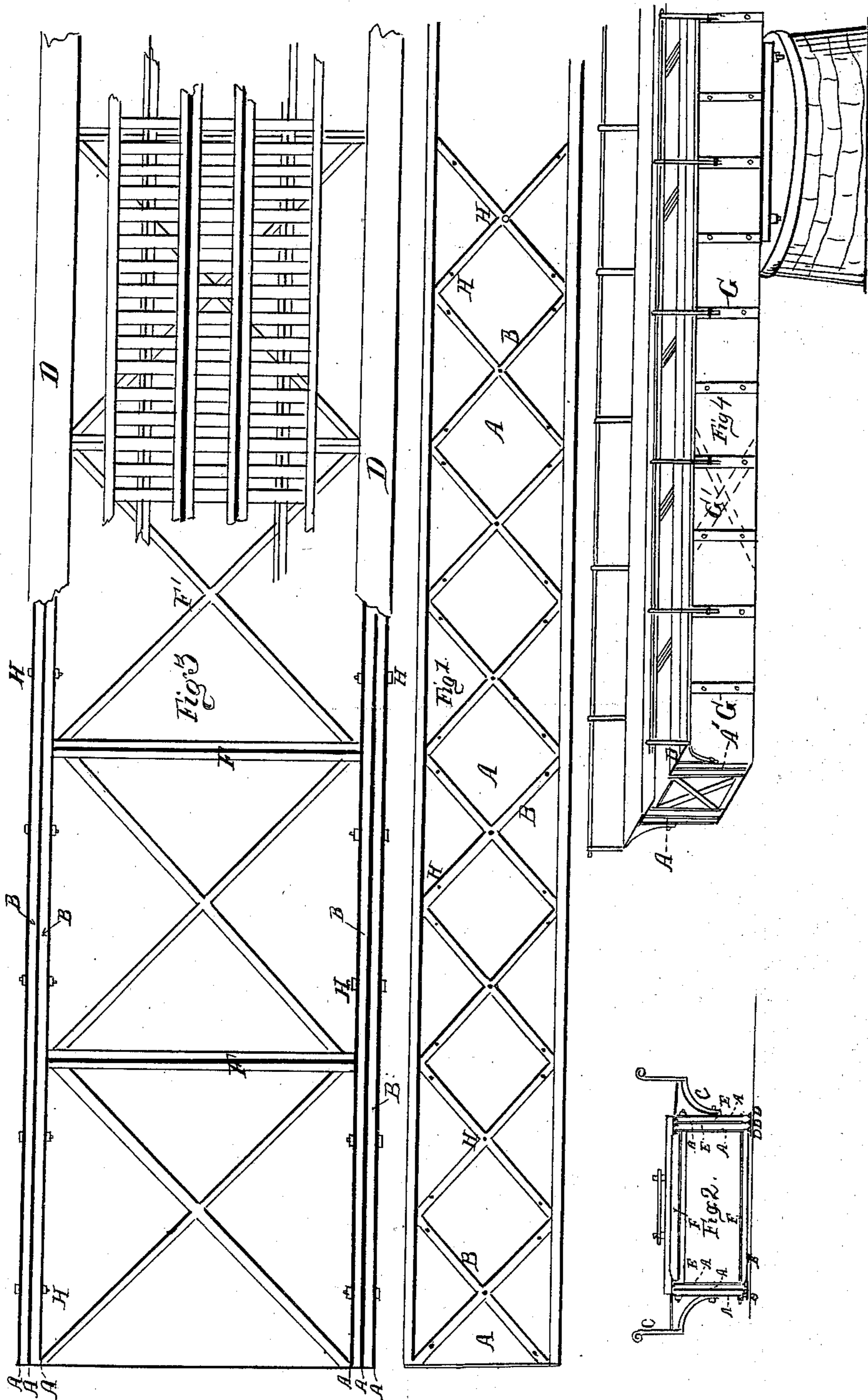


*E. Hamilton,
Truss Bridge.*

No. 78,202.

Patented May 26, 1868.



*Witnesses.
James Price
Wm. D. Lloyd.*

*E. Hamilton Inventor
Chicago Illinois
By A. J. Fowler his
Att'y in Fact*

United States Patent Office.

EDWARD HAMILTON, OF CHICAGO, ILLINOIS, ASSIGNOR TO HIMSELF AND
MATTHEW D. RAPP, OF SAME PLACE.

Letters Patent No. 78,202, dated May 26, 1868; antedated May 9, 1868.

IMPROVED BRIDGE.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, EDWARD HAMILTON, of the city of Chicago, in the county of Cook, and State of Illinois, have invented a new and useful Improvement in the Construction of Bridges; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a section of chord, with the front plate left off, showing the bracing.

Figure 2 is an end view, showing roadway and foot-path or sidewalk.

Figure 3 is a plan or top view, with a portion of the cap and superstructure for railway, a part being cut away to show the top of the chords and the bracing more distinctly.

Figure 4 is a perspective view of a portion of a draw-bridge.

Similar letters of reference in the several figures indicate corresponding parts in the drawings.

The nature of my invention consists in so constructing a bridge of iron, or wood and iron, as to combine, with lightness, great strength and durability. To do this I construct my chords with a combination of thin, but wide sheets of metal, iron, or steel, with wood or iron bracing between the sheets to prevent them from bulging or buckling, so as to mar or destroy their power of resistance to great pressure. These sheets of metal are put in edgeways, as shown in the drawings clearly at A. If wood bracing is used in the chords to prevent the bulging or buckling of the metallic sheets, it should be put in so close or thick as to prevent the same, and this can be done so as to add lightness with economy of construction and great strength to the structure.

A model bridge constructed by me for the purpose of testing this principle, about five feet long, and weighing thirty-seven and a half pounds only, stood a test, under pressure, of over twenty tons.

It should also be stated that if wood is used in the chords, the top and bottom should be covered with metal, to shut out the atmosphere, to prevent the wood from rotting, and add durability to the structure, as it is a well-known fact that if the wood can be kept from contact with the air and atmospheric changes, it will retain its soundness for a great length of time, and, in fact, become almost as durable as iron.

The great object I have in view is to so use the metal sheets in such a manner edgeways as to obtain the greatest force of resistance to pressure which the metal is capable of standing, and at the same time secure the durability of the bridge, lightness of structure, and economy in mode of construction.

To enable others skilled in the art I will now proceed to describe my invention, and its mode of construction.

It will, however, be clearly understood from the foregoing, and the drawings, that the principles evolved in my plan of construction could and might be applied to many distinct forms of building. For draw-bridges and many other structures the plates should be widest in the centre, or so as to stand the greatest strain where it is mechanically shown to need or require it.

This principle may also be applied to streamers, girders, and timbers of great length, used to support heavy structures, as shown in the chords of the drawings.

A A are the sheets of metal used in the chords or girders, suitably braced by means of wood or iron between the sheets of metal A, and firmly-held together by means of bolts and straps. This bracing of wood or iron on the inside, and between the sheets of metal A and the straps, G, on the outside, should be so constructed and formed as to prevent bulging or buckling of the sheets A. This feature, in combination with the angle-irons at top and bottom of the chord, is the one upon which I predicate the importance and value of my invention, in connection, however, with the fact of multiplying the divisions in the chord to any extent desired to obtain the strength required for the structure. I am aware that setting sheets or plates of iron on edge to form chords or bridge-girders is not new, but the filling and bracing, as clearly indicated by the drawings, together with the division of the chords and multiplicity of parts for adding strength to the structure, are distinctive features of novelty and great utility.

B is the bracing between the sheets of metal A, and may be of wood, iron, or steel, and is required to be

so well or closely fitted in as to prevent buckling of the sheets. C are brackets for the support of foot-paths or sidewalks upon each side of the bridge, and may be made or constructed in any suitable manner for the purpose intended. D D are the angle-irons or plates of metal at top and bottom of the girder or chord. E are the cross or lateral timbers for bracing the chords, and forming the base for the superstructure or roadway. F are the cross-rods, holding the same together crossways. E' are the cross-timbers or angle-bracing to strengthen and support the structure. G are plates of metal on the outside, through which pass the bolts, fastening together the parts of the girder or chord. H are the bolts referred to. The straps G might be made angling, as shown at G' in red lines, to brace and strengthen the chord, and prevent buckling of the outside sheets.

It will be seen that the chords shown in the drawings have three sheets of metal, one on each side and one in the centre, forming the thickness of the chord or girder. The great strength of these plates, combined with bracing and bolts, as shown, is fully demonstrated by tests, while its great simplicity, economy, and lightness of structure can hardly fail to commend it to the favorable attention of builders.

It is well understood that the wider a piece of timber is, (and the fact holds good in metals,) the more weight it will sustain. To prove which fact, take a piece of timber, twelve by twelve, inches, and saw it into three-inch plank, and put the plank one on top of the other edgewise, and keep them in position, and you have a much stronger beam than the timber was in its original state; and this idea, practically applied to the construction of bridges, beams, sills, girders, trusses, rafters, and all other means for sustaining great weight, I regard as being the correct principle to adapt therefor.

It will be seen that I take thin sheets of iron or steel plate, of a suitable width and length for the service required. These plates are set up in the angle-iron at the bottom of the chord or girder, the bracing is set up, being of the proper thickness, and another sheet of metal is set up on the other side; another row of bracing is then applied, and then another sheet of metal, and so on till the required thickness and strength are obtained, always commencing and closing with the sheet of metal on the outside. The top is then put on, and the chord securely bolted together; the bridge is then formed in any mode of construction desired, the top and bottom plates thus protecting the inner bracing from the atmosphere. Thus it will be seen that I have no strain on the parts other than their own weight, and I secure the most perfect and equal expansion and contraction of the metal without injuring or straining the fibre or the parts. And this point is of great and acknowledged importance in the construction of bridges. The absence of this principle is a serious objection to bridges built on the truss plan. All timber in my bridge, when used at all, is perfectly secured from rot or decay by reason of the protection afforded from the atmosphere as stated.

From the foregoing description, and an examination of the drawings, the use, structure, and operation will be readily seen and understood.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination with the sheets A of metallic plates, placed edgewise to sustain the incumbent weight, I claim a system of cross-braces, B, to support the same, substantially in the manner set forth.

2. In combination with the metallic plates, disposed as set forth, and wooden cross-braces for supporting the same, I claim plates for enclosing the spaces between the edges of the sheet, substantially as set forth.

Witness my hand to my specification for improved mode of constructing bridges.

E. HAMILTON.

Witnesses:

NATHAN YARNALL,
EBER WOODRUFF.