R. Montgomery.
Truss Bridge.

No. 76,795. Patented Apr. 14, 1868.

Fig. 1.

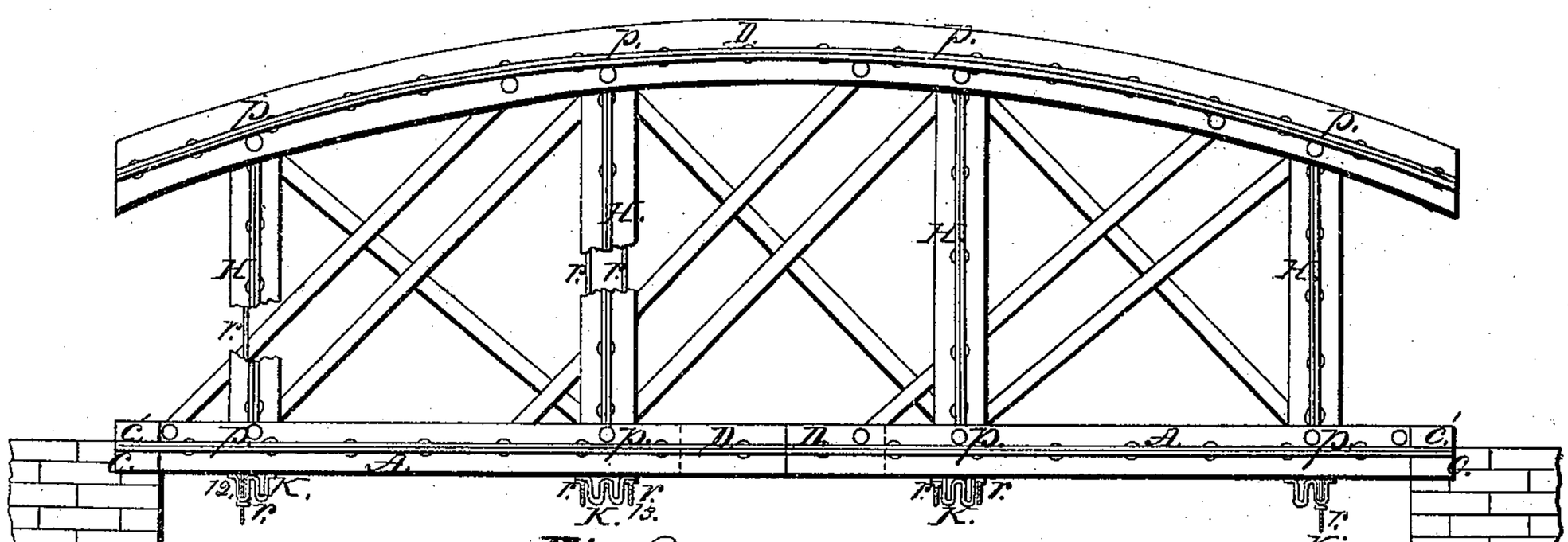
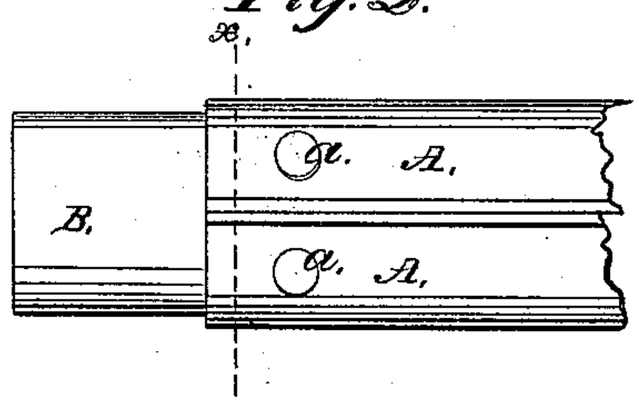


Fig. 2.

Fig. 3.



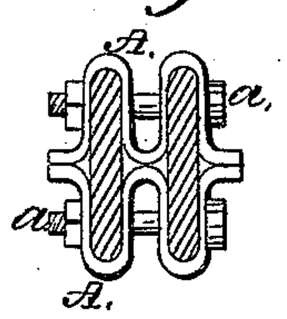


Fig. 5.

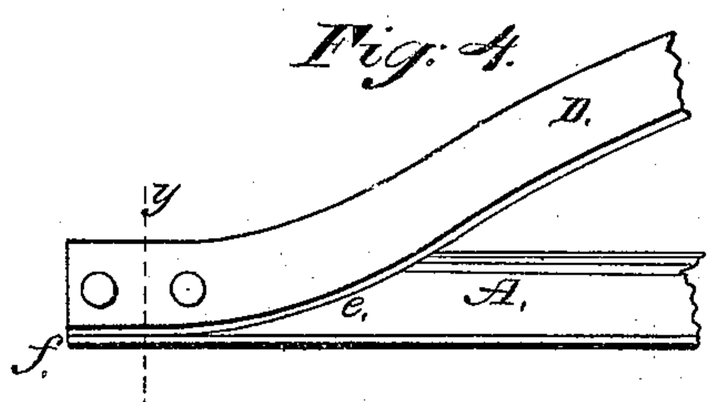


Fig. 4.

Fig. 6.

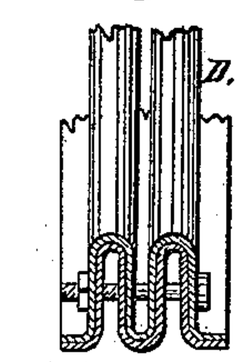


Fig. 7.

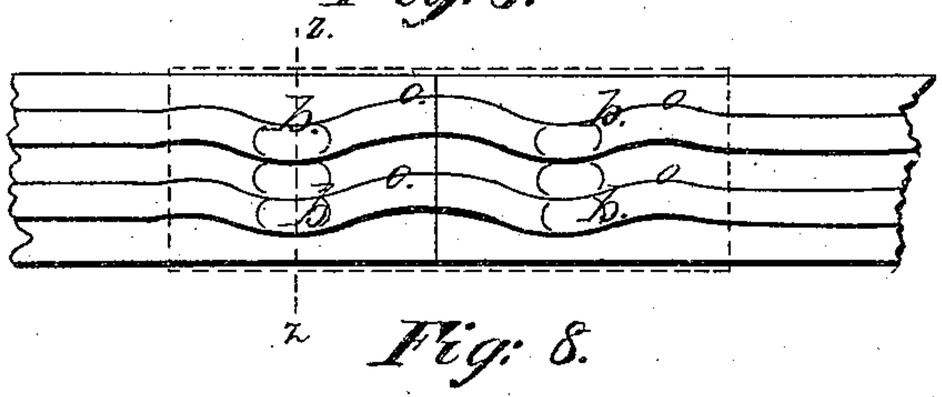


Fig. 8.

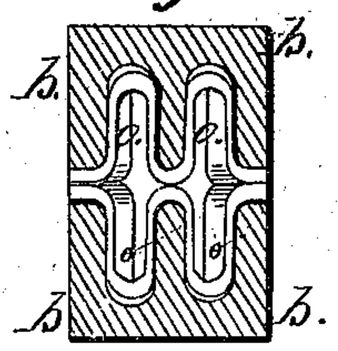
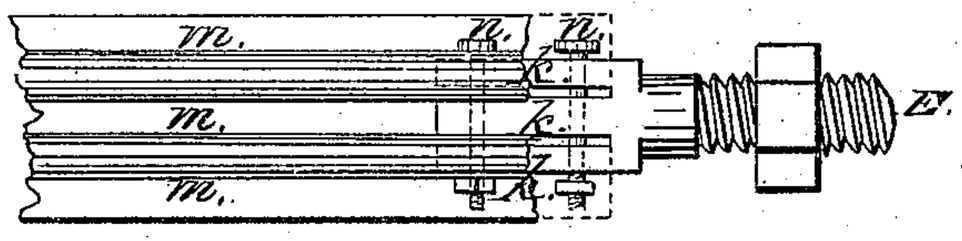
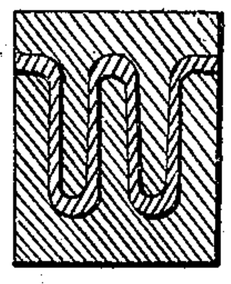


Fig. 9.





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United States Patent Office.

RICHARD MONTGOMERY, OF NEW YORK, N. Y.

Letters Patent No. 76,795, *dated April* 14, 1868.

IMPROVED METAL BEAMS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, RICHARD MONTGOMERY, of the city, county, and State of New York, have invented certain new and useful Improvements in Corrugated Metal Beams for bridges and other purposes; and I do hereby declare the following to be a full and exact description thereof, reference being had to the accompanyin drawings, forming a part of this specification, in which—

Figure 1 is an elevation of a bridge constructed of my improved metal beams.

Figure 2, an elevation of one end of a double corrugated sheet-metal beam, provided with solid core-pieces.

Figure 3, a transverse section in the line *x x* of fig. 2.

Figure 4 illustrates an improved method of combining and uniting the ends of an arch and chord constructed of corrugated sheet metal.

Figure 5 is a transverse section in the line *y y* of fig. 4.

Figure 6 is a plan view, illustrating an improved method of so corrugating and crimping the ends of the metal beams, and of the saddle or anchor-plates fitting thereon, as to produce interlocking projections and indentations therein.

Figure 7 is a transverse section in line *z z* of fig. 6, the saddle or anchor-plates being shown as in place.

Figure 8 illustrates an improved forked fastening-bolt, in combination with the end of a corrugated sheet-metal beam to secure and tie the same as may be desired.

Figure 9 is a sectional view of the saddle or anchor-plates, which I employ to secure the ends of the beams in suitable abutments, as applied to single beams.

Similar letters indicate like parts in each of the figures.

The nature of my invention consists of improvements in the manner of uniting, securing, and strengthening the improved corrugated metal beams which are the subject-matter of sundry patents heretofore granted to me in the United States; and it relates, first, in extending the bearing-ends of corrugated arched beams beyond the spring of the arch in a right plane coincident with its chord; second, in the formation of interlocking elevations and depressions, or counterpart concavities and convexities, in the overlapping ends of my improved corrugated metal beams, and in the saddle or anchor-plates, made to embrace and hold them, to prevent them from sliding or drawing asunder when fitted together, and to relieve the bolts from the great strain otherwise brought to bear upon them; and, third, in the employment of a forked bolt, by which to secure or tie the ends of these corrugated beams to any given object, the forks in the shank of the bolt being made to pass between each fold of the corrugations in the beam, so as to support and steady them, and, at the same time, give a firm hold to the securing-bolts.

My improved beams, A A, are made of metal, corrugated longitudinally, by means of rolls, into two (or more) deep folds, whose sides are parallel, whose ends form alternately inverted and uninverted arches, and which have a greater thickness of metal on the top and bottom, or in the crown of the arches, than in the sides. The manner of constructing them will be found fully described in the Letters Patent of the United States heretofore granted to me therefor.

The metal beams A may be used singly, (see figs. 5, 8, and 9,) or, where greater strength is required, doubled, edge to edge, as shown in figs. 1, 2, and 3. In the construction of upright supporting-columns, and, more especially, in providing for uniting the double metal beams A end to end, so as to form one continuous piece, I combine therewith auxiliary solid metallic core-beams, B, by inserting the same into the longitudinal chambers which are formed in the metal beams by their corrugations. The core-beams B may extend the entire length of the corrugated beam within the same, or, where the sole object is to provide for a strong, substantial joint between the ends of any two, they need but to extend within the metal sufficiently far to admit of a secure, rigid fastening thereto. To obtain such fastening, I use transverse bolts, *a a*, passing through the metal and the solid core-piece, as seen in fig. 3.

In uniting the ends of adjacent metal beams which are made single, I simply overlap them, as seen in figs.

4 and 5, and fasten them by one or more bolts passing through the two; but, in order to protect the bolts from the danger of being cut off or broken, I cause the corrugations to deviate from a right line by curving them in and out longitudinally, as shown at *o*, fig. 6, and also break the continuity of their surface by indentations and counterpart elevations, *b b*, therein, so formed as that the elevations in the surface of one piece will coincide and fit into the indentations of that upon which it is to be superimposed. By thus interlocking them, the two pieces are prevented from sliding apart, and the tie thus obtained receives all longitudinal strain tending to pull them apart, and thus relieves the bolts. By forming the saddle and anchor-plates C C′ (between which the ends of the beams, secured to the abutments of a bridge, are held) with curved recesses and indentations, corresponding to those in the corrugated metal beam, the advantage of the interlocking of the one with the other is available in securing, in the strongest manner, the beams to their abutments.

To obtain a firmer hold between an arch, D, constructed of a corrugated metal beam and its proper chord-beam, I cause the ends of the arch to coincide, in direction, with the chord-beam by bending the ends of the arch until they reach the plane of its chord, as shown at *f e*, fig. 4. These ends, *e f*, will then coincide with the straight beam A, forming the chord when superimposed thereon, so as that a single bolt may serve to secure both, and, in this case, interlocking indentations may be formed in the two, as an additional security in the fastening, as has been hereinbefore described.

Where single corrugated metal beams are employed, instead of using the saddle-plates C, as described, I employ a bolt, E, having a forked shank, K, so disposed as to pass in between the folds *m* of the metal beam, at either end thereof, in the manner illustrated in fig. 8 of the drawings. By this arrangement of the bolt, it may be secured to the beam by transverse bolts, *n*, in the most secure and rigid manner, so as to become, in fact, a part of the beam.

In constructing a bridge of my improved metal beams, I prefer to make the arch D wider and heavier than the floor-beams A, forming its chord. The beams are all made double and hollow, being formed of corrugated pieces, united, as illustrated in figs. 3 and 7 of the drawings, edge to edge. The ends of the corrugated uprights H in the truss-work are compressed and flattened to enter the central recess of the beams above and below, so as to be secured by transverse bolts, *p p*, passing through the two folds forming the recess, and they are strengthened by vertical bolts, *r r*, passing down through the central chamber therein, and which serve to secure the transverse tie-beams K of the bridge, as seen in fig. 1. These vertical tie-bolts *r* may be passed either through the fold of the cross-beam, as seen at "12," fig. 1, or through its edges, as illustrated at "13," fig. 1.

In long spans, requiring more than one beam, I unite two (or more) of them in one continuous length by means of core-beams, as illustrated in figs. 2 and 3, extending them on either side of the joint far enough to give a firm, rigid bearing thereto; or, in some cases, the core-beams may extend the entire length of the bridge, breaking joints with those of the enveloping-beams.

The ends of the bridge are securely anchored to the abutments S by means of anchor-plates C C′. The lower one, C, firmly embedded and tied to the masonry, is channelled, to receive closely the folds of the corrugated beams, and, moreover, indented in the manner illustrated in fig. 6, to receive and interlock with corresponding indentations and curves in the corrugations at the ends of said beams, to prevent them from slipping. When the ends of the beams are laid in place upon the lower anchor-plates C, the upper or saddle-plates C′ are fitted closely thereon, (being channelled in such manner as to conform thereto,) and then bolted down through the beams and anchor-plate C, fastening the whole firmly in place, as illustrated in figs. 1 and 7.

Having thus fully described my invention, what I claim therein as new, and desire to secure by Letters Patent, is—

1. I claim so shaping and forming the ends of an arch constructed of corrugated metal as that said ends shall coincide with the straight ends of a beam forming a chord to said arch, if superimposed thereon, substantially in the manner herein set forth.

2. Imparting a curved or irregular line to the folds of a corrugated metal beam, substantially in the manner and for the purpose herein specified.

3. Indenting or breaking the surface of the folds or corrugations in a corrugated metal beam, substantiallly as and for the purpose herein set forth.

4. A bolt, E, having a forked shank, so arranged and disposed as to fit within and between the folds of a corrugated metal beam, at the ends thereof, substantially in the manner and for the purpose herein set forth.

The foregoing specification of my improvement in corrugated metal beams signed by me, this twenty-third day of July, A. D. 1867.

RICHARD MONTGOMERY.

Witnesses:

R. A. ADAMS,

RANDOLPH MCADAM.