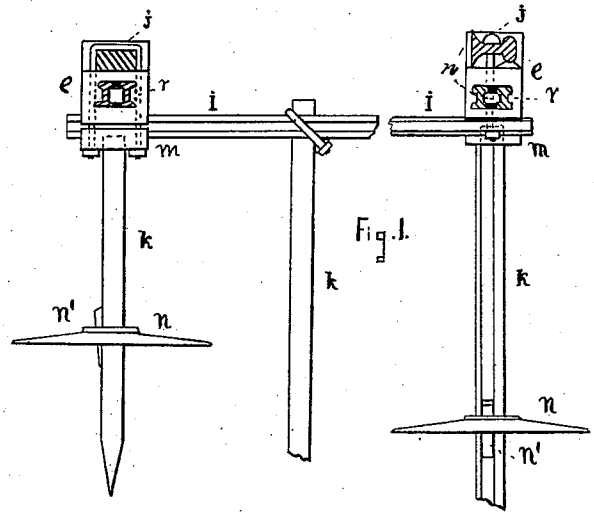
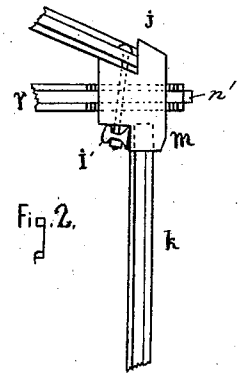
O. AVERY, Jr. & C. BARTHOLOMEW.

BRIDGE PIERS.

No. 189,171. Patented April 3, 1877





Witnesses.
Samuel Y. Barker.
James W. Smith.

Inventors.
Oliver Avery Jr
Caleb Bartholomew

UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN BRIDGE-PIERS.

Specification forming part of Letters Patent No. **189,171**, dated April 3, 1877; application filed August 11, 1876.

To all whom it may concern:

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

Our invention relates more particularly to the top or head-cap for the piles and to the foot-block or shoe for the bridge, made in connection therewith or in one piece; and the nature of our invention will be apparent as we describe it.

Figure 1 is a front elevation of three piles that usually constitute the pier or abutment of a common highway-bridge.

On the top of the right-hand pile is a head-cap and bridge-block, made in one piece, and on the top of the left-hand pile the head-cap is made separate from the bridge-block or shoe, yet fitted to each other, and bound together by a bolt or strap.

Fig. 2 is a side view of the right-hand pile.

In the figures, *k* indicates the metallic piles, made of any suitable iron or steel railroad-rail bars, which are driven into the earth at the place where the bridge is to stand, and several in a row make the pier, if driven in the central portions of the stream.

When they make the abutments at the banks of the stream, plank, stone, or other material is piled against them, to prevent the sliding of earth through them into the stream. These piles usually need to be held together in line by some means, and we prefer to make a part of the bridge accomplish this, and we make the end cross band or tie *i* of the bridge serve this purpose.

When we use *i* as a pile cross-tie, it is bolted or strapped directly to the piles; but we prefer that the head-caps *m* on the top of the piles shall hold them in place, as well as the bridge in its place, on the top of the piles; and as the bridge is not perfect without cross-ties, we make those of the ends of the bridge fasten it to the head-caps, as do other parts of the bridge, directly, as has been said and shown, or to the foot-block *e* or shoe of the bridge, as also has been shown; or we place the cross tie or band *i* between the separated head-cap and foot-block *e;* and whether we make the head-caps and the foot-blocks or shoe in one piece or of two pieces, we make them virtually one by the bolt or strap *j*, so that in every case by this cross-tie *i* of the bridge structure we bind the tops of the piles together.

The middle piles may have head-caps or simply rest strapped against the tie *i*.

In the Fig. 1, at the right hand, the mortice for the platform-chord *r* is seen to be through the solid metal of the combined head-cap and foot-block, with two bars as longitudinal ties or chords, *r*, between which is a wedge, *n'*, which, as a key, makes them fast—an arrangement seen also in Fig. 3—the bolt *j* of the pile-capping acting also to secure the arch-bars, the wedge-key, and the cross end tie of the bridge.

Experience has shown that a single row of piles is sufficient for common road-bridges of moderate spans. If larger spans seem to require two or more rows, they are driven, and the head-caps and foot-blocks made longer or larger, so as to rest on the double or triple series.

So also for other modifications, if any are requisite, in railroad-bridges, the same principles and means are used, be the piles of a single or more rows.

When the strain of the piles on the foot-block *e* is considerable, we use teeth or serrations for the tie *i*, just as we do for the chords *r* of the bridge, as is seen in Fig. 2. So of other ways and circumstances connected with what we have invented.

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

We claim—

1. In bridge-piers, the pile-head *m* and foot-block *e*, in combination with the cross or end tie *i*, as and for the purpose set forth.

2. The head-cap *m* and foot-block *e*, when formed in, and consisting of, one piece, secured to, and holding the top of, the piles, in

combination with the cross-band or end tie *i* and pile *k*, as and for the purpose set forth.

3. Abutments and piers of bridges consisting of the piles *k*, with head-caps *m* and foot-blocks *e*, be the said parts *m* and *e* made of one or two parts, as shown and described, whereby the pier and the bridge are bound together, in the manner and for the purpose set forth.

OLIVER AVERY, JR.
CALEB BARTHOLOMEW.

Witnesses:
S. J. PARKER,
WM. WILLIAMS.