(No Model.)

3 Sheets—Sheet 1.

G. M. WILDIN.

SUSPENSION BRIDGE.

No. 441,862. Patented Dec. 2, 1890.

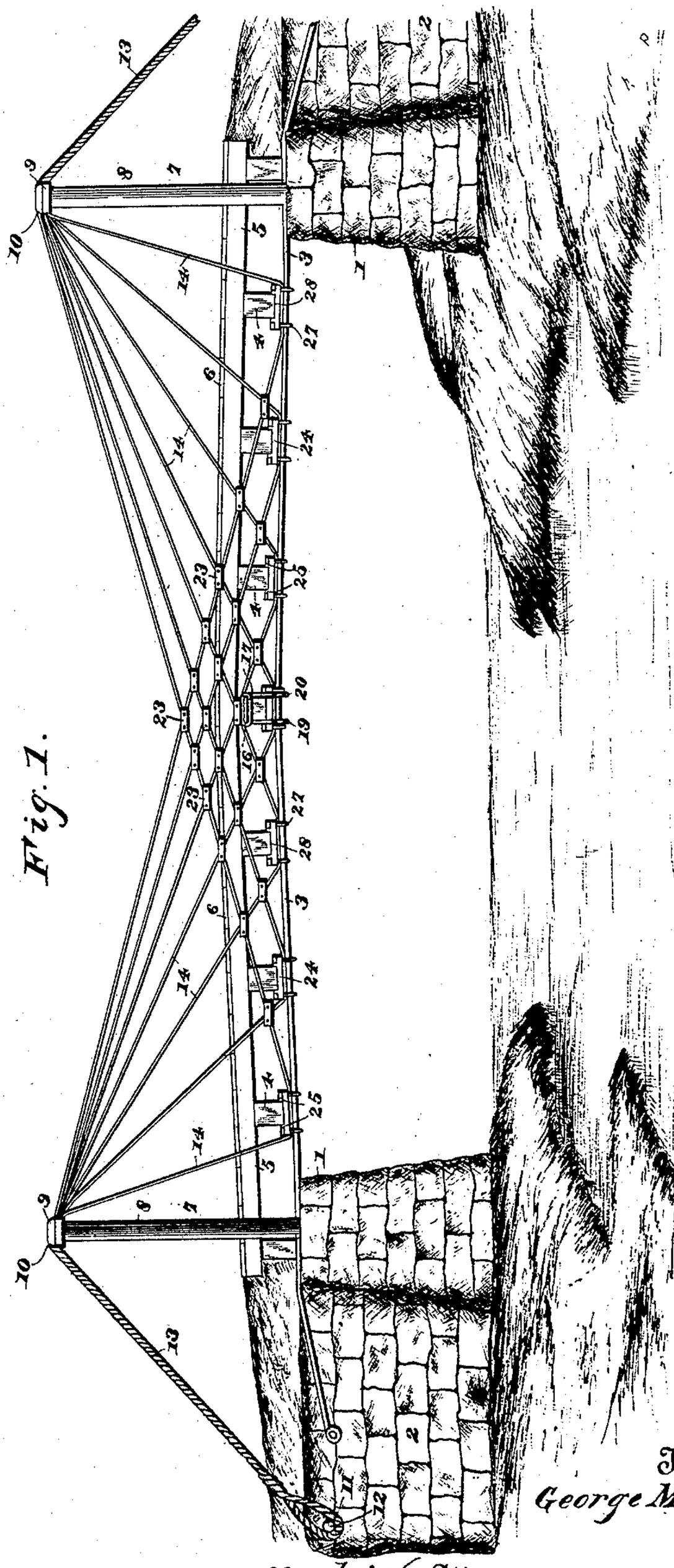

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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SUSPENSION BRIDGE

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Fig. 3.

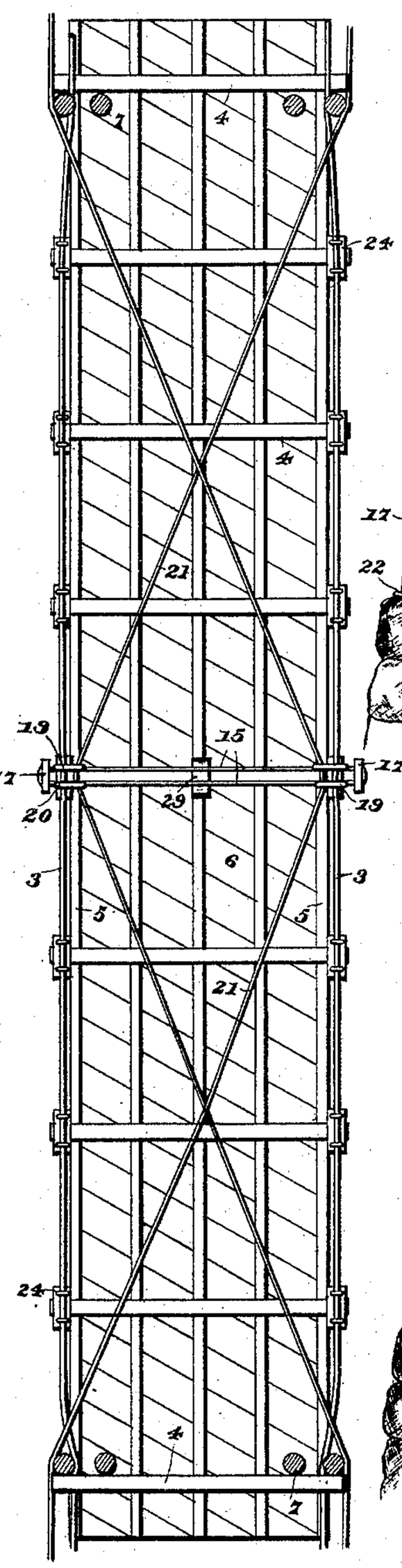

Fig. 2.

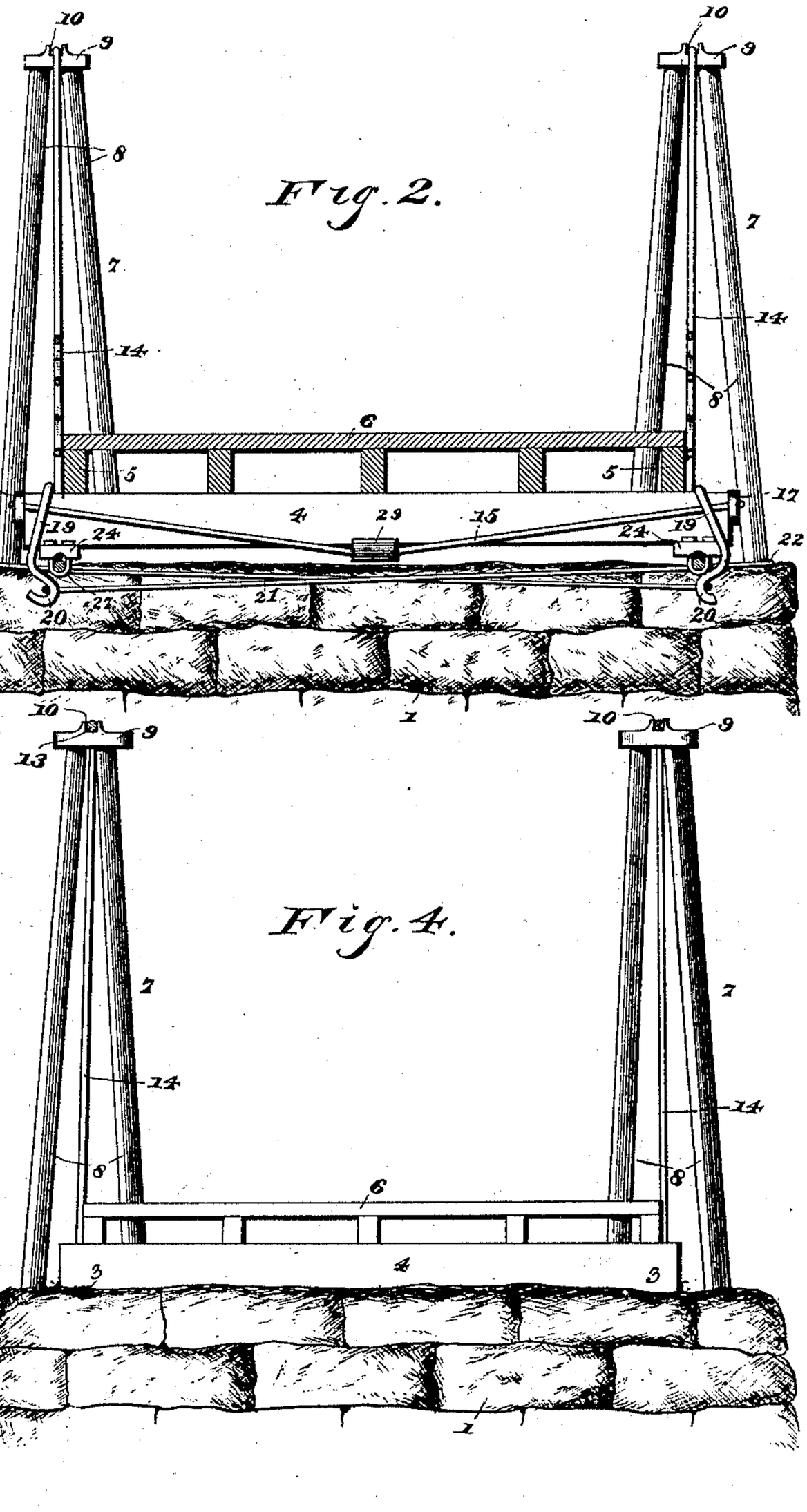

Fig. 4.

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(No Model.) 3 Sheets—Sheet 3.

G. M. WILDIN.

SUSPENSION BRIDGE.

No. 441,862. Patented Dec. 2, 1890.

Fig. 5.

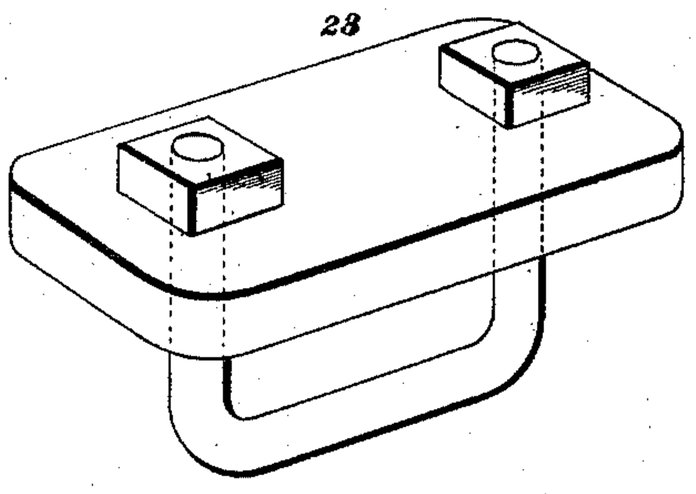


Fig. 6.

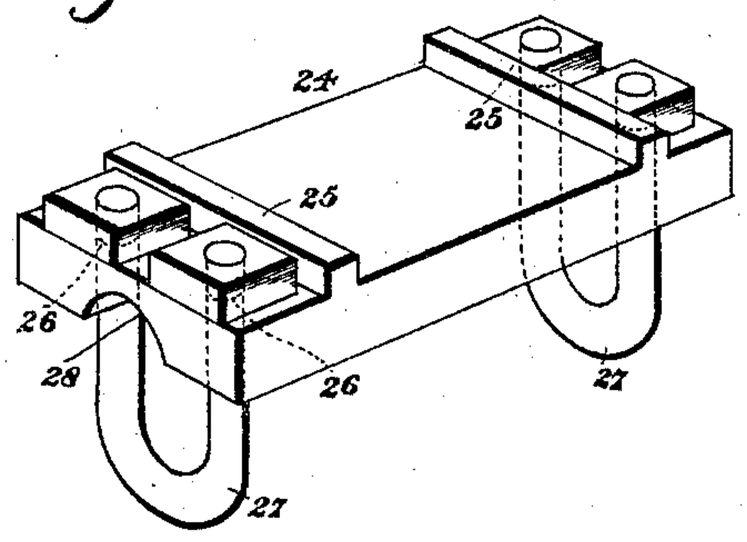


Fig. 7.

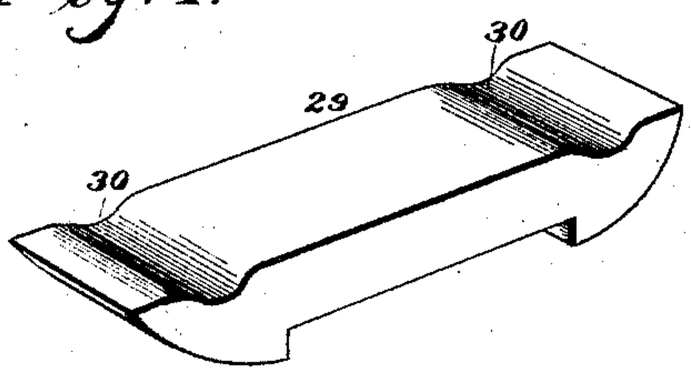
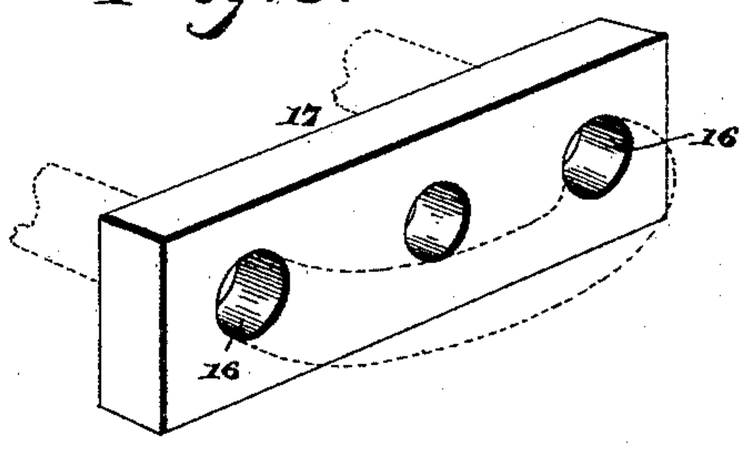


Fig. 8.



Witnesses;
J. M. Witherow,
W. S. Duvall.

Inventor:
George M. Wildin,
By his Attorneys
C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

GEORGE M. WILDIN, OF MELVERN, KANSAS.

SUSPENSION-BRIDGE.

SPECIFICATION forming part of Letters Patent No. 441,862, dated December 2, 1890.

Application filed February 7, 1890. Serial No. 339,539. (No model.)

To all whom it may concern:

Be it known that I, GEORGE M. WILDIN, a citizen of the United States, residing at Melvern, in the county of Osage and State of Kansas, have invented a new and useful Suspension-Bridge, of which the following is a specification.

This invention has relation to suspension-bridges; and the main objects in view are to secure great strength and rigidity with as few parts as possible and so combine the latter as to be readily assembled in the construction of a span and as to distribute the strain evenly at all points.

Other objects and advantages of the invention, together with the novel features thereof, will hereinafter appear, and be particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a side view of a bridge constructed in accordance with my invention. Fig. 2 is a central transverse section. Fig. 3 is a bottom plan. Fig. 4 is an end elevation; Fig. 5, a detail in perspective of the clips employed for connecting the suspension-cables at their points of intersection; Fig. 6, a similar view of the clips employed for connecting the suspension-cables with the stringers at their points of contact; Fig. 7, a similar view of the brace-rod yoke-plate; Fig. 8, a similar view of that clip-plate employed at the ends of the central beam or truss.

Like numerals of reference indicate like parts in all the figures of the drawings.

1 represents the opposite piers arranged at each side of the bank of the stream to be spanned, and in rear of each pier is the wall or abutment 2, of the usual masonry, which re-enforces the piers, and, as hereinafter described, acts as anchorages for the terminals of the suspension-cables. Passing over the abutments is a pair of heavy stringers 3, the terminals of which are secured in any strong manner to the abutments 2. Arranged at intervals upon the stringers are transverse beams or trusses 4, the end of which rest upon the stringers. Upon the beams 4 is mounted the series of opposite longitudinal beams 5, and to the same is secured the roadway 6 of the usual construction.

7 represents the opposite pairs or pillars or towers, and each tower comprises a pair of inclined or converging posts 8, connected at their upper ends by a cap 9, having a longitudinal groove 10 formed upon its upper face, the bases of the posts being secured to the piers 1.

At the outer end of each of the abutments 2 there is located in a transverse recess 11 a transverse anchor-bar 12, the ends of which protrude at each side of the abutment. The cables 13 at each side of the bridge are twisted outside of the pillars and are mounted in the grooved caps at the upper ends of the pillars, and between the span said cables are divided into a series of secondary cables 14. One of the series of cables 14 at each side of the span passes under the nearest or outer beam 4, and thence passes directly to the opposite tower, and another cable at each side of the span will be passed under the next adjacent beam, and from thence to the opposite span, and so on throughout the series of cables, there being as many cables at each side of the bridge as there are beams. The ends of the large cables are connected in any suitable way to the anchor-bar, in this instance by being passed over the same. The central beam of the series is embraced at opposite sides by oppositely-inclined truss-rods 15, the ends of which pass through openings 16, formed in opposite casting-plates 17, which rest upon the ends of the beams. From each of the ends of this central beam there depends a U-shaped stirrup 19, the terminals of which are bent to form hooks 20 and receive the central portion of diagonally-disposed stay-wires 21, the ends of which are secured, as at 22, to the piers. The manner of disposing these wires, of which there are two, is as follows: The ends being secured to one of the piers, said wires are crossed diagonally, so as each to take into the stirrup at the diagonally-opposite center of the bridge, after which they are recrossed at the opposite side of the stirrup and secured to the opposite pier. At the points of crossing of the secondary suspension-cables 14 the same are secured together by means of ordinary clips 23. (See Fig. 5.)

Referring more particularly to Fig. 6, 24 represents a clip-plate, of which there are two series, one mounted upon each of the cables directly over their points of contact with the stringers and under the ends of the beams. To receive the latter said plates are provided with opposite ribs 25, and outside of said ribs the plates are provided with perforations 26,

through each pair of which pass clip-bolts 27, which embrace the stringers and cable, and for the purpose of conforming to the latter the under sides of the plates are provided with longitudinal grooves 28, and thus a snug connection is made at these points. The truss-braces upon the central beam 4 are at their middles projected slightly below the beam, and interposed between the same and the braces or rods is a truss-plate 29, (see Fig. 7,) provided with opposite transverse grooves 30 for the reception of the rods.

From the above construction it will be apparent to those conversant with bridge-building that all strain upon any portion of the span will be equally divided and diffused throughout the series of suspension-cables and the stringers, that by reason of the disposition of the cables no longitudinal movement of the bridge can take place, and by the diagonal brace-wires and their disposition and point of connection all lateral movement will be avoided, and that the above advantages are secured with a very few easily-constructed and comparatively inexpensive elements, capable of being assembled with a small amount of labor, and all combined to form a strong, light, and durable structure capable of withstanding immense weights.

Having described my invention, what I claim is—

1. In a suspension-bridge, the combination, with opposite piers, opposite pairs of towers, and opposite stringers, of a series of transverse beams mounted on the stringers and opposite series of suspension-cables, the corresponding cable of each series passing under the corresponding beam of the series of beams and from thence upward to the opposite pillars over the same, and being twisted with the adjacent terminals of its own series of cables to form main cables and secured to suitable anchors, substantially as specified.

2. In a suspension-bridge, the combination, with the opposite piers, the opposite vertical pillars provided with grooved caps, and the opposite stringers, of the series of transverse beams mounted on the stringers, the opposite series of secondary cables, each passing under the end of a beam and to the opposite pillars and outside of said pillars having their adjacent terminals twisted to form a single cable, and clips securing said cables at their points of crossing and at their points of contact with the stringers, substantially as specified.

3. In a suspension-bridge, the combination, with the piers, the opposite pairs of pillars or towers, the stringers, and the beams mounted on the stringers and supporting the roadway, of the opposite series of secondary suspension-cables crossing each other, the corresponding cable of each series passing under a corresponding beam and from thence to the opposite pillars, said cables merging into a main cable outside of the pillars and being suitably anchored, and the clip-plates mounted upon the secondary cables, and each having a pair of ribs forming a recess for the reception of the end of the beam and opposite perforations, and a pair of clip-bolts embracing the stringers and cables and having their ends passed through the perforations, substantially as specified.

4. In a suspension-bridge, the combination, with the stringers and the series of transverse beams mounted thereon, of the secondary suspension-cables for supporting the beams, a pair of oppositely-inclined rods arranged one at each side of the central beam, tie-plates for connecting the ends of the rods and mounted over the ends of the beams, and a plate interposed between the under surface of the beam and the rods and provided with a pair of grooves for the reception of the latter, substantially as specified.

5. In a suspension-bridge, the towers, combined with the longitudinal stringers 3, the transverse beams 4, supported by the stringers, and the opposite series of suspension-cables 14, supported upon the towers at each end of the bridge, there being as many cables to the bridge as there are transverse beams, each cable passing under a single beam in succession and from thence upward to the towers at the opposite ends, the ends of all the cables at each side of each end of the bridge coming together at the towers and being twisted together beyond the latter, as at 13, and anchored, substantially as specified.

6. In a suspension-bridge, the towers, combined with the longitudinal stringers 3, the transverse beams 4, supported by the stringers, and the opposite series of suspension-cables 14, supported upon the towers at each end of the bridge, there being as many cables to the bridge as there are transverse beams, each cable passing under a single beam in succession and from thence upward to the towers at the opposite ends, the ends of all the cables at each side of each end of the bridge coming together at the towers and being twisted together beyond the latter, as at 13, and anchored, and clips securing said cables at their points of contact with the stringers, substantially as specified.

7. In a suspension-bridge, the towers, combined with the stringers 3, the beams 4, mounted on the stringers, the longitudinal beams 5, supported by the beams and on which the roadway is laid, and the series of suspension-cables 14, depending from the tops of the towers, diverged therefrom, each passing under a beam and toward the opposite tower, the terminals of the cables at each side of each end of the bridge being twisted together, as at 13, as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

GEORGE M. WILDIN.

Witnesses:

OLE WILLIAMS,

J. E. D. WILLIAMSON.