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W. O. DOUGLAS.

Truss-Bridge.

No. 202,526. Patented April 16, 1878.

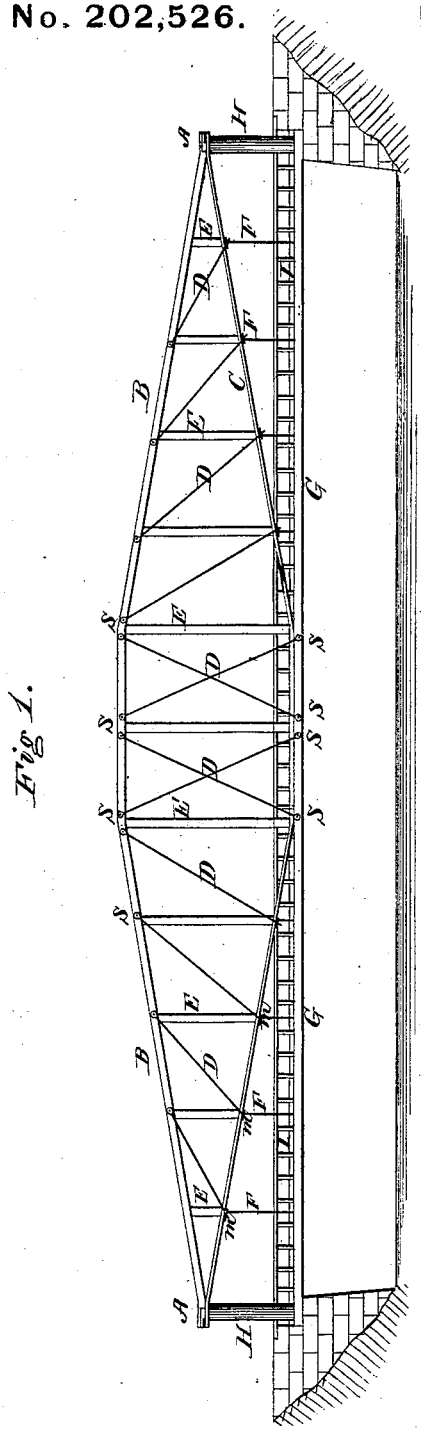

Fig 1.

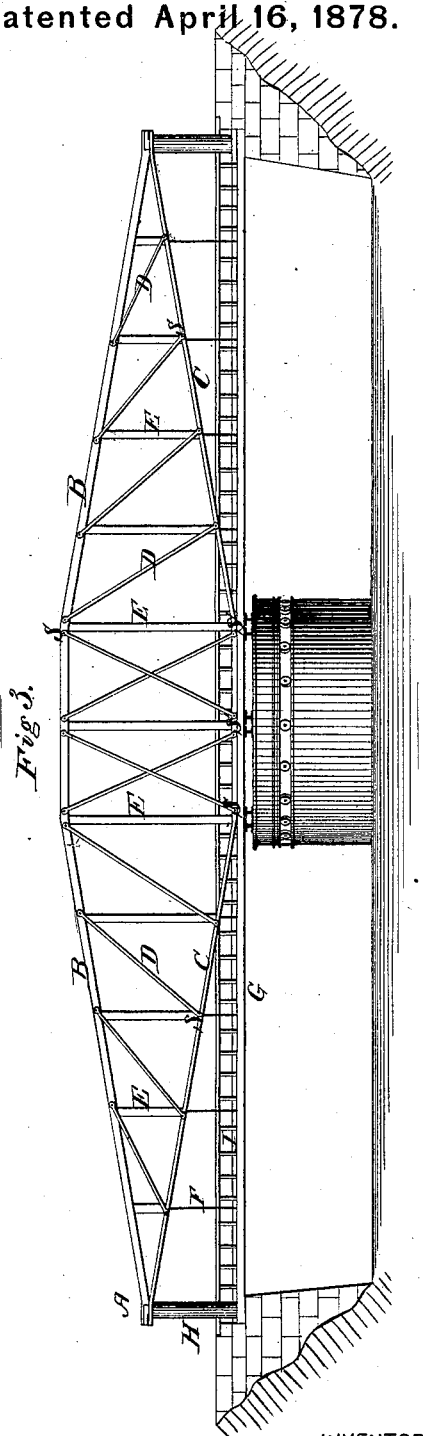

Fig 2.

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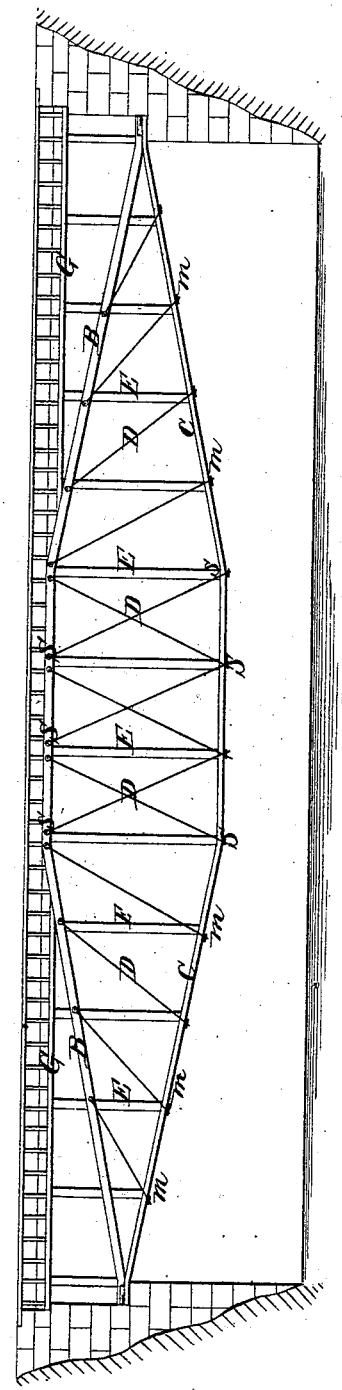

Fig. 3.

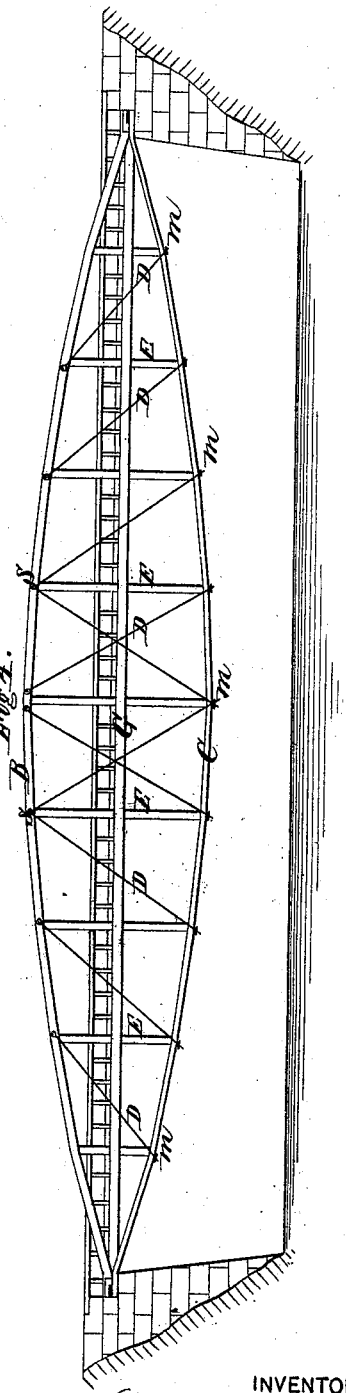

Fig. 4.

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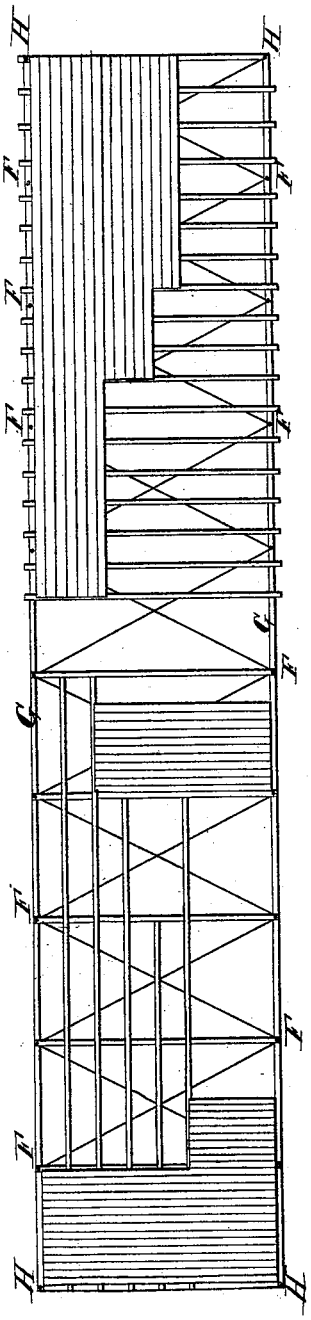

Fig. 3.

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UNITED STATES PATENT OFFICE.

WILLIAM O. DOUGLAS, OF BINGHAMTON, NEW YORK.

IMPROVEMENT IN TRUSS-BRIDGES.

Specification forming part of Letters Patent No. **202,526**, dated April 16, 1878; application filed March 28, 1878.

To all whom it may concern:

Be it known that I, WILLIAM O. DOUGLAS, of Binghamton, in the county of Broome and State of New York, have invented certain new and useful Improvements in Truss-Bridges; and I do hereby declare the following to be a full and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of a through-bridge; Fig. 2, a side elevation of a deck-bridge; Fig. 3, a side elevation of a swing-bridge; Fig. 4, a side elevation of a bridge with the roadway through the center of the truss; and Fig. 5 is a floor plan of the bridge, all constructed in accordance with my invention.

Similar letters of reference in the accompanying drawings denote the same parts.

My invention has for its object to improve the construction and efficiency of truss-bridges by combining as far as possible the maximum of strength with the minimum of cost; and to this end it consists, first, in the combination of parts forming an elliptical truss; and, secondly, in the construction of bridges with such trusses as I will now proceed to describe.

The truss, which constitutes the first part of my invention, is shown in the accompanying drawings composed of a compressive chord, B, and an extension-chord, C, firmly secured together at their ends A, with the struts E and diagonals or tension-rods D between them. The truss thus constructed is shown in Figs. 1, 2, and 3 in hipped form, and in Fig. 4 of parabolic form; but the general form is that of an ellipse or parabolic figure, which may be modified to suit circumstances or the taste of the constructer.

In Figs. 1, 2, 3, and 4 the thrust of the top chord B is resisted by the pull of the lower chord C; but in the form shown in Fig. 3 this is reversed when the span is open; then the pull is upon the upper chord, which resists the thrust of the lower chord.

The diagonals D are preferably arranged in pairs, although this is not absolutely essential, and are connected to the top chord B by pins S, passing laterally through them and the chord, while the lower ends are held in saddle-plates *m* at the points of their connection with the lower chord C at the foot of the struts. At the center of the bridge, where the diagonals cross each other, both their upper and lower ends are fastened to the respective chords by pins S, as shown in Figs. 1 and 3; or the trusses may be, and preferably are for long spans, connected by pins throughout, after the well-known details of the Pratt truss, as now usually employed.

The struts E and diagonals D bind the truss together, and transfer the strains toward the farthest point of support from them, while the chords B C transfer the greatest strain from the same point to the nearest point of support or abutment.

G is the floor-girder to support the roadway, having transverse joist, and either extends to the abutments below the chord C, as in Fig. 1, or above the chord B, as in Fig. 2, or through the center between the two chords B C, as in Fig. 4, or below the lower chord C, but unsupported by the abutments, as in Fig. 3.

In Figs. 1 and 3 the part G and the roadway are supported by rods F F, which run through the chords B C and the member G, and through or alongside the struts E, being secured by nuts at the top of the truss and beneath the part G. In long spans the tie-rod F does not run through to the top chord B, but is secured to the chord C at each panel-joint, as by a pin, a saddle-plate, thread and nut, or bolt-head.

In Fig. 2 the tie-rods are similarly connected at the top to the part G, and at their lower ends to the chord C; but in Fig. 4 their ends are held in the two chords and pass through the part G at about their centers.

In a bridge constructed as shown in Fig. 1, the member G serves to prevent the truss from moving bodily endwise, being attached along the center thereof to the chord C and to the bridge-seat. It also acts as part of the sway-brace system shown in Fig. 5, being subject to but little tensile and compressive strain, and forming no part of the supporting power of the truss. As a beam it carries the floor-joist between the tension-rods F, but is lighter in section when the floor-beams supporting longitudinal joist rest upon it at or near the rods F. For carrying joist upon it between such rods, it may be re-enforced by a T-bar, I,

(shown in Figs. 1, 2, 3, 4,) or otherwise increased in vertical diameter sufficiently to perform the office of a beam to carry transverse joist, as shown at right hand of Fig. 5.

In Figs. 1 and 3, H H are end posts which support the trusses when the roadway is along the bottom. They may be dispensed with when the floor-line is along the top of the truss or through the center, as shown in Figs. 2 and 4. In Fig. 4 the floor-line is unconnected with the truss at the ends.

Fig. 5 shows the different arrangement of the floor-joist and planking—the right-hand half having transverse joist and longitudinal planking, and the left-hand half having longitudinal joist and cross planking. This figure also shows the connections between the girders G and the trusses to form a bridge.

The strains are as follows: The members B, E, and H are compressive, and the members C, D, and F are tensile, excepting in the form shown in Fig. 3 for an open span, in which case the chord B is tensile and the chord C compressive, as previously stated. The strains upon the girder G and T-bar I are slightly compressive and tensile and transverse, accordingly as the joists are placed longitudinally or transversely with the truss.

All the tensile members may be made of any convenient form—round, square, or flat—and all compressive members must be constructed with a proper ratio of diameter to the length, in order to properly resist compressive strain. The trusses or bridge may be constructed of iron or wood, or both.

I claim as my invention—

1. An elliptical bridge-truss consisting of the chords B C, united at their ends, with the struts E and diagonals D between them, substantially as described, for the purpose specified.

2. In combination with the elliptical truss, constructed as described, the suspension or tension rods F and floor-girders G, substantially as described, for the purpose specified.

3. In combination with the elliptical truss, constructed as described, the suspension or tension rods F, floor-girders G, and end posts H, substantially as described, for the purpose specified.

4. The combination of two or more elliptical trusses, constructed as herein described, with the floor girders and joists, and the necessary flooring to form a through, deck, or swing bridge, substantially as described.

WILLIAM O. DOUGLAS.

Witnesses:
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FRED. W. SMITH.