M. ADLER.

Improvement in Compressive-Chord for Bridge-Girders.

No. 128,350. Patented June 25, 1872.

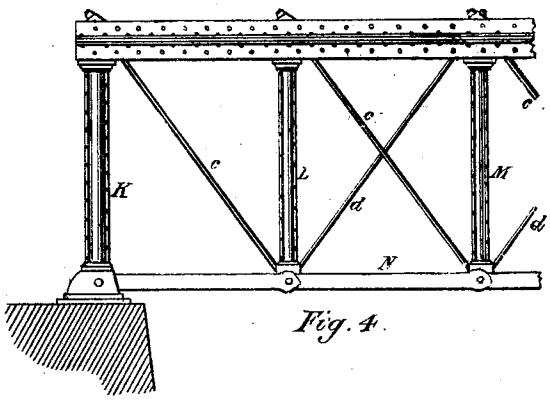


Fig. 4.

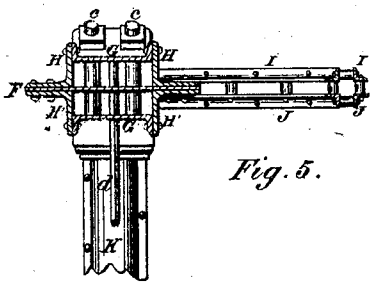


Fig. 5.

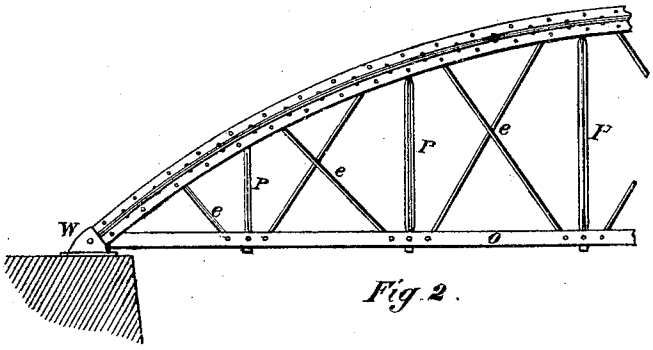


Fig. 2.

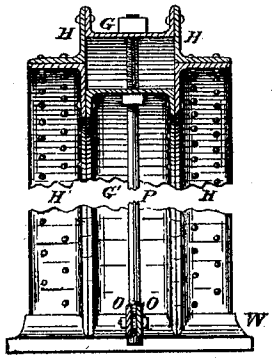


Fig. 3.

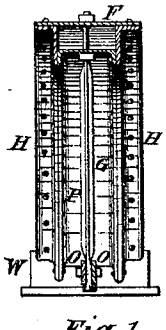


Fig. 1.

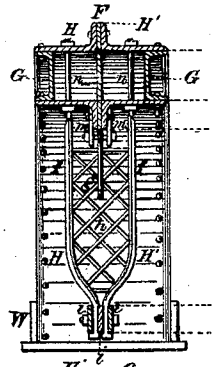


Fig. 6.

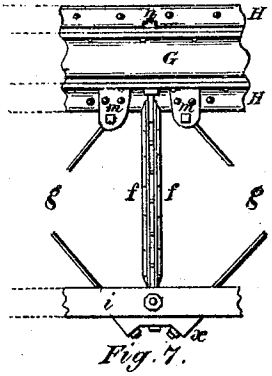
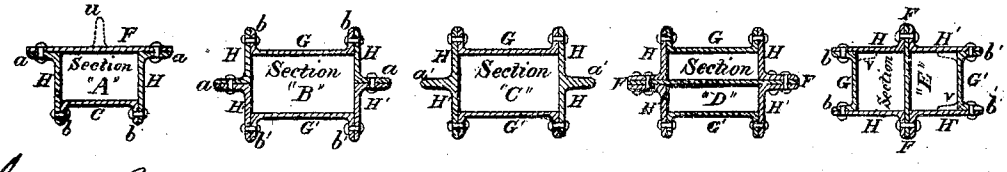


Fig. 7.



Witnesses
Jno. D. Patten
Andrew Choffin

Michael Adler, Inventor
by Jos. Abbott, Attorney.

UNITED STATES PATENT OFFICE.

MICHAEL ADLER, OF CANTON, OHIO.

IMPROVEMENT IN COMPRESSION-CHORDS FOR BRIDGE-GIRDERS.

Specification forming part of Letters Patent No. 128,350, dated June 25, 1872.

SPECIFICATION.

To all whom it may concern:

Be it known that I, MICHAEL ADLER, of Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Compressive Chord for Arched or Truss Girders; and that the following is a full, clear, and exact specification thereof, which will enable others skilled in the art to make and use the said invention.

Most of the tubular compressive chords heretofore constructed for wrought-iron girders, excepting such as are made wholly of channel-bar or I beams and plates, are made of peculiar "shaped" iron, which requires special rolls or machinery for its production, and which is not ordinarily found in market, of all the different sizes desirable for the various spans of bridge-work which the builder is called upon to construct. My invention is designed to obviate this objection by giving to the builder a construction of the common angle L, T, I, and channel-iron and flat plate, which can be readily obtained in market, of any size required to adapt my construction to any ordinary span, and which will afford a strong and economical chord; and to this end it consists in the combination of two L-angle or T-iron bars with a channel or I-bar, said L-angle or T-bars being riveted by one leg to the flanges of the channel or I-bar, and the said three parts being combined with or riveted to a plate or T-bar, or three similar bars, or three similar bars and a plate, so as to form a tubular chord of any ordinary size required, as is hereinafter more fully shown.

In the accompanying drawing, sections A, B, C, D, and E represent the various modified forms of my chord. Figure 1 is an end view of one-half of a bow-string girder having an arch made in the form of section A. Figs. 2 and 3 are side view and enlarged end view of a bow-string girder having an arch made in the form of section B. Fig. 4 is a side view of a portion of a truss-girder made with an upper chord in the form of section D. Fig. 5 is an end view of the upper chord shown in Fig. 4. Fig. 6 is an end view of one-half of a bow-string girder having an arch made in the form of section E. Fig. 7 is a side view of a portion of the girder shown in Fig. 6.

In section A are shown two L-irons, H H, which are distinguished from "angle-iron" by having legs *a* of unequal lengths, and which are united by rivets to the flanges *b b* of the channel-bar G, as shown. To the flanges *a a* of these L-irons is riveted the plate F; or, if preferred, in order to obtain greater cross-section and vertical stiffness, a T-bar, which differs mainly from a flat plate in that it has the flange or rib *u*, indicated by dotted lines, may be used in the place of the plate F.

In section B are shown the two L-irons H H, riveted to the channel-bar G, as before described, and to the flanges of the legs *a a* of these irons H H are riveted the legs of two similar L-irons, H′ H′, which are likewise riveted to a channel-bar, G′, thus giving a section of considerably greater outside dimensions than that of section A. Where the form shown in section B is required in an arch or chord of moderate vertical dimensions, say six inches, the two T-bars H *a′* H′ H *a′* H′ may be used in place of the four L-irons H H H′ H′, as is shown in section C, thus saving two rows of rivets, as will be seen by comparing section C with section B. Where greater lateral stiffness is required in the chord than is given in the sections just described, a flat plate, F, may be riveted between the L-irons H H H′ H′, thus forming a chord of the form shown by section D. Where an increase in both the lateral and vertical stiffness is required, the chord can be made in the form shown in section E, where the long legs of the L-irons H H′ are arranged in a horizontal position, and the channel-bars G G′ and plate F are placed in a vertical position, as shown.

In the practical application of these various sections to bridge-work, as shown by the examples given in drawing, Fig. 1 shows the section A in the form of an arch for a bow-string girder, where its ends rest on shoes W, and are connected by lower chords O O, which are supported by X-iron rods P bolted between said chords, and run through the arch in an ordinary manner.

In Figs. 2 and 3 the arch is of the general form of section B, except that the bars H H′ are of angle-iron instead of L-iron—*i. e.*, the legs of said bars are of the same length instead of being of unequal lengths. The manner of combining this arch with the shoes W, lower chords O O, posts P P, and truss-rods *e*

e, to form the bow-string girder, is too well known to bridge-builders to require further description than that given by the drawing.

The upper chord of the truss-girder, shown in Figs. 4 and 5, is of the general form shown in section D, except that angle-irons are used in place of the L-irons shown in section D. The posts K L M, link-chords N, and main and counter rods *c d* are combined with the upper chord in the ordinary manner. The lateral compressive brace I I J J, formed by uniting four angle-bars back to back, in column form, by means of rivets and intervening thimbles, is readily united to the upper chord by running the upper and lower angle-bars I I and J J of said brace over the horizontal legs of the chord-bars H H′, and securing them by rivets, as shown.

Section E is shown as the arch of a bow-string girder in Figs. 6 and 7, and as this section will usually be used in arches of large span, where a heavy lower chord is required, it is represented in said figures as being used with three plate-chords, *i i i*, placed edgewise and abreast. The post *f f h f f* consists of four angle-irons, *f f f f*, arranged two abreast, and having their lower ends flattened out and bolted between the chords *i i i*. These angle-bars are spread out above said lower chords, and are united by intervening lattice-bars *h* riveted between them, and the bolts *n n* are riveted between their upper ends, and pass through the arch-bars H H′, with jam-nuts above and below, in the ordinary manner. The ears *m m* are riveted to the vertical legs of the lower arch-bars H H′, and the eyes on the truss-rods *g g* are secured by bolts between said ears, the lower ends of said truss-rods passing through an angle-block, *x*, placed below the chords *i i i*. Where a still greater cross-section for the chord is required than is shown in the sections described, I-beams may be used in place of the channel-bars G and G′, which will give the additional flange-section indicated by dotted lines U U in section E.

I am aware that chords have been before constructed of two flat plates and two or more channel or I beams, in which the plates are usually employed as side pieces when said chord is used in arched bridges, and I lay no claim to such construction.

What I claim herein as new and of my invention, and desire to secure by Letters Patent, is—

1. The combination of two L or angle irons H H with a channel or I beam, G, the legs of said L or angle irons being riveted to the flanges of said channel or I beam, and the said combination forming the basis of construction for a compressive chord, substantially as is herein set forth.

2. The combination of the two L-irons H H, channel-bar G, and plate or T bar F, as represented in section A, for the purpose specified.

3. The combination of the four L or angle irons H H H′ H′ and the two channel or I beams G G′, substantially in the manner and for the purpose specified.

4. The combination of the two T-bars H *a′* H′ H *a′* H′ and the two channel or I beams G G′, substantially as and for the purpose specified.

5. The combination of the plate F, four angle or L irons H H H′ H′, and two channel or I beams G G′, said parts being arranged and combined substantially as and for the purpose specified.

As evidence of the foregoing, witness my hand this 11th day of December, A. D. 1871.

MICHAEL ADLER.

Witnesses:
JOB ABBOTT,
ANDREW CHOFFIN.