R. DE T. LAWRENCE.

Bridge.

No. 238,130. Patented Feb. 22, 1881.

Fig. 1.

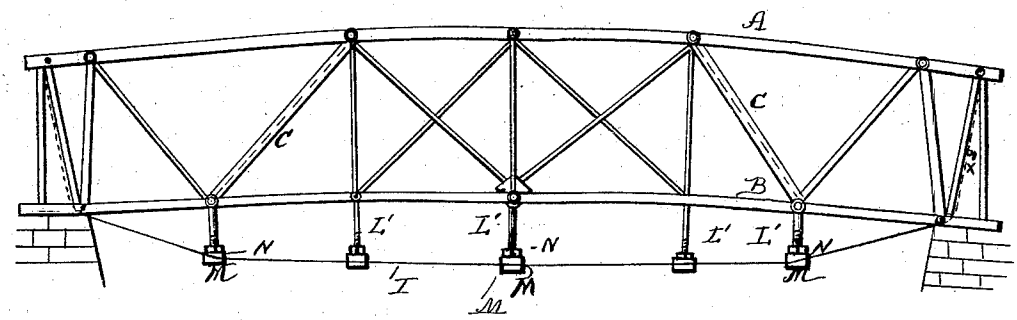


Fig. 2.

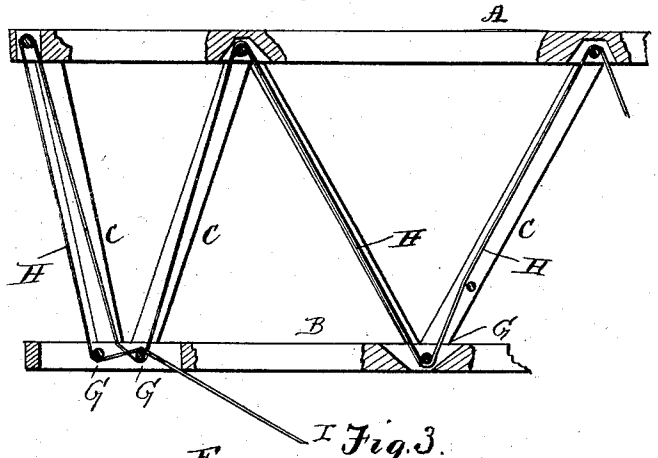


Fig. 3.

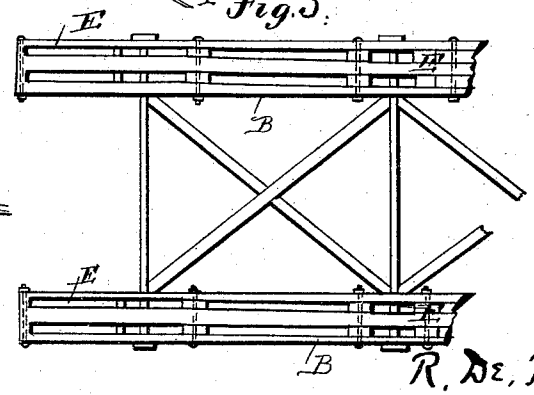
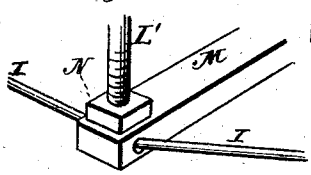


Fig. 4.



WITNESSES

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UNITED STATES PATENT OFFICE.

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BRIDGE.

SPECIFICATION forming part of Letters Patent No. 238,130, dated February 22, 1881.

Application filed December 6, 1879.

To all whom it may concern:

Be it known that I, ROBERT DE T. LAWRENCE, of Chickamauga, in the county of Hamilton and State of Tennessee, have invented certain new and useful Improvements in Combination Bridges; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention has for its object to construct a bridge combining the advantages of the suspension, truss, and arch systems of bridges, and which will possess the greatest amount of strength with a minimum amount of weight and material.

To this end the invention consists in the combination, with the upper and lower arched girders or chords of a bridge and their connecting posts, braces, and rods, of a series of wire-ropes extending alternately from the tops of the posts and braces to the bottoms of the same, around the ends of the transverse connecting-rods of the girders or iron castings held by these rods, the ends of the said ropes being connected, and the ropes extending longitudinally under the lower girders or chords in an approximate arc of a circle, being braced against said chords by means of a series of adjustable plates, and having the ends secured together in any suitable manner, as more fully hereinafter explained.

In the drawings, Figure 1 represents a side elevation of my improved bridge; Fig. 2, a longitudinal section through one of the upper and lower longitudinal girders. Fig. 3 represents a top view of the lower girders of the bridge and their connections, and Fig. 4 a detail perspective enlarged.

The letters A and B indicate, respectively, the upper and lower girders of the bridge, each of which is composed of a number of beams, E, united by means of bolts with intermediate open spaces, in which the ends of the posts and braces C are stepped.

The letter H indicates a series of wires extending over the top of the braces, at one end of the bridge, down under the bottom of the succeeding brace, then over the top of the same, and so on, and at the center down under the bottom of the central counter-braces, then over the top of the next brace and under the bottom of the same, and finally under the top of the end braces. The wires, in passing up and down, as shown, are carried around the transverse connecting rods or bolts G. The wires I are a continuation of the wires H, and the ends of this series of continued wires are secured firmly together at one end of the bridge by any suitable means. The said wires I extend downwardly near the ends of the arched girders B, and are held, approximately in the shape of an arc of a circle, by means of a series of adjustable braces, L'. The posts L' are screw-threaded at their lower ends, and are provided with screw-nuts N and abutments M, upon which the wires rest, and by means of which nuts the series of wires may be tightened in the construction or repair of the bridge.

The parts as above combined give to the whole bridge the proper degree of elasticity, while at the same time the requisite amount of firmness is maintained, and as the suspension-wires below the bottom of the lower girders are continued over the braces and between the girders the wires H sustain as much of the weight and load as the suspension-wires I below, and their combined strength is thus added to the bridge, tending to counteract the breaking or pulling force on the bottom girders, and, to some extent, to transfer the weight from the center to the ends of the bridge in equal proportions without the usual accumulation at any one point, a part of the weight being immediately transferred by the wires to the abutments supporting the bridge.

The bridge as thus constructed, it will be observed, possesses all the advantages of a truss, suspension, and arch bridge combined, and can be made of lighter material and greater span than any of the bridges constructed on the truss plan singly.

From the construction described and shown the simplicity and efficiency of the arched bridge, having a truss and a suspension-wire, will be apparent.

What I claim as new is—

The bridge herein described, consisting of the arched girders A B, the posts arranged vertically between said girders, the braces C, the screw-threaded truss-braces L′, the nuts and abutments M N, and continuous series of wires H I, all constructed, arranged, and combined to operate with the transverse bolts G, as and for the purposes herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 20th day of September, 1879.

ROBERT DE TREVILLE LAWRENCE.

Witnesses:
JNO. M. ELLIS,
S. G. ROBINSON.