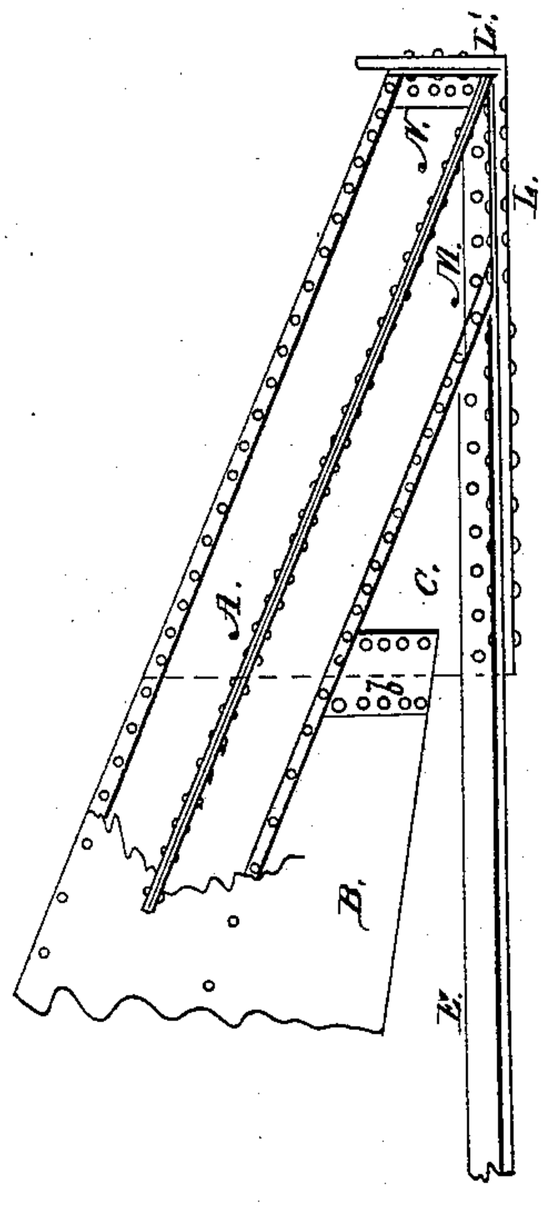
T. W. H. Moseley.

Truss Bridge.

No. 103,765. Patented May 31, 1870.

Fig: 2.



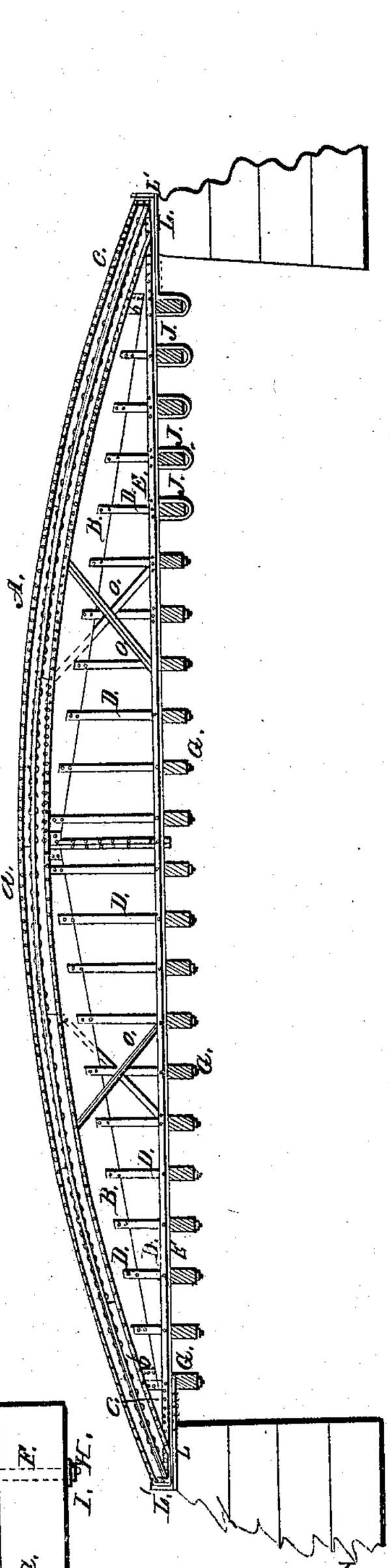


Fig: 1.

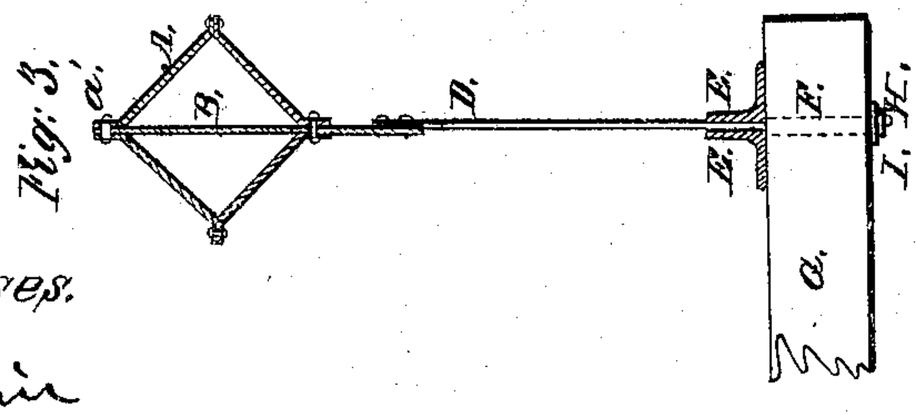


Fig: 3.

Witnesses.

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UNITED STATES PATENT OFFICE.

THOMAS W. H. MOSELEY, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN TUBULAR-ARCH BRIDGES.

Specification forming part of Letters Patent No. **103,765**, dated May 31, 1870.

I, THOMAS W. H. MOSELEY, of Boston, in the State of Massachusetts, have invented certain new and useful Improvements in Bridges, which invention is described as follows:

Nature and Objects of the Invention.

The subject of my invention is a tubular-arch bridge. The arch is quadrangular in its transverse section, being constructed of four plates, connected by flanges to each other and to a diaphragm-plate, which is interposed in a vertical plane centrally between the two sides or halves of the arch. The upper edges of these diaphragm-plates are curved, to correspond with the contour of the top of the arch. Their lower edges are straight, or nearly so, and are nearly coincident with the chords of arcs extending from beneath the apex of the arch to its toe at each end. The diaphragm-plates impart great strength, especially to the hips of the arch, by affording a greater depth of girder at those points.

My invention further consists in employing the said diaphragm-plates for the attachment of the upper ends of the suspension-rods, to the lower ends of which the chord-bars and floor-beams are secured.

The third and fourth parts of my invention relate to devices for connecting the arch and its chord-bars, and sustaining the thrust of the one and the tensile strain of the other.

The fifth part of the invention relates to cross or diagonal bracing, employed to impart additional stiffness and strength to the hips of the arch.

Description of the Accompanying Drawing.

Figure 1 is a side elevation of a bridge, illustrating my invention. Fig. 2 is a side elevation of one end of the same on a larger scale. Fig. 3 represents a vertical transverse section of one side thereof.

Like letters of reference refer to corresponding parts in all the views.

General Description.

The main supporting parts of my bridge consist of two or more metallic tubular arches, A, of which one only is here shown. The arch is formed of plates of wrought-iron from one-tenth of an inch to an inch or more in thickness, and from three inches to six feet or more in width, as the length or span of the bridge or the service it is to perform may require. The plates of which the arch is made are sheared in circular arcs of radii to suit the span desired. The longitudinal flanges *a a*, through which the plates are riveted together, are formed on their edges, varying in width as the plates vary—say, from one inch to eight inches or more—and in angle to suit the intended form of the tube in its transverse section. This section is preferably rectangular, as shown in Fig. 3, or diamond-shaped, with the acute angles up and down and the obtuse angles at the sides, so as to bring the major axis in a vertical plane. For a tube of square section the flanges are bent at angles of forty-five degrees, and the angles are correspondingly varied for other forms of sections, so that the planes of the flanges in the finished tubes will bisect the angles formed by the junction of the plates.

The structure thus far described consists of a curved tube of quadrangular section. In application the edge or angle *a'*, having a longitudinal convexity, is placed uppermost, and that which is concave at bottom; and in order to produce an arch of great power and strength, I apply, vertically and longitudinally, between the halves of the arched tube a wrought-iron plate, B, which may be of equal thickness with the side plates of the tube, and is secured between the upper flanges, and also between the lower flanges, by through-rivets.

The plate B thus divides the tube A from angle to angle, forming two prisms or triangles, and producing the strongest form into which iron can be put for such a purpose. This division-plate B, I term a "diaphragm." Its upper edge is curved to conform to the comb or top flanges of the arch-plates; but its lower edge, instead of conforming to the lower concave edge of the arch-plates, is left straight.

The plate B is thus adapted to serve three distinct purposes: First, it forms a chord to half the arch; second, it affords additional depth of girder at the hips or haunches of the arch, thereby imparting greatly-increased strength and stiffness at these points, which, in all arches, are the most frail and flexible parts; third, it is employed for the attachment of the vertical bars, which sustain the chord-

bars and the floor-beams of the bridge, and of the diagonal or cross bracing, which is secured to the said plate above and to the main chords below, as hereinafter explained.

Two of the above-described curved tubes A, with their crescent-shaped diaphragms B, are placed together, end to end, as represented in Fig. 1, to form each arch of the bridge.

The vertical suspension-bars D vary in size according to requirement, say from two inches wide and a quarter of an inch thick up to double that size, or more. They are attached, about two feet apart, to the lower part of the diaphragm B, and extend downward between the two chord-bars E E, to which they may be united by through bolts or rivets.

In some cases I weld to each suspension-bar a round rod, F, which is passed through each of the floor-beams G, and is provided at its lower end with a screw-thread to receive a nut, H, which supports a washer, I, upon which the floor-beams rest. In other cases I employ stirrups J, Fig. 1, constructed in U form, of flat bar-iron. The legs of these stirrups inclose the floor-beams, and project upward between the chord-bars E E, to which they are secured by bolts or rivets. The floor-beams rest with a uniform and level bearing on saddles K, which fill the curves of the stirrups.

My mode of making a union of the chords with the arches, at the feet of the latter, is as follows: Each diaphragm-plate B is united at its lower or outer end to a foot-plate, C, which forms a continuation of the diaphragm B, extending between the two sides of the arch to the toe or extremity thereof, and down to the bottom of the arch and the lower edges of the chord-bars. A wrought-iron plate, L, called the "shoe," generally one quarter thicker than the side or diaphragm plate, lies in a horizontal position under the foot of the arch. This shoe is generally made in width equal to one-fourth the vertical height of the arch at its apex, and in length equal to twice or more the greatest diameter of the tube of the arch. Such length is necessary to allow room for rivets, by which it is united to the horizontal stems of the angular chord-bars E, a sufficiency of rivets being used to equal the horizontal stem of the chord-bars E in substance and strength.

To the sides of the arches, where they come in contact with the shoe L, are riveted smaller angle-bars, M, the horizontal stems of which are riveted to the shoes, and similar angle-bars, N, connect the upturned end L′ of the shoe to the toe of the arch.

The upright stems of the angle-bars are united to the foot-plate C by like rivets, as shown at *c*, of strength equal to that of the vertical stems of the chord-bars. The diaphragm-plate B is further united to the shoe at its lower end by battens and rivets on each side of the joints, as shown at *b*. All the joints of the diaphragm-plates, both within the arch-tubes and on the outside thereof, are formed by battens and rivets *b*, in similar manner.

To impart additional stiffness to the hips of the arch, I apply, when necessary, diagonal vertical braces O O, of T-iron, crossed, with their straight faces riveted together, their upper ends being riveted to the diaphragm-plates B, and their lower ends secured between the chord-bars E.

Claims.

The following is claimed as new:

1. The arch-tube A, of quadrangular section, constructed of flanged plates, combined with a diaphragm-plate, B, substantially as described.

2. The diaphragm-plates B and suspension-bars D, combined with each other, and with the arch A and chord-bars E, substantially as set forth.

3. The diaphragm-plate B, foot-plate C, and shoe L, when connected and arranged to act as described.

4. The combination and arrangement of the arch A, foot-plate C, shoe L L′, and chord-bars E E, substantially as and for the purposes specified.

5. The diagonal braces O O, constructed and applied substantially as herein stated, in connection with the arch A, plate B, and chord-bars E.

THOS. W. H. MOSELEY.

Witnesses:

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OCTAVIUS KNIGHT.