W. IRELAN.
Truss-Bridge.

No. 220,382. Patented Oct. 7, 1879.

Fig. 1

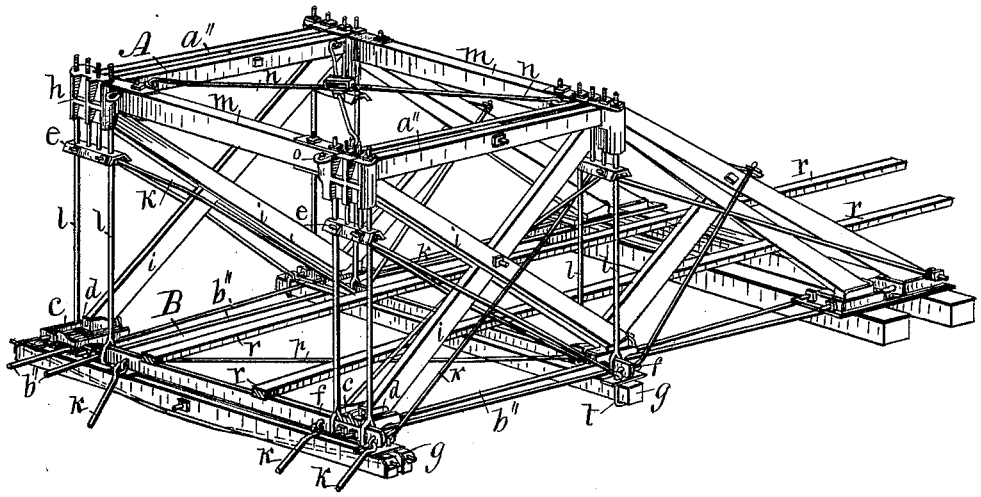


Fig. 2

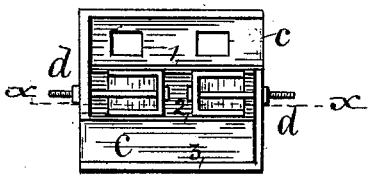


Fig. 3

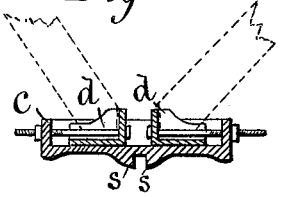
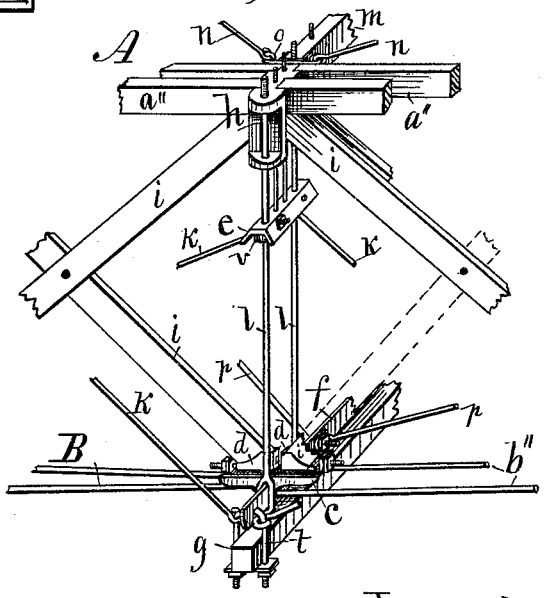


Fig. 4



Witnesses:
P. C. Kenyon,
Frank W. Heers.

Inventor:
William Irelan,
By Thomas G. Orwig,
Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM IRELAN, OF OAK SPRINGS, IOWA.

IMPROVEMENT IN TRUSS-BRIDGES.

Specification forming part of Letters Patent No. **220,382**, dated October 7, 1879; application filed April 30, 1879.

To all whom it may concern:

Be it known that I, WILLIAM IRELAN, of Oak Springs, in the county of Davis and State of Iowa, have invented an Improved Truss-Bridge, of which the following is a specification.

My invention is an improvement of my bridge patented July 9, 1878, No. 205,799; and my object is to simplify the manner of forming and combining short wooden sections or panels by means of iron shoes, binding-plates, couplings, and tension-rods, so that a combined iron and wooden bridge, of any size and strength desired, can be more advantageously built, and any single piece of timber in the complete bridge readily detached and removed without loosening more than one piece of wood at a time, and consequently repairs made, when necessary, without first building supports, (trestle or false work,) as heretofore required in repairing bridges.

It consists in forming, arranging, and combining binding-plates, horizontal sliding shoes, vertical fixed shoes, adjustable and removable stays and tension-rods, compound joists, angular coupling-plates, vertical rods having loops and enlargements, removable chord-timbers, and adjustable and detachable chord-rods, and removable tension-rod links, in the manner hereinafter fully set forth.

Figure 1 of my drawings is a perspective view of a half-section of my bridge, in which A represents the upper and arched wooden chord, composed of a number of timbers, *a''*, connected by means of vertically-placed shoes; B, the lower chord, in a horizontal position, composed of short iron rods *b''*, connected by means of my auxiliary joists.

c c are my binding and shoe-bearing plates, and *d d* my sliding shoes. *e e* are my tension-rod coupling-plates. *f f* are my auxiliary iron joists, resting upon the lower wooden joists, *g g*. *h h* are shoes, fixed in vertical positions at the top ends of the diagonal braces *i i*, fitted in the sliding shoes *d* at their lower ends. The shoes *h* may be cast in one piece, or formed in sections and then bolted together.

k k are crossed tension-rods, combined with the diagonal braces *i i*. *l l* are vertical rods or joist-bearers, that have loops at their lower ends to engage the auxiliary joists *f*. *m m* are wooden top joists, resting in sockets formed in the sides of the vertical shoes *h*.

n n are diagonal tension-rods, coupled by means of turn-buckles, and connected with the fixed shoes *h* by means of detachable links *o*. *p p* are corresponding tension-rods, connected with the perforated auxiliary joist *f* by means of screw-bolts.

r r represent bridging-joists or railway-rails, fixed upon the compound binding-joists *f g*.

Fig. 2 is a top-plan view of my binding-plate and its sliding shoes. Fig. 3 is a sectional view through the line *x x* of Fig. 2. Together they illustrate the construction and combination of the two distinct iron castings.

The plate *c* has walls or flanges on its top side to form ways and bearings 1 2 3, in which the sliding shoes *d* are fitted to move in opposite directions by means of screw-bolts passed through the heels of the shoes and the outside wall or flange at the closed end of the passage-way.

By closing the two sides and the rear end of the sliding shoe *d*, as shown in Figs. 1, 2, 3, I produce a socket specially adapted to receive the end of a diagonal stay, *i*, and to protect that end as the stay is carried back and forth by means of the sliding shoe in one of the passage-ways of my binding-plate *c*.

s s, on the under side of the plate *c*, are ribs or enlargements, designed to strengthen the plate and to form shoulders to engage the auxiliary joist *f*, upon which the plates rest when fixed in the bridge.

Fig. 4 is a view in detail, illustrating my manner of combining the binding-plates *c*, sliding shoes *d*, coupling-plates *e*, auxiliary joists *f*, wooden joists *g*, vertical shoes *h*, diagonal braces *i*, diagonal tension-rods *k*, the vertical rods *l*, the top joist, *m*, the tension-rods *n*, links *o*, and tension-rods *p*.

In the practical construction and operation of my invention the wooden joists are necessarily placed upon trestle-work or other suitable support before the other parts are attached. When great strength is required trussed beams can be used for joists, as shown in Fig. 1. When the wooden joist is in position I place my auxiliary and perforated iron joist *f* on top of it. The loop-form ends of the joist bearing rods *l* are slipped upon the ends of the iron

joist, and iron loops *t* then passed through horizontal perforations in the iron joist, and also vertically through or around the wooden joists *g*, and fastened by means of screw-nuts. The posts *l l*, thus connected with the compound joists *f g*, have male screws at their top ends, and over these ends the angular coupling-plates *e* are passed downward by allowing the rods to go through corresponding perforations in the plates until the plates engage collars or enlargements that are formed on or fixed to the rods. The vertical shoes *h* may be then placed upon the top ends of the rods in the same way, and supported at proper elevations by means of the diagonal stays *i*, that are readily connected with the binding-plates *c* by means of the sliding shoes *d*, as illustrated by Figs. 2 and 3.

The straight tension-rods *b''* composing the horizontal and lower chord, B, have screw-threaded ends, which ends are passed in reverse ways through horizontal perforations in the auxiliary iron joists. Screw-nuts then placed on the screw ends secure the rods and afford a means of tightening the chord whenever desired. The straight timbers *a''* composing the arched and upper chord, A, are placed in the sockets of the shoes, and coupled together, when two or more are placed parallel to each other, by means of screw-bolts and stay-blocks.

The diagonal tension-rods *k k* are linked at their lower ends to the loops *t* and passed through the perforations of the inclined sides or flanges of the coupling-plates *e*, to be secured and tightened at pleasure by means of screws and nuts on their projecting ends. The ends of the top binding-joists, *m*, are placed in sockets of corresponding form opening inward from the vertical shoes *h*, and secured thereto and also to the vertical posts *l* by means of straps and screw-bolts. The links *o*, to which the tension-rods *n* are connected, are placed in transverse vertical slots formed in the tops of the shoes *h*, and also under the top straps that extend from the joists *m* over the tops of the rods *l*, and thus securely combined with the joists and the top chords, B.

The diagonal and horizontal top tension-rods, *n*, coupled by means of turn-buckles, are thus spanned between the chords, to be tightened or loosened at pleasure by operating the turn-buckles. The corresponding rods *p*, at the bottom of the bridge, connected to the auxiliary joist *f* by means of screw-bolts, also have turn-buckle couplings for the same purpose. A complete bridge is thus constructed in which all the parts that are subjected to tension are iron, and all the parts that are subjected to compression are small wooden timbers that have no mortises or tenons, and consequently not liable to catch and retain water and to speedily decay, as is often the case when large timbers are framed together.

The chord-pieces *a''* are cut shorter on their lower sides than at their upper sides, so as to fit the shoe-sockets of corresponding form, so that they can be readily removed, one at a time, by simply taking off the nuts from the tops of the rods *l*.

To loosen and remove any one of the diagonal braces *i*, turn the nut on the end of the bolt that passes through its sliding shoe *d*, and the clamping-pressure will be thereby relaxed and the shoe allowed to slide, and the brace lifted out to be replaced by a new one whenever necessary.

To loosen and detach any one of the wooden joists *g* located underneath my auxiliary joists *f*, simply take the nuts off the ends of the loops *t*, and then press the joist downward to disengage it from the loops that pass through the auxiliary iron joist *f* and are engaged with the diagonal tension-rods *k*.

By the provision thus made for putting in place, loosening, detaching, and replacing each wooden part independently and successively, it is obvious that a light, strong, durable, combined wood and iron bridge can be readily built, and when repairs are required retained intact without supports, and the bridge taxes of the country thereby greatly reduced.

The strength of a bridge thus constructed can be governed by the numbers, sizes, and quality of the timbers and irons used.

I claim—

1. In the construction of a bridge, the binding-plate *c*, having flanges 1 2 3 on its top side, and ribs and shoulders *s s* on its under side, in combination with a movable shoe and supporting-joist, substantially as and for the purposes set forth.

2. The sliding shoe *d*, having its two sides and rear end closed, in combination with a binding-plate and adjusting devices, substantially as shown and described, for the purposes set forth.

3. The combination of the angular and perforated coupling-plate *e*, the vertical rods *l l*, having enlargements *v*, and the diagonal tension-rods *k*, substantially as shown and described, for the purposes specified.

4. The combination of a sliding shoe, *d*, and a binding bridge-plate, *c*, substantially as and for the purposes set forth.

5. The combination of the plate *c*, sliding shoe *d*, and a stay, *i*, substantially as and for the purposes set forth.

6. The combination of the plate *c*, the auxiliary joist *f*, and the rod *l*, having a loop at its lower end, substantially as and for the purposes set forth.

7. The combination of the auxiliary joist *f*, the wooden joist *g*, the loop *t*, and diagonal tension-rods *k*, substantially as shown and described, for the purposes specified.

8. The combination of the binding-plate *c*, the auxiliary joist *f*, the loop *t*, the vertical rods *l l*, having enlargements *v*, the coupling-plate *e*, the diagonal tension-rods *k*, the stays *i*, and the detachable upper chord, A, composed of the shoes *h* and timbers *a''*, and a lower tension-chord, substantially as and for the purposes shown and described.

9. The combination of the binding-plate *c*,

the auxiliary joist *f*, the vertical rods *l l*, having the enlargements *v*, the coupling-plate *e*, the diagonal tension-rods *k*, the diagonal stays *i*, the vertical shoes *h*, the chord-timbers *a''*, and the lower chord, B, composed of the detachable tension-rods *b''*, substantially as and for the purposes shown and described.

10. The combination of the binding-plate *c*, the sliding shoe *d*, carrying the lower end of the adjustable and detachable braces *i*, the auxiliary joist *f*, the rods *l l*, and the shoes *h* in the upper chord, A, and a lower tension-chord, constituting an adjustable truss, in the manner and for the purposes specified.

11. The combination of the binding-plate *c* and shoes *d*, adjustably connected, the auxiliary joist *f*, the loop *t*, the diagonal and adjustable tension-rods *k*, the vertical rods *l l*, the coupling-plates *e* and shoes *h*, adjustably connected, and the detachable stays *i*, substantially as shown and described, to operate and adjust the tension-rods *k* relative to the stays *i*, in the manner and for the purposes set forth.

12. The combination of an upper chord, a lower chord, a binding-plate, *c*, supported on the lower chord, shoes *d*, adjustable on said binding-plate, vertical rods *l*, and stays *i*, as and for the purposes set forth.

13. The combination of the shoes *h* in the upper chords, A, the detachable links *o*, the joists *m*, having coupling devices on their ends, and the detachable tension-rods *n*, having turn-buckles, substantially as and for the purposes shown and described.

14. The binding-plate *c*, the sliding shoes *d*, carrying detachable braces *i*, the compound joists *f g*, the rods *l l*, the vertical shoes *h*, the diagonal and adjustable rods *k*, the couplings *e* on the rods *l*, the chords A, composed of detachable timbers *a''*, the chords B, composed of adjustable rods *b''*, the detachable joists *m*, and the adjustable rods *n* and *p*, all arranged and combined substantially as shown and described, to produce a bridge in which strain by compression is received on wood, and strain by tension resisted by iron, as set forth.

WILLIAM IRELAN.

Witnesses:
D. L. HANNAH,
ABREHAM DAY.