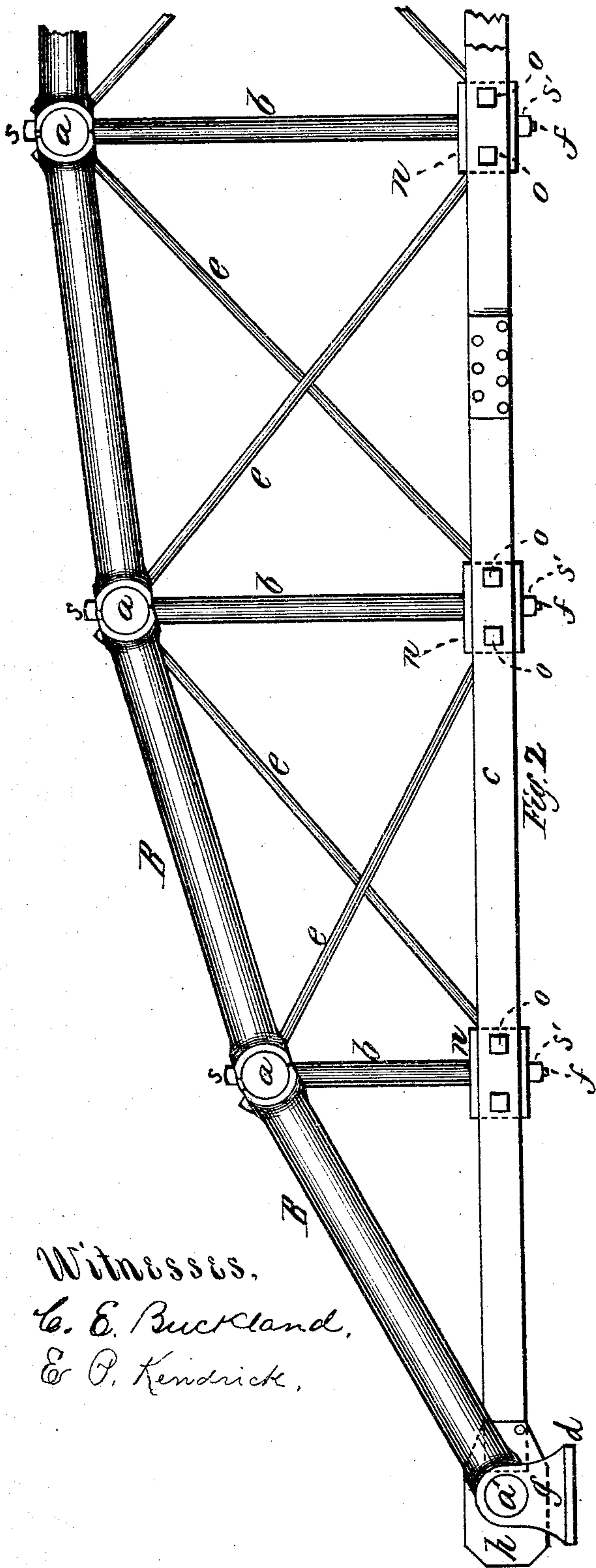


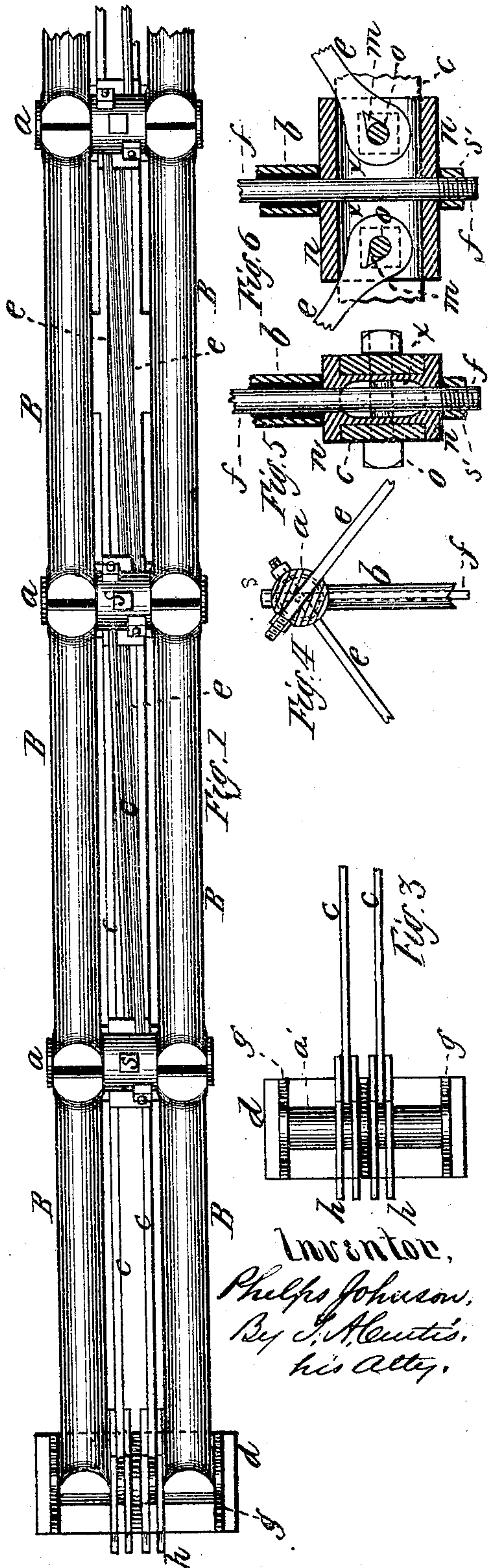
**P. JOHNSON.**  
**Iron Bridges.**

No. 144,766.

Patented Nov. 18, 1873.



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# UNITED STATES PATENT OFFICE.

PHELPS JOHNSON, OF SPRINGFIELD, MASSACHUSETTS.

## IMPROVEMENT IN IRON BRIDGES.

Specification forming part of Letters Patent No. **144,766**, dated November 18, 1873; application filed October 29, 1873.

*To all whom it may concern:*

Be it known that I, PHELPS JOHNSON, of the city of Springfield, State of Massachusetts, have invented an Improvement in Truss-Bridges, of which the following is a specification:

The object of my invention is to provide a truss-bridge in which the top chord or arch of each truss is composed of two members, each member forming an arch or the segment of an arch, which are placed sufficiently far apart that the ties, struts, and diagonal braces, which extend from the bottom chord upward, may take their bearing in the king-bolts above, between the two arch members of the top chord, so that all loads or strains transmitted from the bottom chord or tie (on which the flooring rests) to the top chord or arch shall take effect centrally upon the king-bolts and between the two arch members, instead of outside the arch, and partially sidewise, as is the case when the ties, struts, and diagonal braces have their connection in the top chord outside of the arch members, owing to the springing of the needle or floor beams under the impact of rapidly-moving or excessive loads, and consequent deflection of the inside portion of the bottom chord below the outside portion, causing undue strain in the brace extending from at or near the deflected side of the chord to the corresponding side of the top chord or arch.

In the drawings, Figure 1 is a plan view of the arrangement of all the members of so much of the truss as is necessary to show my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a plan view of the wall-plate and bolt and bottom chord attached thereto. Fig. 4 is a vertical section through one of the king-bolts at the line of the diagonal braces. Fig. 5 is a vertical transverse section through the tie-block at the line of the vertical tie and strut, and Fig. 6 is a longitudinal vertical section through the tie-block on the line of the diagonal braces; the two last-mentioned figures being enlarged to show more fully and clearly the details of construction.

The wall-plate *d* is provided with three uprights, *g*, in which the ends and middle of the end bolt *a'* has its bearings; and attached to the end bolt *a'*, by means of the plates *h*, is

the bottom chord, consisting of the two members *c*, extending from the end bolt *a'* at one end of the truss to the end bolt at the other end. Placed at suitable distances apart are the tie-blocks *n*, having a longitudinal recess in each side, into which are fitted the members *c* of the bottom chord, as shown clearly in section in Figs. 2 and 5. The tubular sections *B* of the arch members of the top chord have their ends made concave to fit well against the cylindrical exterior of the king-bolts *a*, against which the ends of the sections have their bearing. A hollow or tubular strut, *b*, has a horizontal bearing against the lower side of the king-bolt *a*, and also at the lower end upon the top of the tie-block *n*; and a vertical tie, *f*, provided with a nut, *s*, at the top, passes down through a hole in the king-bolt *a*, and through the tubular strut *b*, and also through the tie-block *n*, with a threaded nut turned upon the lower end. A bolt, *o*, is passed transversely through each end of each tie-block *n*, passing through an eye, *m*, in the lower end of each diagonal brace *e*, which extends from each tie-block *n* diagonally upward to and through the next king-bolt *a*, and is secured thereto by a thread and nut at the top. The nuts being all turned up snugly, so that all the ends of the tubular sections *B* of both arch members have a firm bearing against the king-bolts *a*, and the tubular struts *b* have a firm bearing at their upper ends against the king-bolts *a*, and at their lower ends upon the tie-blocks *n*, two or more of these trusses are placed side by side, with the wall-plates *d* properly set upon the abutments. The floor-timbers are secured to the bottom chord *c* of both trusses, and the floor laid in the ordinary manner.

It will be seen that all the weight or load that may be brought to bear upon either member *c* of the bottom chord, or upon both, communicates the strain to the whole length of the arch midway between the two members *B* of the top chord; consequently there is no tendency to load the arch unequally and bring a side strain upon it, even if the members of the bottom chord are loaded unequally. This feature is an important one, owing to the comparatively great width given to the compression or top chord, and the bridge, thus con-

structed, is thereby rendered more steady and more free from lateral vibration, and will sustain more weight applied unequally—the sectional area of the chords being equal—than when the two top members B are placed near each other, and the members of the bottom chord are placed farther apart, so that the braces and ties take their bearing upon the outside of both members B of the top chord, owing to the danger of unequal loading of the braces. This construction also admits of the use of a bottom chord of the minimum width, avoiding in a great degree any lateral vibration of the trusses from the springing of the floor-timbers.

Having thus described my invention, what I claim as new is—

1. The combination of the double arch made

in sections, B, with the king-bolts *a*, vertical ties *f*, struts *b*, diagonal braces *e*, tie-blocks *n*, bottom chord *c*, and end bolts *a'*, substantially as described.

2. A truss-bridge wherein the arch or top chord is composed of two members extending parallel with each other, and connected by king-bolts *a*, extending from one member to the other, and with the ties, struts, and braces extending upward from the bottom chord, and taking a bearing between the two members of the top chord or arch, substantially as described.

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Witnesses:

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