

(No Model.)

D. M. EDDY.
BRIDGE.

2 Sheets—Sheet 1.

No. 510,064.

Patented Dec. 5, 1893.

Fig. 1.

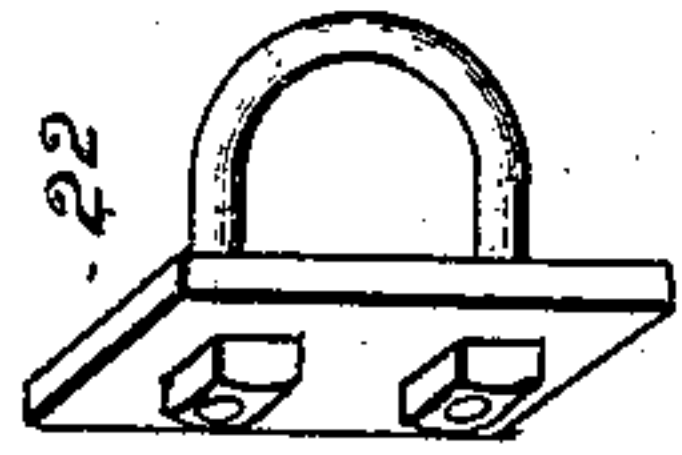
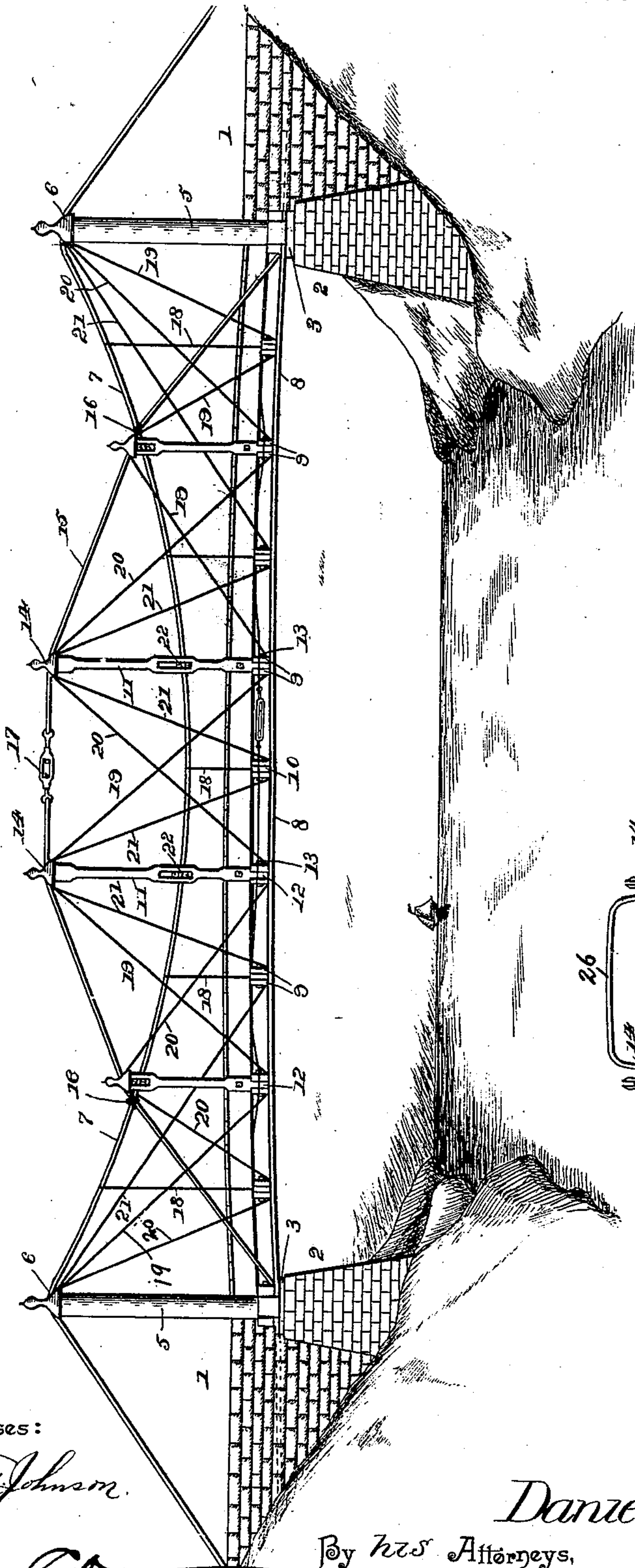


Fig. 6.

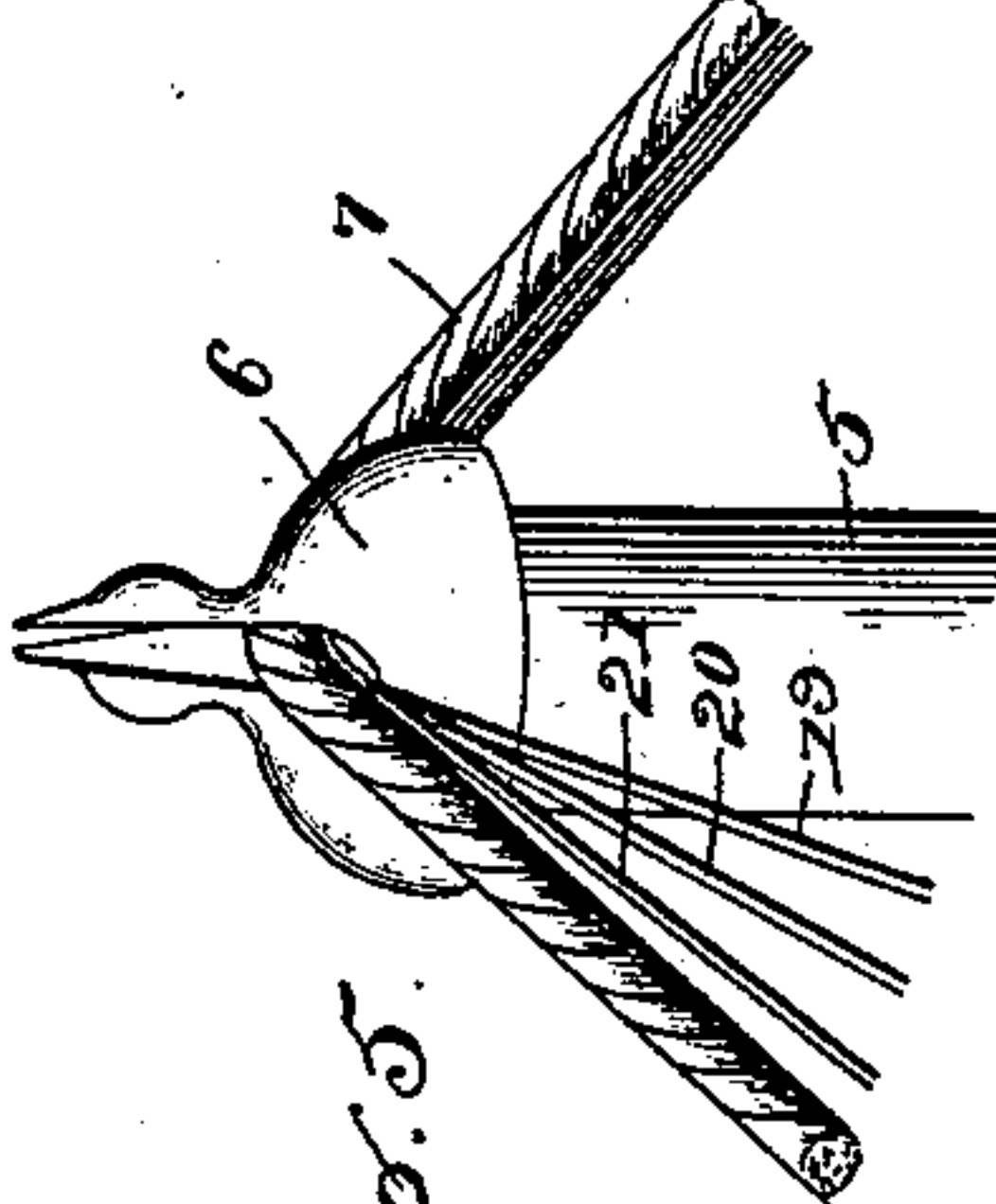


Fig. 5.

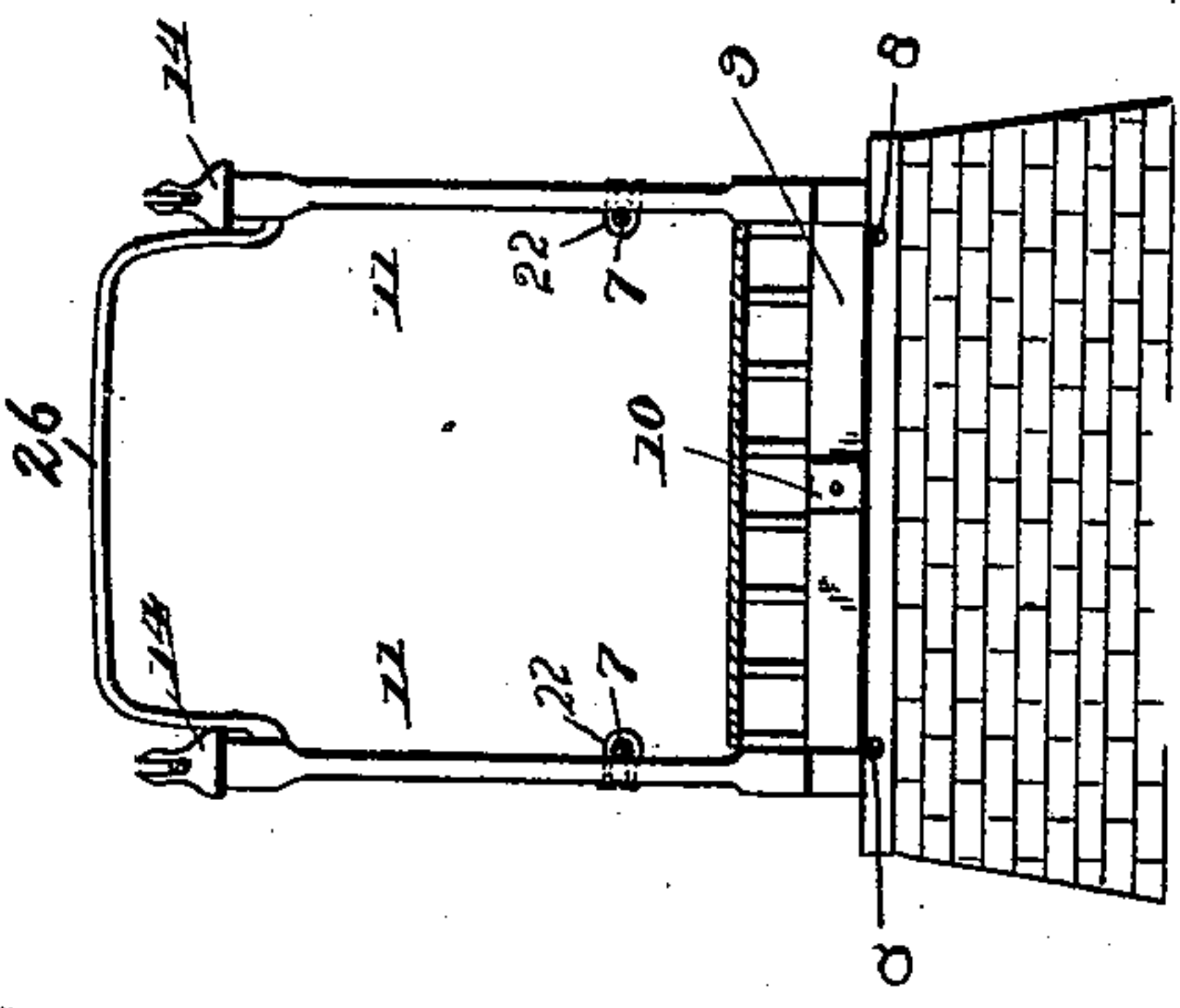


Fig. 3.

Witnesses:

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Inventor:

Daniel M. Eddy

By *his* Attorneys,

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(No Model.)

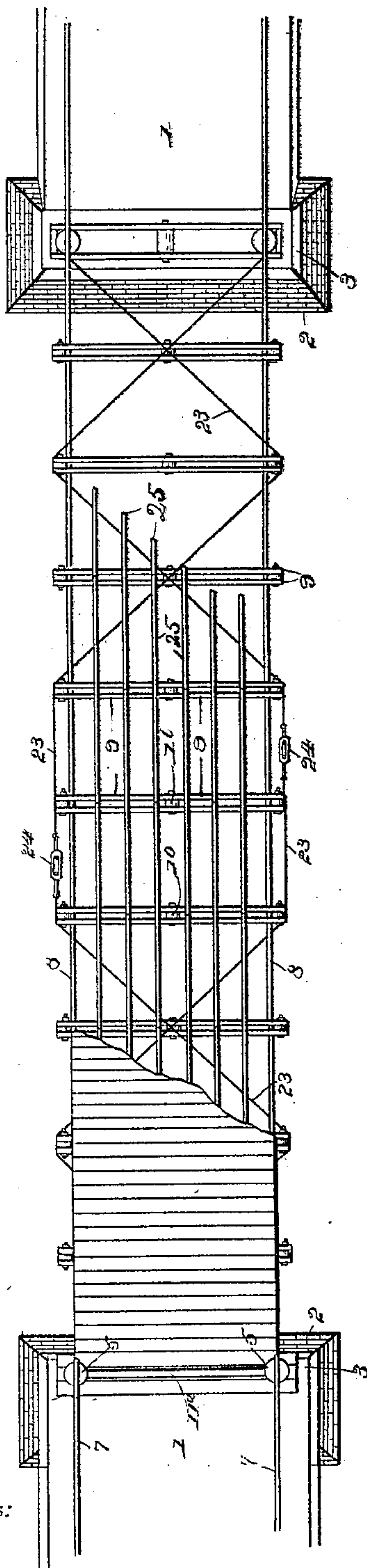
2 Sheets—Sheet 2.

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Fig. 2.



Witnesses:

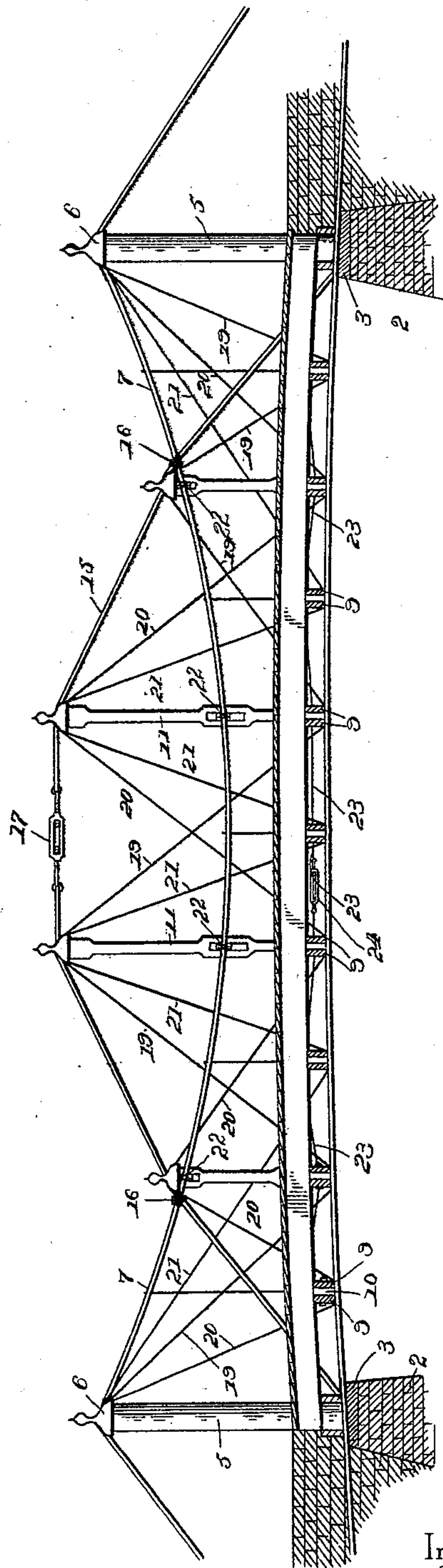
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Fig. 4.



Inventor:

Daniel M. Eddy

UNITED STATES PATENT OFFICE.

DANIEL M. EDDY, OF STOCKTON, MISSOURI.

BRIDGE.

SPECIFICATION forming part of Letters Patent No. 510,064, dated December 5, 1893.

Application filed June 15, 1893. Serial No. 477,723. (No model.)

To all whom it may concern:

Be it known that I, DANIEL M. EDDY, a citizen of the United States, residing at Stockton, in the county of Cedar and State of Missouri, have invented a new and useful Bridge, of which the following is a specification.

My invention relates to improvements in bridges, and especially to that class termed suspension.

The objects of my invention are to provide a bridge of simple construction, which is built upon the principle of the suspension bridge and yet embodies in it also the principle of the bow-string bridge, the two principles being combined in a convenient manner and so as to produce a structure of great durability, strength, and steadiness.

Various other objects and advantages of the invention will appear in the following description and the novel features thereof will be particularly pointed out in the claims.

Referring to the drawings:—Figure 1 is a side elevation of a bridge embodying my invention. Fig. 2 is a plan view, a portion of the flooring being broken away to expose the framework below. Fig. 3 is a transverse vertical sectional view. Fig. 4 is a vertical longitudinal sectional view. Fig. 5 is a detail in perspective, showing the upper end of one of the towers or pillars. Fig. 6 is a detail, showing the U-shaped clip for connecting the main suspension cable with the struts.

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

The opposite abutments 1 are of masonry and in front of the same are provided with steps 2 slightly below the plane of the abutments. Surmounting these steps 2 are metal caps 3 from which the four towers or pillars 5 extend vertically. These towers or pillars 5 are surmounted by saddles 6 adapted to receive the cables in a manner hereinafter described, and are connected at each end of the bridge by arches 11^a. Arranged over the saddles, between which points they hang, are the opposite main suspension cables 7, the ends of said cables extending backward beyond the towers and being suitably anchored in the masonry of the abutments 1. Passing through the lower ends of the towers are the lower floor cables 8, the same extending beyond the said towers and also being suitably anchored

in the masonry of the abutments. These floor cables 8 support at intervals pairs of cross-beams 9, which beams are spaced apart, having bolted at their centers intermediate packing blocks 10. Rising from the opposite ends of each alternate pair of beams are the struts 11, the same being vertically extended and diminishing in size from the center toward the ends of the series. The lower ends of the struts are reduced to form pinions 12, which take between and are bolted to the ends of the pairs of beams, as indicated at 13. The upper ends of these struts are surmounted by saddles 14 and the series at each side of the bridge supports a bowed truss cable 15. The truss cable 15 joins or passes through the pillars or towers 5 in conjunction with the floor cables 8 and its ends are anchored in the abutments. At the points where the truss cables intersect or cross the suspension cables 7 the two are tied or clipped together as at 16. The truss-cables are divided at their centers and are connected through the medium of turn-buckles 17, whereby their tension may be increased or diminished as desired.

Between the struts the suspension cables 7 and the floor cables 8 are connected by short vertical suspension cables 18, which are drawn to such a tension as to bow the floor cables 8 slightly. A series of auxiliary cables 19, 20 and 21 are connected at their opposite ends to the abutments. The course of the cables may be traced as follows:—The cable 19 passes under the first cross-beam 9, thence over the saddle 14 of the first strut, thence under the cross-beam upon which the second strut is located, thence up over the saddle of the third strut, again down under the cross-beam upon which the fourth strut is located, the end portions extending over the saddles 6 and beyond the same secured to the abutments. The second auxiliary cable 20 passes under the first strut supporting cross-beam, thence over the saddle of the second strut, thence down under the cross-beam of the third strut, thence over the saddle of the fourth strut, down under the next cross-beam, over the saddles 6 to the abutments. The third cable 21 extends under the cross-beam located between the first and second struts, thence upward over the saddle of the second strut, down under the

cross-beam between the second and third struts, thence over the saddle of the third strut, thence down under the cross-beam between the third and fourth struts, and finally
 5 over the saddles 6 to the abutments. At the points of intersection between the suspension cables 7 and the struts U-shaped bolts or clips 22 embrace said cables 7 and pass through the struts, being provided with nuts
 10 upon the outer sides of said struts.

Wind cables 23 extend through the pillars or towers and are arranged diagonally and in opposition to each other, passing alternately around the ends of and under the pairs of
 15 beams 9 with the exception of the central beams at which points they pass simply around the ends of the beams, thus forming central straight portions. At these points the bracing cables are divided and connected by
 20 means of turn-buckles 24, whereby their tension may be increased or diminished. The beams 9 are surmounted by a series of longitudinal stringers 25, and upon these is laid the floor or driveway.

From the foregoing description in connection with the accompanying drawings, it will be seen that I have embodied in the construction of a bridge the principle of the suspension and the bow-string structures, and that
 30 as a result I have a stiff, rigid bridge, steady at its center, strong and durable, and not at all complex in arrangement. The central struts where they extend enough above the flooring to permit of the passage thereunder
 35 of the usual loads may be braced by cross-braces 26. The shorter struts have ample supports from the cross-beams, floor-stringers, and suspension cables. It will be seen that the cables extend beyond the pillars or towers and
 40 hence exert a bracing action in both directions, so that as a consequence loads or weight upon the bridge at any point is conveniently distributed over the entire structure.

I do not limit my invention to the exact detail of construction herein shown and described, but hold that I may vary the same to any degree and extent within the knowledge of the skilled mechanic.

The pillars or towers, as well as the intermediate longer struts 11, may be connected in transverse pairs by bowed or arched braces 11^a, though the same may be omitted from all or some of such towers and struts.

Having described my invention, what I claim is—

1. In a bridge, the combination with the opposite pairs of towers having saddles at their upper ends, the suspension cables 7 surmounting the towers and having their opposite ends anchored to the abutments, the floor cables 8 secured to the abutments, the beams supported by the floor cables, and the suspension cables 18 connecting the main suspension cables with the floor cables, of the graduated
 60 struts surmounting the ends of the beams, and the bowed truss cable surmounting the struts

and secured to the abutments, substantially as specified.

2. In a bridge, the combination with the opposite abutments, the opposite towers having
 70 saddles, the main suspension cables surmounting the saddles and secured to the abutments, the floor cables secured to the abutments, the vertical suspension cables connecting the main suspension cables with the floor cables
 75 and bowing the latter, and the series of transverse beams surmounting said floor cables, of the series of struts surmounting the ends of the beams, and the bowed truss cables arranged over the ends of the struts and connected with the abutments, substantially as
 80 specified.

3. In a bridge, the combination with the opposite abutments, the opposite towers rising therefrom, the suspension cables arranged
 85 over the upper ends of the towers and anchored to the abutments, the floor cables secured to the abutments, the beams surmounting the same, and the short vertical suspension cables connecting the main cables with
 90 the floor cables, of the struts graduated in height and rising from the beams, the clips connecting the main suspension cables with the truss cables at their points of intersection, and the clips connecting the main suspension cable with the struts at their points
 95 of intersection, substantially as specified.

4. In a bridge, the combination with the opposite abutments, the towers provided with saddles rising therefrom, the main suspension
 100 cables anchored to the abutments and seated in the saddles, the floor cables passing through openings in the towers and connected to the abutments, the pairs of beams supported at intervals by said floor cables and spaced
 105 apart, and the intermediate packing blocks, of the vertically disposed and reduced struts bolted to the ends of said cross-bars, the short suspension cables connecting the main cables with the floor cables and alternating with the
 110 struts, the opposite bowed truss cables supported in saddles in the upper ends of the struts and passed out through opposite ends through the towers and anchored to the abutments, substantially as specified.
 115

5. In a bridge, the combination with the opposite abutments, the floor cables secured thereto, the towers rising from the abutments, the suspension cables supported by the towers and secured to the abutments, and the
 120 short vertical suspension cables connecting the main suspension cables with the floor cables and bowing the latter, the series of floor beams surmounting the floor cables, and the struts rising therefrom, of the adjustable
 125 truss cables supported upon the upper ends of the struts, passed through openings in the lower ends of the towers and anchored to the abutments, the series of bracing cables 19, 20, and 21 anchored at their ends to the abutments, passing over the upper ends of the
 130 towers and engaging the under sides of the

beams and passing over the upper ends of the struts, in the manner described substantially as specified.

6. In a bridge, the combination with the opposite abutments, the floor cables, the towers, and the suspension cables, of the cross-beams, and the pair of diagonal bracing cables leading from the abutments, disposed at right angles to each other, and passing alternately around and under the series of cross-beams

and along the ends of the central beams of the series and provided with turn-buckles, substantially as specified.

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

DANIEL M. EDDY.

Witnesses:

W. W. YOUNGER,

W. P. CHURCH.