Herrey & Osborn.

Suspension Bridge.

No. 13,461. Patented Aug. 21, 1855.

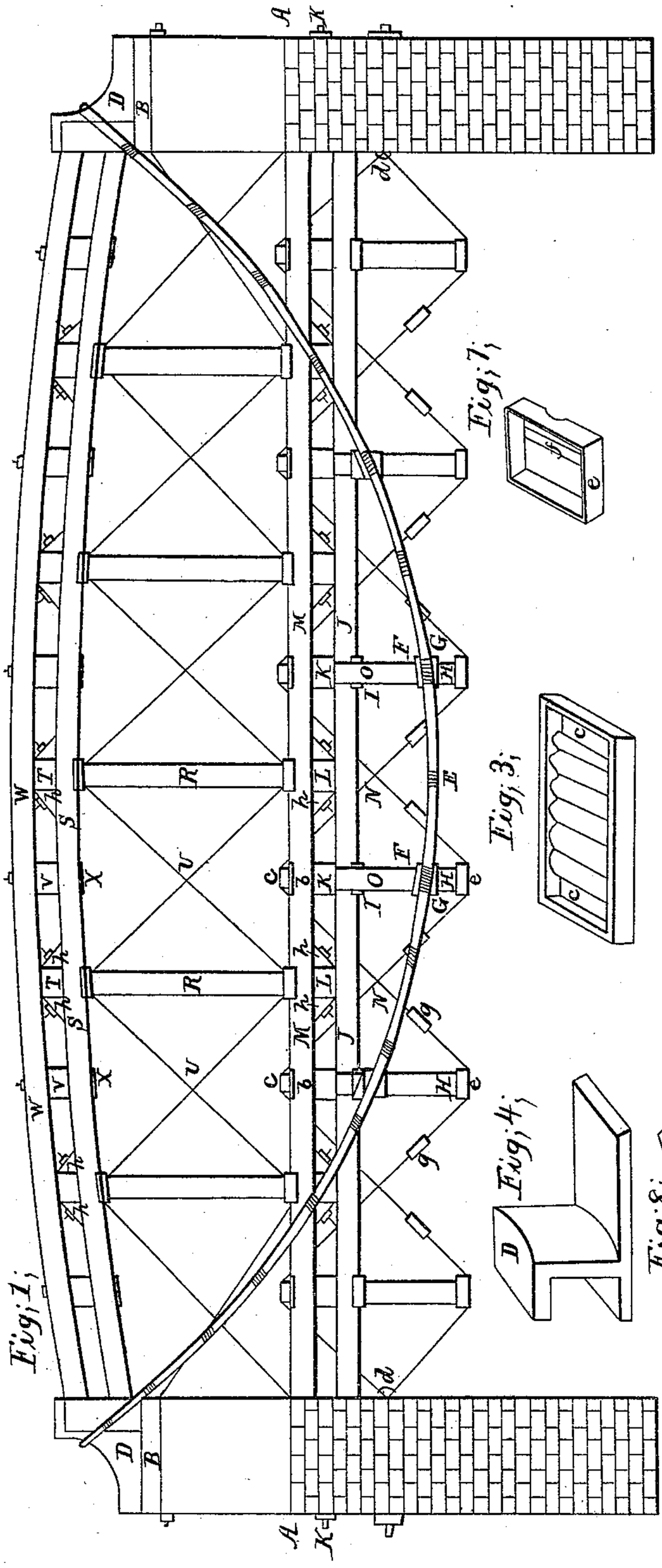

Fig. 1.

Fig. 7.

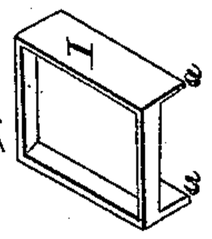

Fig. 6.

Fig. 3.

Fig. 5.

Fig. 4.

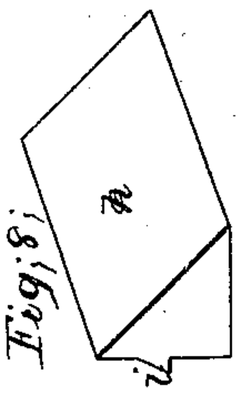

Fig. 8.

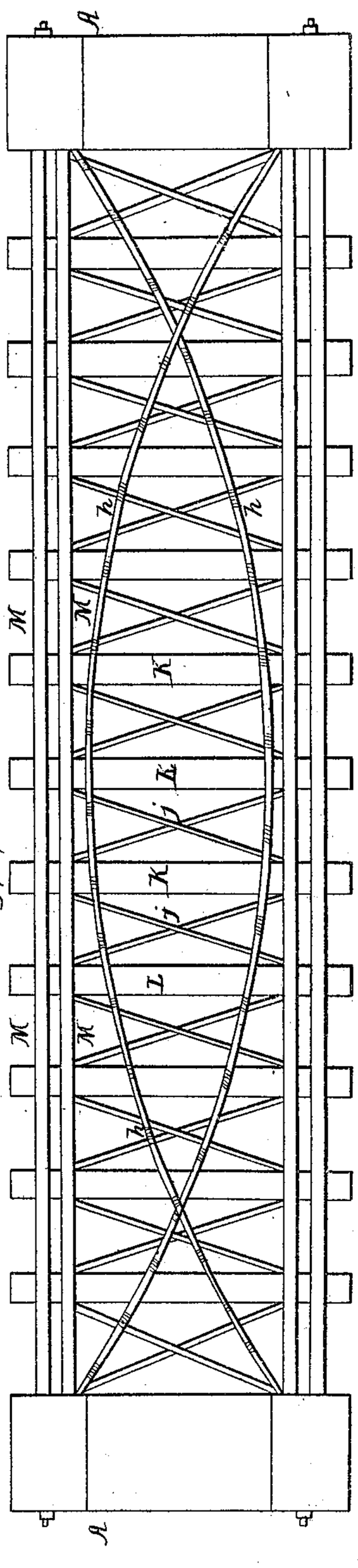

Fig. 2.

UNITED STATES PATENT OFFICE.

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BRIDGE.

Specification of Letters Patent No. 13,461, dated August 21, 1855.

To all whom it may concern:

Be it known that we, HORACE L. HERVEY, of Quincy, in the county of Adams and State of Illinois, and ROBERT E. OSBORN, of Springfield, in the county of Summit and State of Ohio, have invented certain new and useful Improvements in Bridges; and we do hereby declare that the same are described and represented in the following specification and drawings.

To enable others skilled in the art to make and use our improvements we will proceed to describe their construction and use, referring to the drawings in which the same letters indicate like parts in each of the figures.

Figure 1, is an elevation of one side of our improved bridge. Fig. 2, is a plan showing the floor timbers and the lateral cables. The other figures in the drawing will be referred to in the specification.

The nature of our invention consists in arranging the abutment suspension blocks so as to traverse on the abutments in combination with an adjustable suspension truss and an arched truss, so that the camber of the bridge may be increased or diminished in connection with the tension chord, so as to increase the strength of the bridge by lessening the strain on any one point and distributing it to many points. Also in so constructing and arranging the blocks which sustain the tension braces of the tower or suspension section, that they will slide on the string pieces, so as to equalize, distribute and proportion the load more uniformly and over a larger portion of the bridge. And further in supporting the floor timbers alternately or successively by the arch and suspension trusses.

In the accompanying drawings A, A, are the abutments or towers supporting the bed plates B, B, which bed plates are provided with a series of rollers C, C, as represented in Fig. 3, upon which the suspension blocks D, D, rest and traverse. One of the suspension blocks is represented in Fig. 4. The suspension cables, which may be made of wire in the usual manner, one of which is seen at E, passing around the blocks D, D, and supporting the lower or suspension truss frame by means of the flanges or projections F, F, on the boxes G, G, which boxes surround the posts H, H, the flanges resting on the cables. One of the boxes G G is represented in Fig. 5. They are fitted to move up and down upon the posts H, H.

The upper ends of the posts H, H, are provided with metal sockets I, I, one of which is shown in Fig. 6, provided with flanges *a*, *a*, to embrace the stringers or chords, J, J, below the floor timbers K, K, which stringers have their ends resting in the abutments A, A. The floor timbers L, L, which are sustained by the upper or arch truss are placed upon the chords J, J, alternately between the timbers K, K; and the chords M, M, are laid across both sets of floor timbers as represented with their ends resting in the abutments A, A.

There are some metal plates *b*, *b*, placed on the chords M M for the blocks *c*, *c*, which sustain the suspension braces N, N, of the suspension truss, to rest and traverse upon. The suspension braces N, N, are arranged as represented and secured to each abutment by the eye bolts *d*, *d*, and pass alternately over the blocks *c*, *c*, and under the sockets *e*, *e*, upon the lower ends of the posts H, H, which sockets are made so as to surround the foot of the posts and provided with an opening *f*, in the bottom for the escape of moisture, as represented in Fig. 7. These suspension braces N N are made in separate pieces of convenient lengths and connected together by swivel links *g*, *g*, with a female screw in one end fitted to the male screws on the ends of the braces, so as to loosen or tighten them as required.

There are some short posts O, O, placed each side of the suspension truss frame between the flanges F, F, (on the boxes G, G,) and the floor timbers K, K, so that the suspension truss frame and cables E, E, may unitedly sustain the load upon the bridge.

The posts R R of the arch truss frame are provided with metal sockets I, I, like the one represented in Fig. 6, with flanges to embrace the chords M M right over the floor timbers L, L; the sockets on the upper ends of the posts embracing the chords S, S, right under the upper floor timbers T, T, which rest upon the chords S, S, as represented.

There are a series of triangular metal blocks *h*, *h*, placed on the chords S, S, each side of the floor timbers T, T, and under the chords M, M, each side of the floor timbers L, L, which blocks are perforated for the suspension braces U U of the arch truss frame which are provided with screw nuts which are screwed up against the blocks *h*, *h*, to support the arch truss frame. One of the blocks *h*, *h*, is shown in Fig. 8, provided with

a flange *i*, which is inserted in a mortise made to receive it in the floor timbers T, T, and L, L. There is a series of floor timbers V, V, placed half way between the timbers T, T; and the arch stringers W, W, are put on the top of all the timbers, and a hole bored through the stringer and timber V; and a metal plate X put under the chords S, S, and bolts are put through the plates timbers and stringers so as to clamp the whole firmly together as represented in the drawing. The ends of the chords S, S, and arch stringers W, W, are fitted to the recesses Y, in the suspension blocks D, D. There are a series of braces *j*, *j*, framed in between the floor timbers K K and L, L, as represented in the drawing Fig. 2, and a similar set of braces between the floor timbers T, T, and V, V.

There are some scores cut across the floor timbers K, K, and L L for the lateral cables Z, Z, which cables prevent the bridge from vibrating sidewise and make it very firm, and support it against the pressure of the wind, and any motion sidewise that the loads passing over might have a tendency to give it. The lateral cables Z, Z, are fastened to the abutments A, A, by the eye bolts *k k* which extend through the abutments.

The abutment blocks D D being on rollers move readily and admit of the diminution of the camber of the upper chords S, and W, when the load is passing over the bridge which they would not do if the blocks D, D, were permanent. But the office of the tension chord E is to increase the stiffness of the arched truss by preventing the diminution of the camber in the upper chords; and if this tension chord was so made and adjusted that its extremities at (D D) should always be at the exact distance they now are from each other, it is evident the camber of the upper chords must be unchanged. But the tension chord being in this case an endless one; and always of the same length; the adjustment of the camber of the bridge is effected by making the abutment blocks traverse within the tension chords, and the blocks *c*, *c*, to traverse on the chords M, M, thereby allowing the tension chord E, to become more or less arched to adapt itself to the degree of camber given to the trussed arch or bridge. In the usual combination of the arched truss with the tension chord the struts corresponding to O, O, are fixed; and the tension chord is tightened or loosened by means of screws which throws the principal strain on those points at the bridge immediately over the struts corresponding to O, O.

By the above described construction and arrangement the suspension cables support the suspension truss, and when the bridge is loaded the weight tends to draw the suspension blocks toward each other, which tends to spring up the arch truss, and in doing so compels it to support the suspension truss with the load upon it. But if the load be placed on the arch truss, or upper tier of floor timbers its tendency is to straighten the chords and stringers of the arch truss, and push the suspension blocks apart and straighten the cables, and compel them and the suspension truss to support the arch truss. Hence it is apparent that if the load is applied in either place the several parts of the bridge unite in sustaining and supporting it.

By making the suspension blocks of the cables, and the suspension blocks of the suspension braces, to traverse, we compel each part of the bridge to sustain and support its proper proportion of the load, and distribute the strain or weight of the load more uniformly over the several parts of the bridge, without compelling any particular part to sustain more than its proper share.

By the use of metal sockets at the joining with openings for the escape of moisture the tendency to decay is very much lessened.

We believe we have described the construction and use of our improvements, so as to enable any person skilled in the art to make and use them, we will now specify what we desire to secure by Letters Patent.

We claim—

1. The arrangement of the blocks D D and posts O, O, in combination with the adjustable suspension truss the arched truss and the tension chord E, so that the camber of the bridge may be increased or diminished by the adjustment of these blocks in connection with the tension chord E, so as to increase the strength of the bridge by lessening the strain on any one point, by distributing it to many points, by means of the adjustable blocks substantially as described.

2. We claim constructing and arranging the blocks *c*, *c*, which sustain the tension braces of the suspension truss so that they will slide or traverse on the string pieces M, M, substantially as described; so as to equalize, distribute and proportion the load more uniformly and over a larger portion of the bridge.

3. We claim supporting the floor timbers K, K, and L L alternately or successively by the arch and suspension trusses substantially as described.

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Witnesses to the signature of Horace L. Hervey:
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