N. Rider
Truss Bridge.

No. 4,287. Patented Nov. 26, 1845.

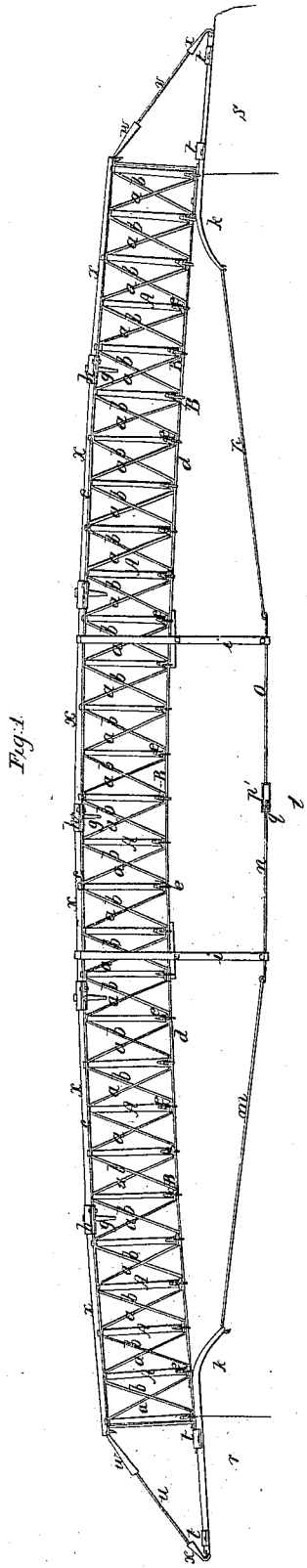

Fig. 1.

Fig. 3.

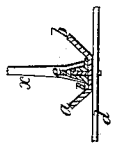

Fig. 4.

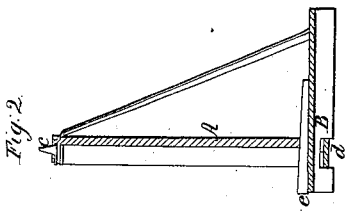

Fig. 2.

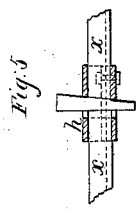

Fig. 5.

UNITED STATES PATENT OFFICE.

NATHL. RIDER, OF SOUTHBRIDGE, MASSACHUSETTS.

BRIDGE.

Specification of Letters Patent No. 4,287, dated November 26, 1845.

To all whom it may concern:

Be it known that I, NATHANIEL RIDER, of Southbridge, in the county of Worcester and State of Massachusetts, have invented a new and useful improvement in bridge-trusses having diagonal braces, all of which are subjected by the forces which usually act upon a bridge to tension strains; and I do hereby declare that the nature of my invention and the manner in which it is to be performed are fully set forth in the following description and accompanying drawings, letters, figures, and references thereof.

Of the aforesaid drawings Figure 1 represents a side elevation of my improved truss frame. Fig. 2 is a transverse and vertical section of it taken through one of the posts, and Fig. 3 is another and similar section taken between two adjacent posts of the series, and somewhat nearer to one than to the other. Fig. 4 denotes a cross section of one of the sills together with the post and wedge over it.

A, A, A, &c., of the drawings denote the several posts of the truss or frame, the said posts being each arranged vertically, upon a horizontal transverse road sill or bar (B) of a series of such sills or bars. Every one of the said sills or bars (whose object is to support the roadway) is sustained in position upon, and by two iron or metallic tension bars or braces (*a*, *b*), which are united together beneath the sill; and diverge therefrom upward and in opposite directions from one another as seen in Figs. 1 and 4. The tension bar (*b*) of each panel or space between any two adjacent posts, is to be connected or united, at the top of a post, to the bar (*a*) of the panel immediately succeeding and toward the right of the one in which the bar (*b*) may be. One of the bars (*a*) therefore proceeds from the top of each post, to the bottom of the post in advance or on the right of it, while one of the bars (*b*) proceeds from the top of each post to the bottom of that post which immediately precedes it, and the said bars (*a*, *b*) cross one another the whole being as seen in the drawings. Over and upon the top of the tension bars resting upon the several posts and secured to them is a horizontal chord or stringer *c* made of strong plate iron or other suitable material as the case may require. Another chord or stringer (*d*) of plate iron extends beneath the several bars or sills B and the tension braces as seen in Fig. 1—the said stringer or chord being bolted or otherwise properly secured to the said sills. At or near the foot of each of the posts A, A, &c., and between the said post and the sill B, or whatever it may rest upon, I place or insert a wedge (*e*) see Figs. 1, 2, 3, 4. By driving in the wedge the post will be elevated, and the tension braces strained. The power by which the wedge is driven will distribute the force of tension equally upon each of the bars (*a*) and (*b*) of any two panels (of the truss), immediately adjacent to the wedge.

The tension bars or braces as well as the top and bottom strings (*c*) and (*d*), I make of wide plate iron, which I prefer to rods of iron, such as are used in other bridges of this kind, particularly in one described in certain Letters Patent numbered 3523 and dated the fourth day of April, A. D. 1844, my invention being intended as an improvement on such; a part of my improvement consisting in wholly dispensing with "straining blocks," such as are described in the said Letters Patent as combined with the tension rods or braces; also in dispensing with nuts and screws upon the rods or tension braces, and using in the place of said rods flat or thin and wide bars of iron, or wire cables. Also in employing a simple wedge, so arranged with respect to the same (viz. the tension braces) as to enable a person with great ease and certainty (in comparison to the labor and skill required to be expended in straining the bars of the bridge described in the aforesaid patent) to produce the necessary strain upon the tension bars (in order to tighten such parts as may have become loosened) as the case may require.

I am aware that a mere change in the form or substance of any of the parts composing the truss, does not entitle me to be protected by Letters Patent, notwithstanding much mechanical skill may be displayed in proportioning the several members, and in selecting proper materials for their construction. I am also aware that in the gen-

eral manner or principle in which the several diagonal tension braces, horizontal top and bottom stringers, and vertical posts are arranged and operate together there is no substantial novelty. I do not mean therefore to be understood that my discovery or invention is to be found therein. It is however to a certain extent in an arrangement of the straining power with respect to the tension braces and posts, so that it shall not act unequally upon them, or so that the force applied to effect a strain shall apply to two of them at once, and be distributed equally upon each thereof. The bridge is to be composed of two or more of the said truss frames, placed or arranged in lines parallel to each other and at suitable distances apart, the sills B, &c., extending from one to the other and being supported by them.

By my mode of constructing the bridge truss, or several parts thereof, and arranging the straining power, I produce a very simple, cheap, and durable structure, one much more so and much more easily and effectually combined than any other of the kind now used. The roadway and side walk are to be sustained by the sills.

The next part of my invention consists in the apparatus for cambering the bridge and for this purpose I interpose one of a series of wedges (g, g, &c.), between the adjacent ends of each two of the bars x, x composing the upper cord (c) and I connect the said ends of the said bars together by a lapping socket or band h (see Fig. 1, also see Fig. 5, which denotes a longitudinal and vertical section of it) which is to be properly applied to the bars so as to sustain them in position, and permit the end of one to approach toward or recede from that of the other according as the wedge may be driven upward or downward. On two opposite sides of the center of the truss, and at suitable and equal distances therefrom, I apply to the truss two metallic posts, i, i, of length sufficient to extend some distance below the lower string (d) of the truss, as seen in the drawings. I also apply to the two ends of the lower string, two arms or bent bars (k, k) as seen in the drawings. Between the said two arms, and underneath, and against the lower ends of the posts (i i) or the peripheries of friction rollers placed therein, I arrange a cambering chain (l) composed of a series of rods (m, n, o, p). One end of each of the rods (m, p,) is secured or jointed to one of the arms (k,k,) while the other end is jointed to one end of one of the rods (n, o). The two rods (n, o,) are connected together by a swivel joint (p'), which should be applied to the rod (o) in such manner, as to swivel or turn around thereupon.

That one end of the rod (n) which is connected to the swivel joint has a screw (q) cut upon it, which enters a corresponding screw hole formed or made through one end of the swivel joint, and the said parts should be so constructed and arranged that on the swivel joint being turned around upon its axis transversely, either in one direction or in the opposite it shall either shorten or lengthen the cambering chain and (of course) the distance between the two arms (k, k). As many of the said swivel joints may be adapted to the cambering chain, as may be desirable. On shortening the cambering chain, and driving downward the wedges of the upper stringer or cord, the whole truss may be sprung upward, or cambered. The application of wedges between the ends of the beams or bars composing the upper stringer, as well as that of a cambering chain to the lower stringer or truss, has never before to my knowledge been attempted in any bridge.

In bridge trusses of the kind above described, or such as are composed of diagonal tension braces, posts and stringers, attempts have been made to camber them by using straining blocks and screws and nuts upon the braces, but it will be evident to any competent bridge architect that no proper cambering of a bridge can be effected without the upper stringer is lengthened when the truss is elevated in its central part. Therefore as such bridges or trusses, or those having straining blocks, and nuts and screws applied to them, as described in the Letters Patent hereinbefore mentioned, admit of no distension of their upper chords, they cannot be cambered with safety or without producing an undue and improper strain upon their upper chords. Each of the bars (k) should extend over the abutment (r or s) and from the end of the truss, as seen in Fig. 1, and it should be confined down upon the abutment by clasp plates (t, t) or other suitable contrivances, which will admit of its sliding upon the abutment in a longitudinal direction, according to the degree of expansion and contraction of the truss, which may be created by changes of temperature. Each end of the upper chord should be connected to the abutment or to the end of the bar (k) adjacent thereto, by one of two inclined rods (u, v,) arranged as seen in Fig. 1. The said rod may be connected to the end of the stringer and abutment or bar (k) by two stirrups (w, x,) in one of which it may be made to swivel or turn while into the other it may be screwed; the object of the said attachments being to regulate the length of the rod to the extension or contraction of the upper stringer of the truss, in order to relieve or counteract, the strain upon the first post at either end of the bridge.

I claim—

The mode of producing the camber of the truss, viz., by the distension wedges or apparatus as above described, applied between

the ends of the bars of the upper stringer, or chord, in combination with the contractile and cambering chain made and applied to the lower or other suitable part of the truss and operating substantially as above specified.

In testimony whereof I have hereto set my signature this eleventh day of September A. D. 1845.

NATHL. RIDER.

Witnesses:
MOSES PLIMPTON,
GEO. L. PLIMPTON.