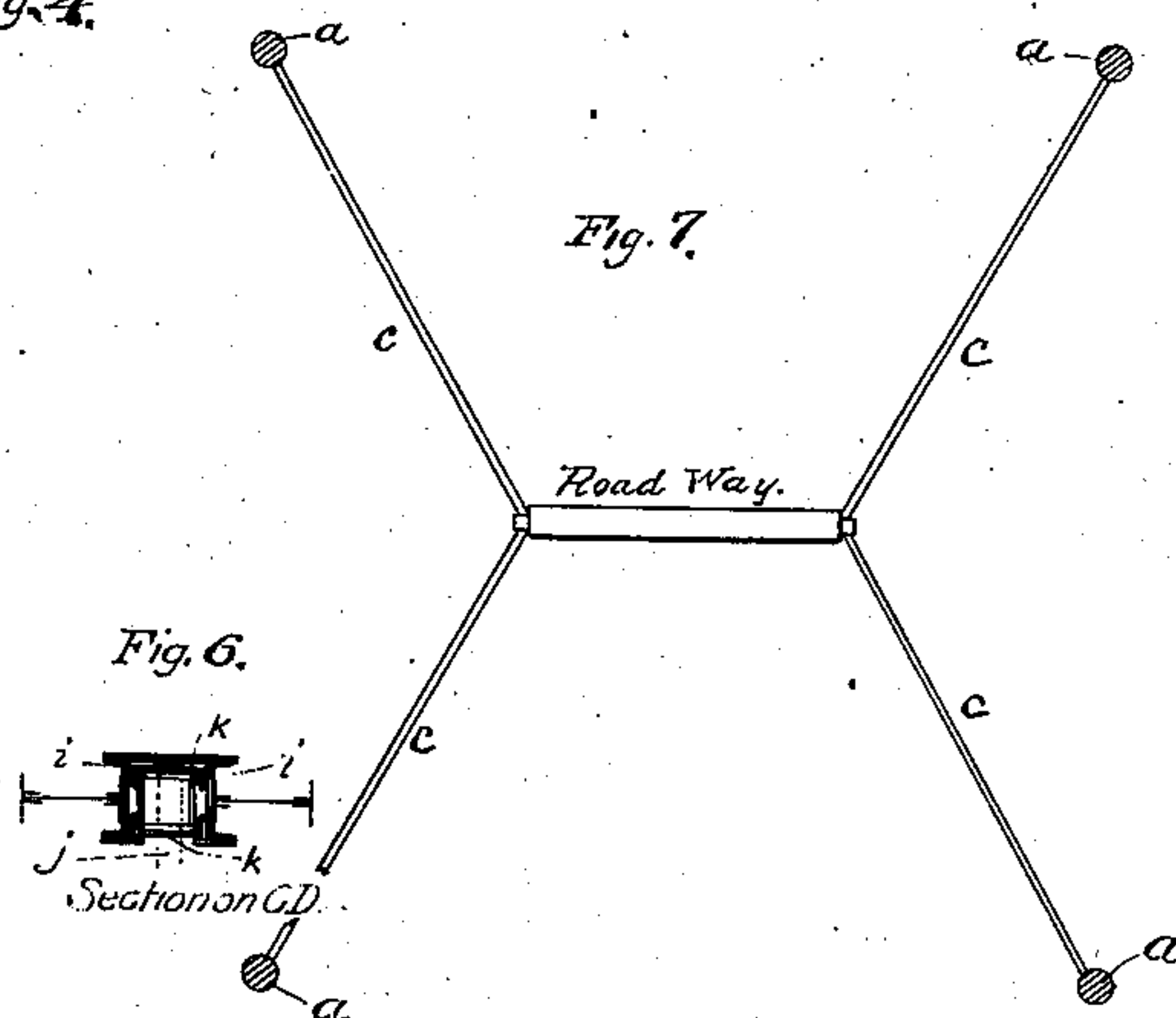


Fig. 6.

Fig. 7.

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# UNITED STATES PATENT OFFICE.

JOHN A. L. WADDELL AND IRA GRANT HEDRICK, OF KANSAS CITY,  
MISSOURI.

## SUSPENSION-BRIDGE.

SPECIFICATION forming part of Letters Patent No. 605,153, dated June 7, 1898.

Application filed October 14, 1897. Serial No. 655,138. (No model.)

*To all whom it may concern:*

Be it known that we, JOHN A. L. WADDELL and IRA GRANT HEDRICK, citizens of the United States of America, and residents of Kansas City, county of Jackson, and State of Missouri, have invented certain new and useful Improvements in Suspension-Bridges, of which the following is a specification.

Our invention relates to improvements in the construction of suspension-bridges which greatly reduce its cost and at the same time make the structure satisfactory in every respect. We attain these objects by the arrangement of cables and towers illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the entire structure. Fig. 2 illustrates a tower as seen from the bridge. Fig. 3 is a side elevation of a single tower. Fig. 4 is a detail view of the weight adjustment for the lower cables. Fig. 5 is a detail in elevation showing the rocking construction of the lower-cable angle. Fig. 6 is a plan section of the guide and the weight-beam support. Fig. 7 is a detail view showing the inward deflection of the suspending-cables *c c* to their immediate connection.

Like letters of reference denote corresponding parts in the several views of the drawings.

*a a* are the upper cables.  
*b b* are the lower cables.  
*c c* are the suspending-cables.  
*d d* are vertical towers.  
*e e* are the hinged bottoms of the towers *d d*.  
*g g* are the small rockers. *f f* are saddles secured thereto, to which the lower cables *b b* are fastened.

*j j* are axles upon which the small rocker turns.

*k k* are vertical channels in which the axles *j j* turn.

*i i* are vertical guides for the channels *k k*.  
*h h* are I-beams bearing the weights *w* and supported upon the channels *k k*.

The upper cables *a a* carry the load to the tops of the rocking towers *d*. The lower cables *b b*, which are connected firmly to the upper cables *a a* by means of the suspenders *c c*, tend to hold the upper cables *a a* to a perfect curve at all times, and thus prevent any undue deflection of the said upper cables. The suspenders *c c* are made tight and the

tension is kept constant by means of an automatic adjustment, which will be fully described later. The vertical towers *d d* are hinged at the bottom *e*, so as to be free to move parallel to the central line of the bridge, thus allowing an adjustment of the stresses in the top cables from span to span. The top cables *a a* may be made continuous from anchorage to anchorage; but they must be firmly attached to the tops of towers *d d* by means of saddles. The object of the small rockers *g g* is to allow the cables *b b* to adjust themselves freely from span to span. The weights *w w* are just heavy enough to put the greatest safe load on the lower cables *b b*. The combined object of the weights *w w*, the I-beam *h*, the guides *i i*, the vertical channels *k k*, and the small rockers *g g* is to provide an automatic adjustment of the lower cables, so that, no matter what are the conditions of temperature, loading, or other circumstances which might affect the position of the upper cables *a a* or the lower cables *b b*, the lower cables will always exert the same downward pull on the upper cables *a a*, the weights moving up or down, according to the conditions of loading or temperature.

With the style of suspension-bridge described in this specification we dispense with the stiffening-truss, which is a very costly item in the ordinary suspension-bridge, the lower cables *b b* serving in its stead to prevent any irregular deflection in the upper cables *a a*, which would result from the application of the live load on the bridge. The rocking towers make it practicable to build an indefinite number of such spans, all connected in the same manner, as shown for the two in Fig. 1, at a very much less cost than rigid towers could be built. Both the upper cables *a a* and the lower cables *b b* are cradled in the horizontal direction to provide for resisting the wind-pressure on the spans. All the suspending-cables *c c* are also inclined from the cables *a a* and *b b* toward the center of the bridge.

Having described all that is necessary to a full understanding of our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a suspension-bridge, the combination



of one or more towers, pivoted at their lower ends so as to tilt lengthwise of the bridge, with cables connecting the upper ends, and cables connecting the lower ends of the towers, and suspenders holding the upper and lower cables in inverted curves as to each other, as shown.

2. In a suspension-bridge, the combination of one or more towers, pivoted at their lower ends so as to tilt lengthwise of the bridge, cables connecting the upper ends and cables connecting the lower ends of the towers, and suspenders holding the upper and lower cables in inverted curves as to each other, with weights at the lower connection of the cables, to take up the slack and distribute the load over the whole bridge, substantially as shown.

3. In a suspension-bridge of the construction substantially as set forth, the rockers

*g g*, the weights *w w*, the beam *h*, and the guides *i*.

4. In a suspension-bridge having lower cables, a connection between spans, which is above the bearing of a pivoted anchorage, so as to permit an adjustment of those cables lengthwise of the bridge, substantially as shown.

5. The combination of the lower cables *b b*, the rocker-bents *d d*, the small rockers *g g*, and the automatic adjustment composed of the weights *w w*, the beam *h*, and the guides *i i*, in a suspension-bridge as herein described.

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Witnesses:

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