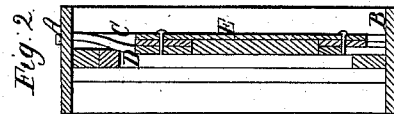
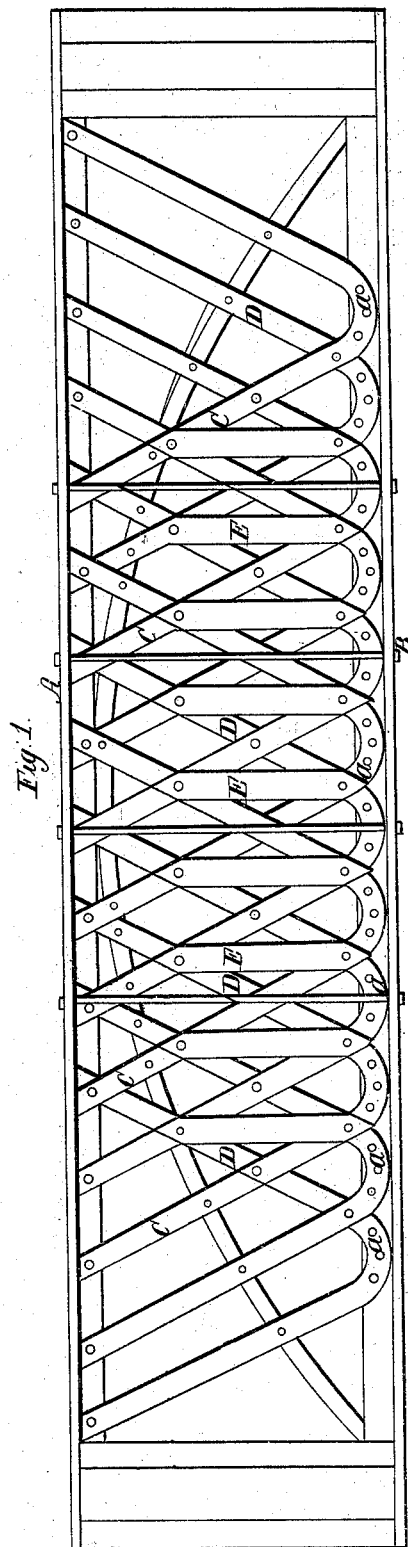


J. Boles, Jr.
Truss Bridge.

N^o 48,013.

Patented May 30, 1865.



Witnesses;
Frederick Burtis,
J. P. Hale Jr.

Inventor;
John Boles Jr.
by his attorney
R. W. Eddy

UNITED STATES PATENT OFFICE.

JOHN BOLES, 2d., OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN BRIDGES.

Specification forming part of Letters Patent No. **48,013**, dated May 30, 1865.

To all whom it may concern:

Be it known that I, JOHN BOLES, 2d., of Boston, in the county of Suffolk and State of Massachusetts, have made a new and useful invention having reference to trusses for bridges, roofs, &c.; and I do hereby declare the same to be fully described in the following specification and represented in the accompanying drawings, of which—

Figure 1 is a side elevation of a truss constructed in accordance with my invention. Fig. 2 is a vertical and transverse section of it.

My invention has reference to what is termed "lattice" trusses, or those which have diagonal braces and counter-braces crossing one another, so as to form quadrilateral openings at the crossings of four of such braces, such invention consisting in uniting each two straight braces or a straight brace and a counter-brace by curved or arched connections, to be fastened to the chord at the union of such braces.

And my invention also consists in a combination of a series of diagonal struts with the braces and counter-braces and their quadrilateral openings, the whole being arranged substantially as hereinafter described.

In the drawings, A and B are the top and bottom chords of the truss, and C C C, &c., and D D D, &c., are the braces and counter-braces of such truss, they being arranged between the chords, so as to cross one another, in manner as shown in Fig. 1. The foot of each brace is connected with that of each counter-brace D by means of an arched or curved connection or continuation of both of such braces, the same being as shown at *a*, such connection being bolted to the bottom chord. In the same manner, if desirable, each of the braces, at its upper end, may be connected with some one of the counter-braces. This method of connecting the braces and counter-braces is particu-

larly useful when they are made of thin iron bars, and it affords increased strength to the truss, and particularly to the chord to which the connection may be bolted. Another mode of carrying out my invention is to unite each two of the braces, as well as each two of the counter-braces, by means of an arch-connection, or combination of them, as described, there being such a connection at the two lower parts of the braces, and, if desirable, at the upper parts thereof. Furthermore, I arrange within each of the quadrilateral openings of the lower range or ranges of such openings of the braces and counter-braces what I term a "diagonal upright strut," E, which is to overlap the braces and extend into or through its openings in manner as shown in the drawings, and is to be bolted to the braces at their crossings. These struts serve to prevent sagging of the truss. They contribute greatly to its strength, as well as to relieve from strain the bolts of the crossings to which such struts are connected. They also answer other useful purposes.

Having thus described the nature of my invention and the manner of constructing the same, what I claim is as follows, viz:

1. The combination of the series of arch-connections *a a a*, the straight braces and counter-braces and their chord or chords, the whole being arranged substantially as set forth.

2. The combination of the series of diagonal upright struts E E with the system of braces and counter-braces and their chords, the whole being arranged substantially as specified.

In testimony whereof I have hereunto set my signature.

JOHN BOLES, 2d.

Witnesses:

R. H. EDDY,
F. P. HALE, Jr.