No. 755,724. PATENTED MAR. 29, 1904.

J. TOMLINSON.

BRIDGE.

APPLICATION FILED NOV. 28, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig 1.

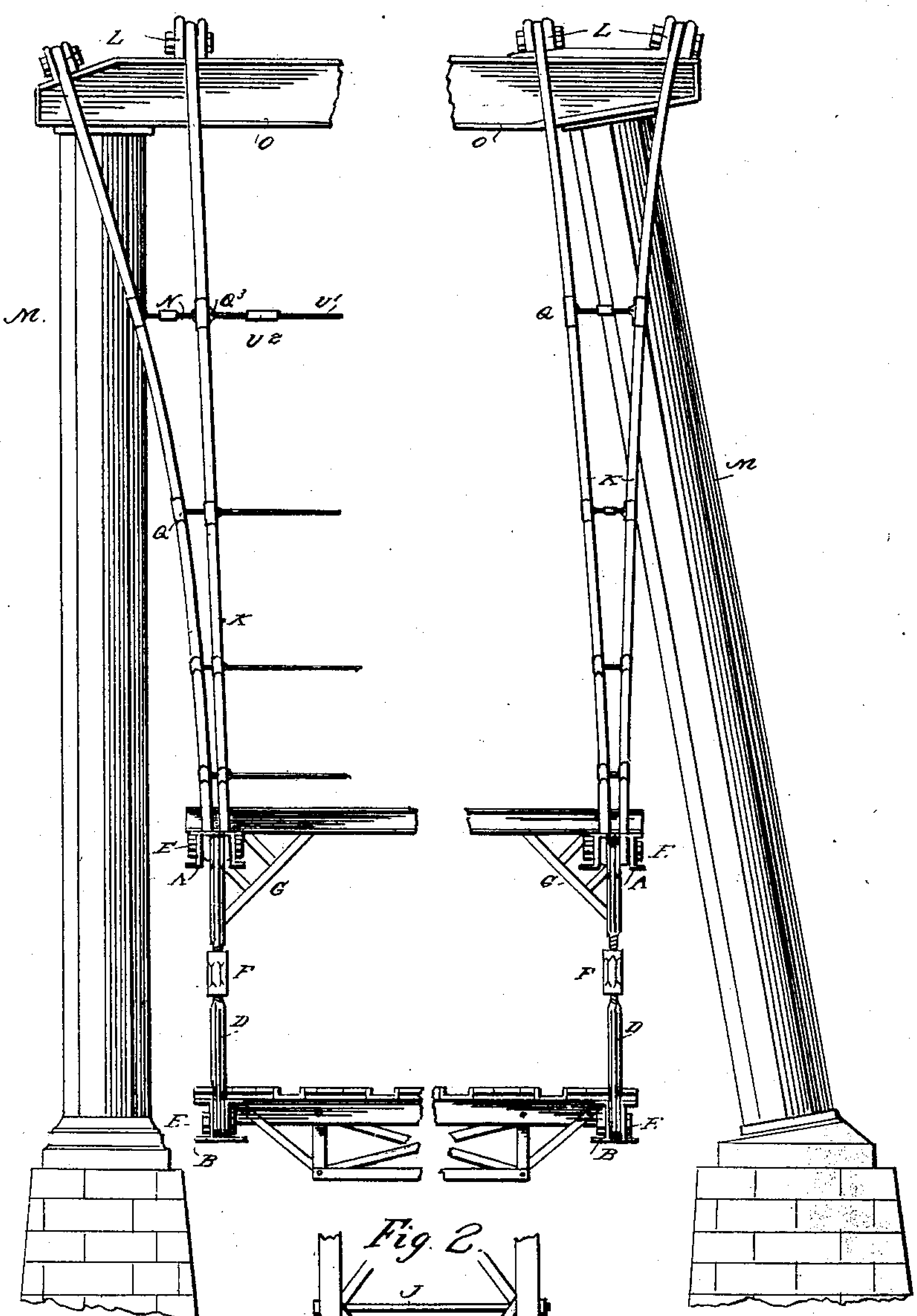
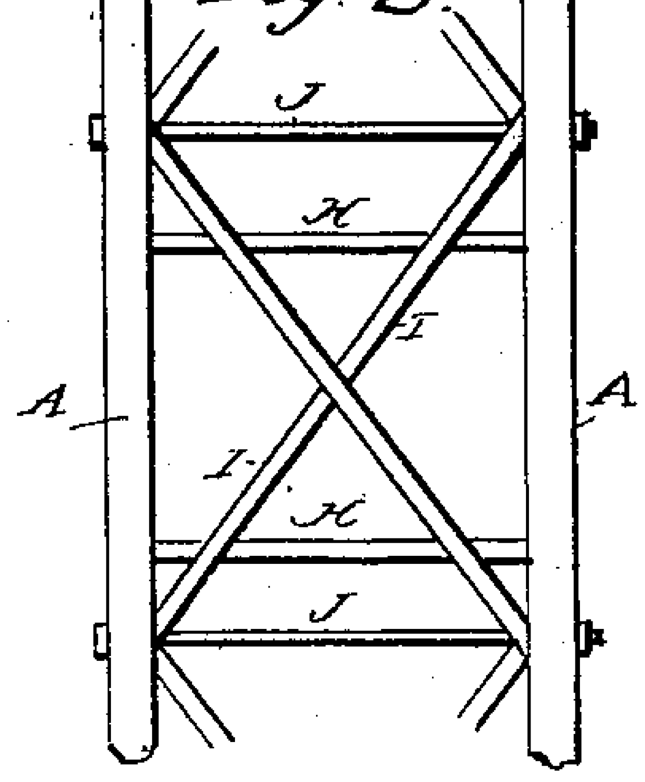


Fig. 2.



Witnesses.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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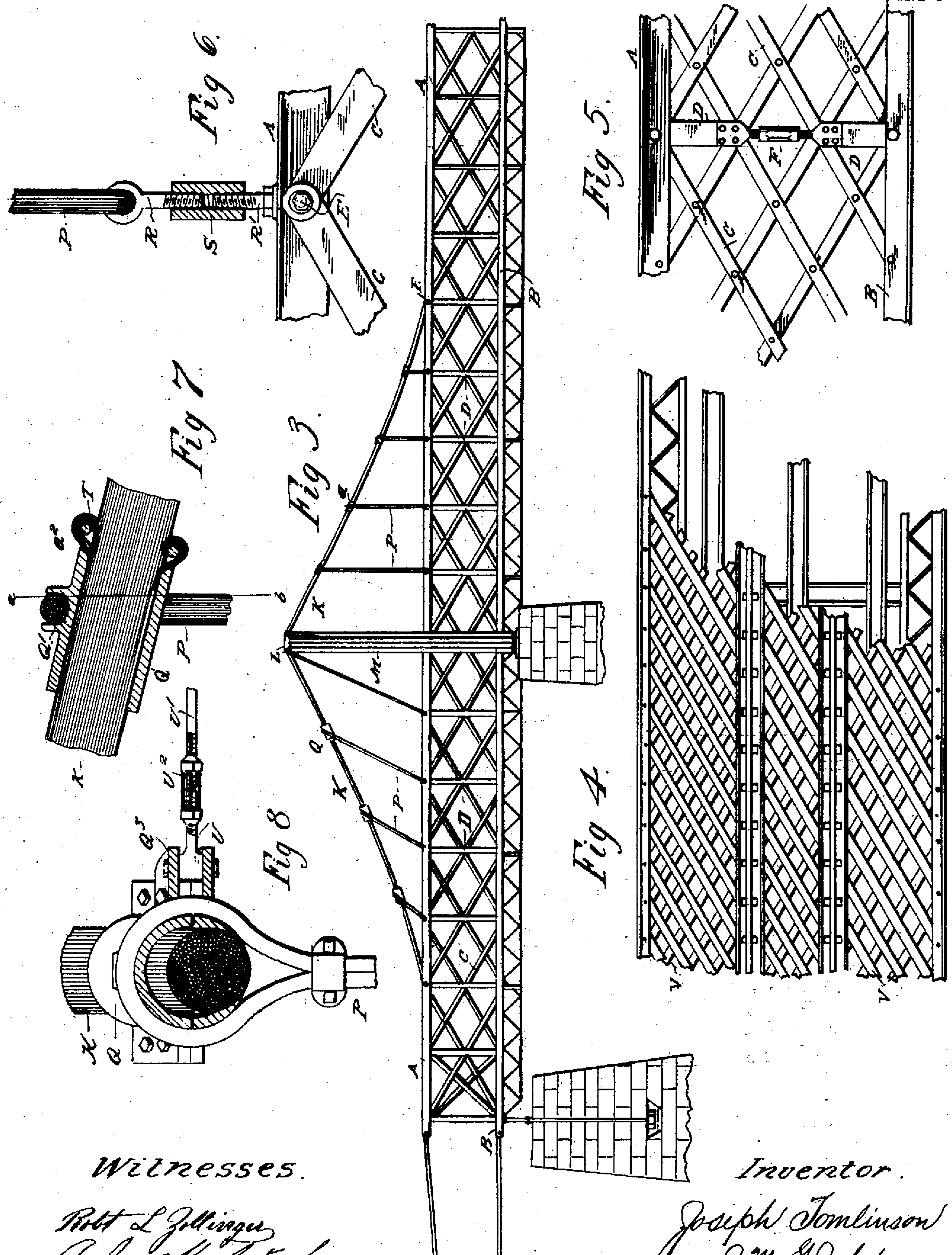

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UNITED STATES PATENT OFFICE.

JOSEPH TOMLINSON, OF CEDAR RAPIDS, IOWA.

BRIDGE.

SPECIFICATION forming part of Letters Patent No. 755,724, dated March 29, 1904.

Application filed November 28, 1903. Serial No. 182,948. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH TOMLINSON, a citizen of the United States, residing at Cedar Rapids, in the county of Linn, and State of Iowa, have invented certain new and useful Improvements in Bridge Construction, of which the following is a specification.

This invention relates to cantaliver suspension-bridges supported by steel chains, wire ropes, or cables, and has for its object to improve the construction of bridges of this character, so as to produce great strength and integrity of form with the least possible weight of material.

The nature of the invention will fully appear from the description and claims following, reference being had to the accompanying drawings, in which—

Figure 1 is an ideal cross-section of a bridge embodying my improvements, the inclined tower being an alternative form as distinguished from the vertical tower. Fig. 2 is a plan of the cross-bracing connecting the upper chords across the bridge. Fig. 3 is a side view showing one end of said bridge. Fig. 4 is a plan of the floor or deck of the same. Fig. 5 shows details of the main truss, in which extensible posts are employed to produce initial stresses in the bracing. Fig. 6 shows the connection of the suspenders with the upper chord of the main truss and its braces. Fig. 7 is a fragmentary longitudinal section of one of the cables and its connection with a suspender. Fig. 8 is a transverse section of the same in the line *a b*.

In the drawings, A designates the top chord, and B the bottom chord, of a suspended structure. These are connected at suitable intervals by posts D and braces C, the ends of the posts and of the oppositely-inclined braces being secured to the chords by pins or bolts E passing through all the parts. The braces are riveted at every intersection, thus forming a rigid lattice-work throughout the truss. The posts are made in two parts, the adjacent ends being united by sleeve-nuts F, by means of which a powerful end pressure may be exerted on the posts, thus forcing the chords apart and producing a strain on the diagonal lattice-bracing to any desired initial stress. The posts are united to the diagonal bracing at the intersections and form abutments for the top corner-braces G, which serve as brackets to support the top lateral struts H and braces I at their intersections. These braces have an initial compressive stress produced by bolts J, uniting the top chords.

The cables K are comparatively short, with looped ends, by which they make a pin connection with supporting-saddles L, resting on the towers M, and at the other ends with the upper chords of the main truss, an extra strong pin taking the cable-loop, chord, post, and intersecting braces.

By having the towers of spans of moderate length inclined toward each other, as indicated by the tower at the right in Fig. 1, they will be more stable laterally and form supports for cables considerable distances apart on both sides, allowing them and the suspenders to converge to the chords at equal angles both inside and outside. With vertical towers the convergence of the cables must be from the outside only, and the ties between the cables N serve to draw the cables toward each other downwardly in a regular curve, bringing them finally parallel, so as to fit on the pins at right angles thereto.

The upper ends of the towers are connected by transverse girders O, reinforced to form firm supports under the eyebar-saddles, to which the upper ends of the cables in each direction are connected by pins. The comparatively short cables extend from the tower-saddles down through the top chords and unite with the posts, braces, and chords in the manner already described. The pins should be of extra diameter and the bracing extra strong, so as to transmit cable stresses from the end of one cable to the opposite end of the structure.

The suspenders P, of wire rope, are looped at the middle over sleeves Q, securely bolted to the cables, the sleeves having seats Q′ formed thereon to take the suspender-loops. The lower ends of each suspender connect with an eyebolt R, connecting by a sleeve-nut S with a similar eyebolt R′, connecting with the upper chord, braces, and post by a pin, as shown. By this means the suspenders are drawn taut.

In some cases it is desirable to incline some of the suspenders, as shown at the left in Fig. 3, so as to embrace a considerable length of the main truss and hold it from a fixed point of support. In this case the suspenders near the tower are attached at the upper ends to the same saddle-pins as the cables and at the lower ends to the truss a panel's length or more from the tower. The whole length of this cable is then divided into as many spaces as there are remaining panels in this part of the truss, and suspenders are attached at such points.

To prevent the sleeves from sliding on the cables, supplemental cable-wires are added, and these are looped or bent at T over lugs or pins Q^2 of the sleeves and folded back under the same. In practice the lowermost sleeves are first so secured, the long wires being passed through the sleeves higher up on the cable. In the same manner the succeeding sleeves are secured with additional wires until all are fastened in place. Besides preventing the possibility of the sleeves slipping these wires give additional strength to the cables.

The inner sides of the suspender-sleeves have extra flanges Q^3 to connect by suitable pins or bolts with eyebolts U, forming part of cross-ties U′, to connect the inner cables on opposite sides of the structure. Proper tension is secured by sleeve-nuts U^2, and by this means the cables may be gradually drawn in from the upper ends, so that at the lower ends they lie at right angles to the pins passing through their lower loops. Similar but smaller cross-ties connect adjacent cables, as before explained.

The deck or floor of the bridge is a lattice-work of flat steel bars V, riveted to the transverse and longitudinal girders of the lower chords of the main trusses, thus forming a powerful auxiliary stiffener for the main trusses laterally and longitudinally, but serving in itself as an elastic support for railway-rails, as shown in Fig. 4, or for channel-bars for wheeled vehicles, as shown in Fig. 1.

The whole of the suspended structure is thus arranged and connected together to form a stiff and rigid hollow strut to resist the compressive stresses of the cables, suspenders, and tension-braces.

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

1. In cantaliver suspension-bridges and like structures, the combination with supporting-towers and main trusses, of cables connecting at one end with fixed supports on said towers, and at the other with the upper chords, posts and diagonal braces of said trusses, substantially as and for the purpose set forth.

2. In a bridge structure, the combination with the main truss, cable and suspenders, of sleeves to support said suspenders on the cables, and supplemental cable-wires looped into said sleeves to prevent slipping.

3. The combination with a truss, supporting-cables, and suspenders, substantially as described, of sleeves to connect the suspenders to the cables, flanges at the side of said sleeves, and cross-ties connecting therewith.

4. In a bridge structure, a truss composed of upper and lower chords, connecting diagonal braces, and extensible posts connecting at the ends with said chords and braces, whereby initial stresses may be imparted to the bracing.

5. In a bridge structure, the combination with pairs of cables separated at their upper ends, and converging at the lower ends, trusses supported by said cables, and suspenders to connect the cables and trusses, of sleeves to support the suspenders on the cables, and cross-ties connecting said pairs of cables, and whereby their lower ends may be drawn parallel.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH TOMLINSON.

Witnesses:
ROBT. L. ZOLLINGER,
J. M. ST. JOHN.