O. AVERY, Jr. & C. BARTHOLOMEW.

BRIDGE.

No. 189,170. Patented April 3, 1877.

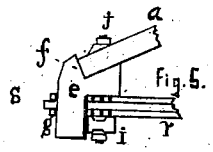
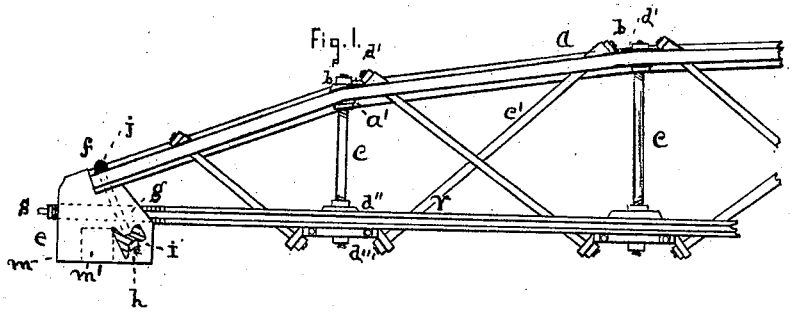
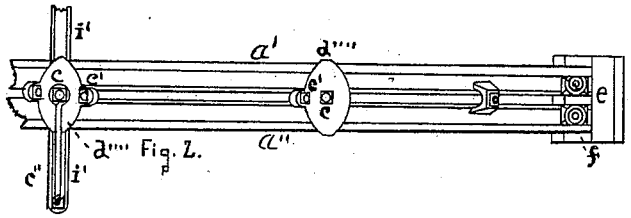


Fig. 5.



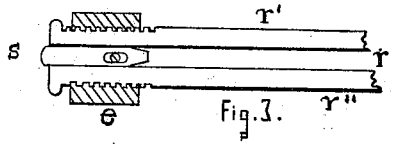



Fig. 3.

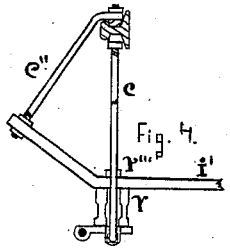


Fig. 4.

Witnesses.
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# UNITED STATES PATENT OFFICE.

OLIVER AVERY, JR., OF GROTON, AND CALEB BARTHOLOMEW, OF ETNA, NEW YORK.

## IMPROVEMENT IN BRIDGES.

Specification forming part of Letters Patent No. **189,170**, dated April 3, 1877; application filed September 11, 1876.

*To all whom it may concern:*

Be it known that we, OLIVER AVERY, Jr., of the town of Groton, Tompkins county, New York, and CALEB BARTHOLOMEW, of Etna, in the town of Dryden, Tompkins county, New York, have invented an Improved Bridge, of which the following is a specification, reference being had to the accompanying drawings.

Our object is to make a wrought-iron or steel bridge for common roads and railways; and the nature of our invention will be apparent as we describe it.

Figure 1 is a view from above of a bridge-truss, made after our plan—a part of a truss—seen from the outside of it. Fig. 2 is a view from above of a portion of a truss, with the arch-rail duplicated. Fig. 3 is a transverse sectional view of the chord-mortise in the foot-block. Fig. 4 is a view of our side bracing; Fig. 5, the form of our foot-block, without the end cross and pile-head mortise in it.

In the figures, *a* is one of the arch metallic pieces of frame-work shown, made of railroad-rails. We place, for the arch-rail, the base edgewise, so that the broad part of the bars shall show on the inside of the bridge. These arch-rails are bent at angles *b*. Bars long enough to make a bridge of thirty feet span, of one single piece, can be had. Those of greater span need usually to be spliced end to end at the middle bend, where plates *b*, such as connect the brace *c'* and perpendicular rods *c* at all our angles, make the joining. At the base of the rods *c* are plates *d''* above and plates *d'''* below the chord *r*, thus by the bars above and below the arch-rail and its plates, and by the plates above and below the chord, and the tightening-burrs there, the arch-rail is bound fast, and the chord also at these places. The ends of the arch-rail rest on the foot-block *e* by a shoulder, *f*, and the two foot-blocks at each end of the truss are bound together by the main chord or tie *r*, which acts as a support for the timbers or metal beams on which lie the planks of the platform.

We prefer to make these chords double, or of two pieces, *r'* and *r''*, in Fig. 3, and of light H or T railroad-bars. We also turn the base or broad part upward, thus making a broad bearing for the wood cross-beams. In the ends of the chords we cut teeth or serrations, and insert them in corresponding serrations of a mortise, *g*, made in the foot-block *e*, and secure them by a wedge, *s*, driven in between the two parts of the chord, thus locking them to the sides of the mortise. These teeth or serrations enable us to fit the bridge to its exact place, and to the exact length of the arch-rails, and to the exact place where, when we use them, are driven the metallic piles described in an application filed August 11, 1876, as well as make a ready and secure adjustment of the chords to the foot-blocks.

The arch-rail, the foot-block, and the platform-chord we always bind together by a bolt or strap, *j*. This bolt goes through the middle portion of the arch-rail, and thence, as seen in Fig. 5, through the block, then between the two chords and through a slot in the wedge *s* and is fast beneath the bridge end tie *i*; or, when the pile-head cap is cast as part of the foot-block, as in Fig. 1, as in the application just named, it is fast to an iron plate, or other part in the hollow of the foot-block. This bolt may be made as a binding-strap, or may go through the separate pile-head cap, or in other ways.

It will be noticed that *a'* and *a''* of Fig. 2 represent the arch-rail as duplicated side by side. This is desirable in common road-bridges over forty feet span, and, if for any reason, three or more rails are thought necessary they may be thus used side by side. Arch-frames thus made have either a single or double foot-block, with one or more mortises, *g*, and all else similar but duplicated. Binding-plates or transverse plates, at the angles of the arch-rails, bind the arch-frames to each other, in which case the rods *c* go through these binding-bars, and the brace-rods *c'* also are connected with these bars or plates.

A middle cross bar or beam, *i'*, is seen fast at *r'''*, Fig. 4, to the chord *r*, and bent upward so as to meet the base-rod *c''* at or nearly at right angles. Such rods and beams are common, but the bending upward, and the stiffer bracing, of the bridge-truss thereby has advantages. Its mode of fastening to the bridge

is similar to what has been explained—be the chord single or double, or the arch-frame single or double.

The same letters refer to the same parts as far as used in this specification, and in that of the application of August 11, 1876, as in that we have set forth those parts of our invention that relate to the joining of our bridge to the piles.

At I is seen the end band or tie of the bridge. It is either inserted through a transverse mortise in the foot-block, or is fast by the bolt *j* to the combined foot-block and head-cap of the bridge, as has been said, to be more useful when piles support the bridge, as in the application that has been referred to. This mortise and tie is toothed or serrated similar to the chord *r*.

Plates *d''* and *d'''* are used above and below the chord *r* for two purposes—one to hold the various parts of the chord together; and, second, to bind the chord fast to the rods *c*, so that there shall be neither an upward nor a downward motion or vibration. The beams or bars, whose ends are bent upward to brace the bridge-truss, act as plates on the rods where they are used, and while thus acting are themselves bound fast to the base or platform part of the bridge.

The advantages and uses of our invention are apparent to those skilled in the art to which it appertains.

We claim—

1. The foot-block *e*, with an aperture, *g*, for the chord *r*, toothed or serrated, and said teeth or serrations of the chord and aperture locked together by a key, *s*, as set forth.

2. The foot-block *e* with a serrated recess, *h*, or transverse aperture for the tie *i*, said tie being bound to the foot-block or in the aperture, as set forth.

3. The middle cross beams or ties *i'* fast to the lower part of the bridge, and bent or curved upward outside of the bridge, in combination with the rods *c''* fast to the end of said beam or beams at or nearly at right angles to the beam, and bracing the bridge-truss, as shown and described.

4. The chord *r*, having its base upward and ends serrated, as and for the purpose set forth.

5. The tie *i* fast or locked to the foot-block as a transverse end tie or band, as set forth.

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Witnesses:
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