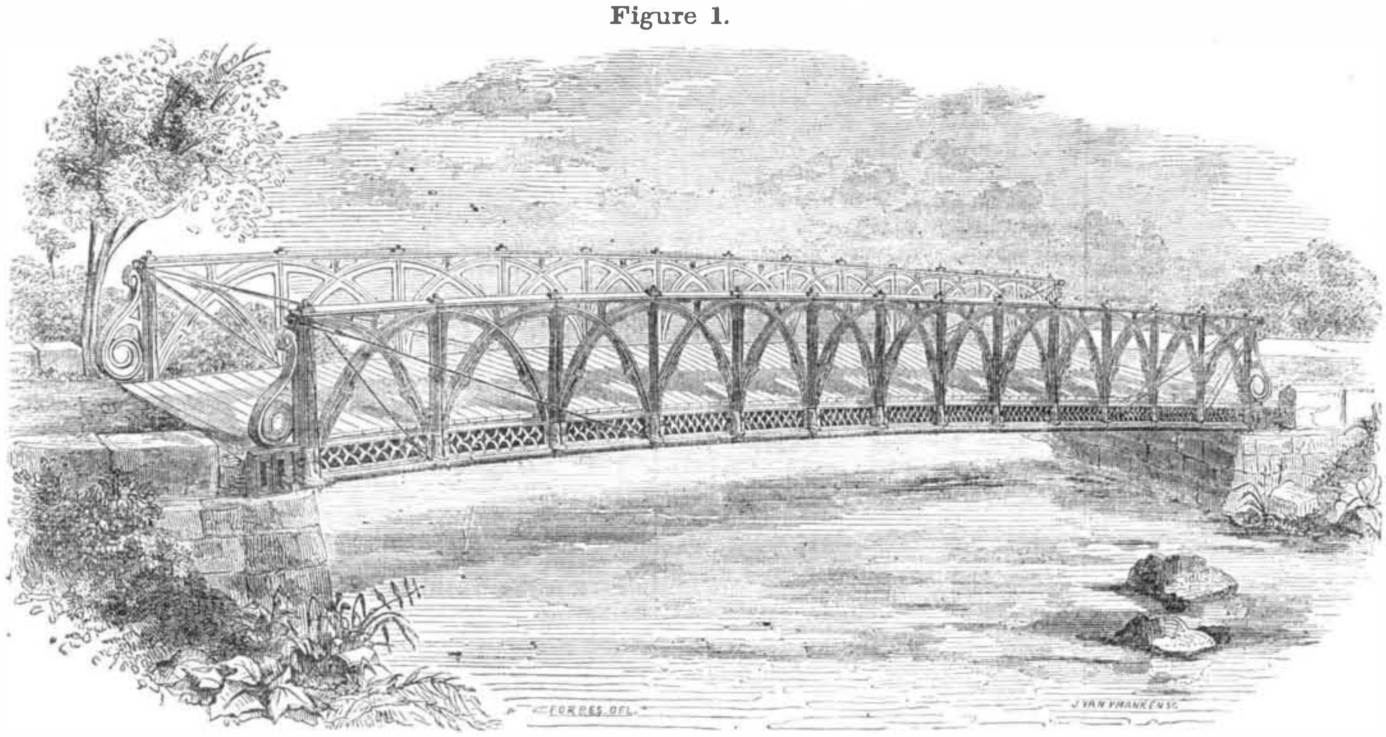
BENJAMIN SEVERSON'S IRON BRIDGE.

This bridge is the invention of Mr. Benjamin Severson, Schenectady, N. Y.

Fig. 1 is a perspective view of the bridge; it is cambered about 1 in 80 or 100, or a versed-sine of 1 to a chord of 80 or 100—the whole combined forming a trussed girder—a portion of a great circle. The sides or body of the trusses, when made of cast-iron, will be composed of pieces, or voussiors, with their upper and lower parts corresponding with the circle; their ends radial and the whole, together with the cable underneath them, to have one common centre. Thus, the upper and lower parts of the voussiors, and the tie beneath them, will form three concentric arcs. The ends and joints between the voussiors being radii, the lower arc or tie, will be the shortest of three arcs; and it will be impossible to bring the three arcs down to a straight line, (they being held parallel by means of the radial rods,) without extending the tie or shortest arc to the length of the two rigid arcs above it; or else compressing the two arcs to the length of the tie. This arrangement will insure a tightening of the whole system under the pressure of a load, and prevent the tie from becoming slack under any depression of the structure; but it would be otherwise if the tie were not acompanied by a longer and rigid arc. There may be more ties added to a truss, and they may be placed in a straight position, provided that they do not come below the highest part of the cambered tie; but it is important to have at least one of the ties in each truss cambered, as they will in this situation more effectually prevent vertical vibration; and for canal bridges it is important, in many situations, to camber the bridge to make room for the passage of boats, and yet keep the ends of the bridge as low as may be. To guard still further against vertical vibration in railroad bridges, a small wire cable or wrought-iron bar may be substituted and used tensionally, for the longitudinal binding effect of the caps represented in Fig. 2.

The quarter-braces, made of wire cables or wrought-iron rods, starting from the ends of the upper arcs and connected at different points to the lower parts of the voussiors, add much to the strength of the structure. At the middle of the length of the truss, the positive and negative forces act horizontally on the abutments. The amount of vertical pressure at intermediate points, is in proportion to the distance of each point from the ends of the middle of the truss; and regarding these braces as resultants, acting in the direction of their length, an analysis of the forces will show that the amount of vertical support given by each brace, will also be in proportion

Figure 1.



to the amount of vertical pressure occurring at their several points of construction with the lower part of the truss. And these braces being connected to the end pieces, opposite the ends of the upper rigid arc, and by means of screws made to press firmly against the ends of the arc, the arcs being cambered, it is evident that any downward bending of the structure will produce a horizontal thrust of the ends of the arcs against the upper ends of these braces; thus regulating the intensity of their tension, by the amount of pressure of a load on the Bridge,—hence, the amount of vertical support, rendered by each brace at its upper end, from the end of the arc bearing against it; thus the tension of the braces will at all times act with an intensity in proportion to the pressure of a load on the bridge.

It will be observed that the action of these braces comes within the length of the truss, and does not depend on a tower outside of it, as is the case with suspension Bridges; and therefore the whole will be alike affected by a variation of temperature, or contraction and expansion, and as the braces are straight, they will not produce any undulating, vibratory motion, which is entirely incompatible with the safety of a rigid structure; but undulation will always occur where the catenarian form of braces or suspenders is used, whether attached to a tower or confined within the length of the structure.

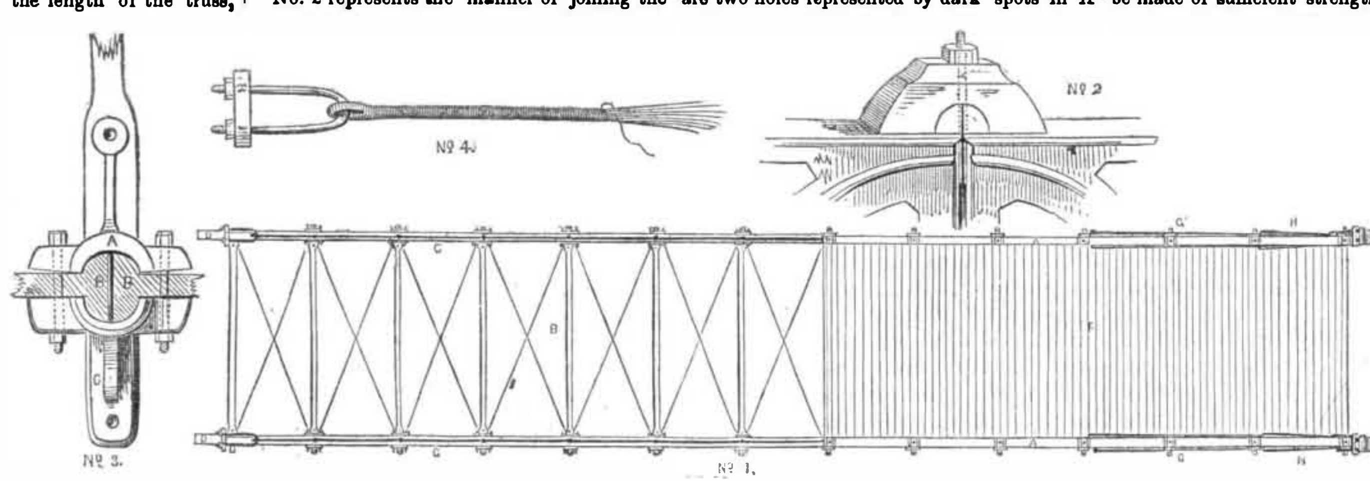
In No. 1, at F, is represented a portion of the floor as seen from above. A the upper rail, or arc. G G and H H the quarter-braces. E, end pieces. At B is half the bridge as seen from below. D D bottom of end pieces. C C main cables, or ties. The sway-braces and under side of girders between C C at B.

No. 2 represents the manner of joining the upper parts of two adjacent voussoirs, with a cap embracing circular raised parts of each; the cap, being held down by means of a screw and nut at the upper end of the radial rod, will bind the voussiors firmly together, and the joint between the three parts being circular, is simple and not liable to fracture, should any change occur in consequence of a slight settlement of the structure.

No. 3.—A is the end of the girder. B B lower part of voussoirs. C outside brackets made concave to correspond with the concave end of the girder, for the purpose of embracing convex parts of the voussoirs, B B. The whole to be firmly bound together by means of screw-bolts passing through the flanges of A and C. The circular form of joint is here also adopted to provide for any change that may occur in the bearing of the joints. There are two holes represented by dark spots in A and C through which to pass the lower ends of the radial rods. These rods are divided into two parts near the cap above. Their lower ends pass through the holes, and are secured by means of screws and nuts underneath the girder and bracket, A and C. Thus the radial rods form tensional braces to hold the upper arc or truss in line. When another roadway is added to the side of the first, its girders will take the place of the bracket, C Then the radial rods of the middle truss will pass through the ends of opposite girders.

No 4 is a portion of a wire cable, with a bow or staple-bolt, with screws and nuts by means of which the cable is drawn to a proper degree of tension.

This bridge is exceedingly beautiful in design, as well as being strong and durable in its construction. Bridges on this plan may be made of sufficient strength for railroads to



an extent of 500 feet span. A bridge built on this plan, 72 feet span, weight 14½ tons, was tested before Peter Rowe, Esq., Mayor of Schenectady, and some other gentlemen, who have published a certificate respecting its qualities and behavior. Forty-two tons of iron were left on it for 30 hours, without any sign being given that this was anything like a test of its strength. Besides the trusses for sustaining loads on this bridge, the girders and abutting end pieces are an addition to the truss of 72 feet clean span, and they are made strong and heavy to form a protection to the bridge. The four ends weighs each 505 lbs. The 13 beams weigh each 590 lbs.—9,690 in all, which, when deducted from 14½ tons, the entire weight of the bridge, will bring the metal in the sustaining parts to less than 10 tons.

Messrs. Clute, Brothers, of the Schenectady Foundry and Machine Shop, make this bridge, and communications sent to them will meet with prompt attention, and what they undertake to do we know will be well done.

Improvement in Presses.

Mr. George B. Whiting, of Harvard, Worcester Co., Mass., has invented a very novel and ingenious press, for which he has taken measures to secure a patent. The press is constructed with three circular thick metal plates having spirally inclined ways upon their faces which are placed towards each other with metal balls between them. The middle plate has cog teeth upon its periphery extending nearly around it; into this is geared a worm screw on a shaft, which, by turning, causes the said plate to revolve, and the balls—(or rollers may be used) to travel down the spiral inclines. The top and bottom plates, not moving round, are acted upon by the balls running in the inclined faces, so as to push down the lower plate to act with great force as a platten in the compression of any material that may be placed between it and the bottom part of the frame.

This press is adapted to press cotton, tobacco, paper, books, and bales of any kind of merchandise.

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