Jan. 9, 1923.

1,441,387.

C. A. P. TURNER.

LONG SPAN BRIDGE.

ORIGINAL FILED JULY 10, 1913.

3 SHEETS—SHEET 1.

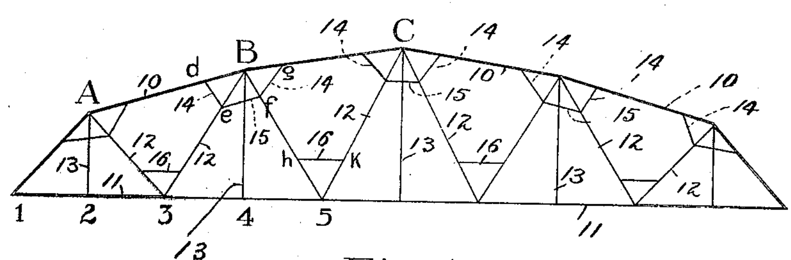

Fig. 1

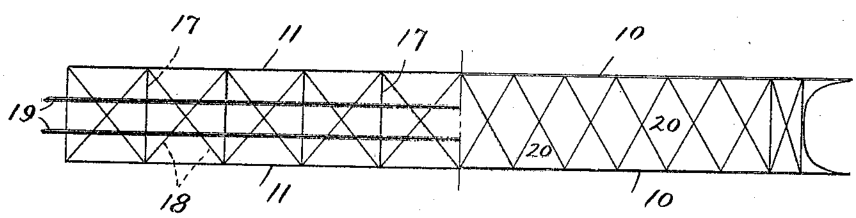

Fig. 2

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BY Chas J. Williamson
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3 SHEETS—SHEET 2

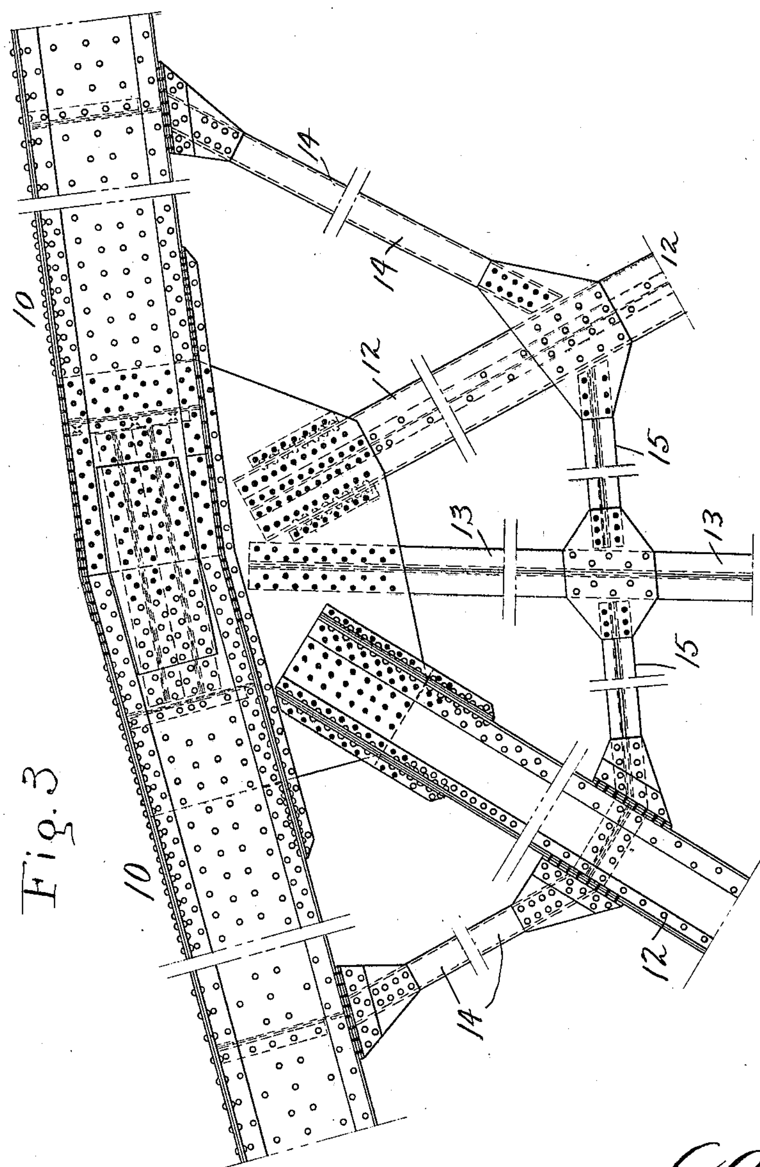

Fig. 3

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Jan. 9, 1923.

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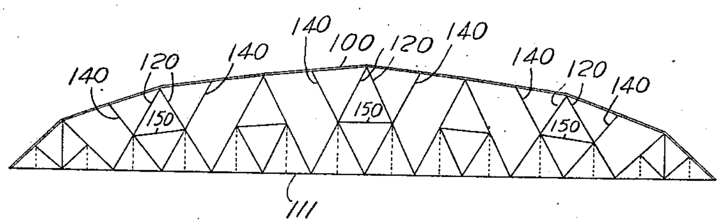
3 SHEETS—SHEET 3.

Fig. 4.



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Patented Jan. 9, 1923. 1,441,387

UNITED STATES PATENT OFFICE.

CLAUDE A. P. TURNER, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO T. WEGENER, OF COLUMBUS, OHIO.

LONG-SPAN BRIDGE.

Application filed July 10, 1913, Serial No. 778,278. Renewed January 21, 1921. Serial No. 439,058.

To all whom it may concern:

Be it known that I, Claude A. P. Turner, of Minneapolis, in the county of Hennepin and in the State of Minnesota, have invented a certain new and useful Improvement in Long-Span Bridges, and do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to bridge trusses, and generally stated has for its object economy of material, and the production of a structure of great stiffness. This application is filed as a renewal of application No. 778,278, filed July 10, 1913, allowed Dec. 8, 1919, and also to embrace a different embodiment of my invention from that illustrated in the drawings of my aforesaid application.

In the drawings—

Fig. 1 is a side elevation of a truss embodying my invention, the illustration being diagrammatic, for the truss shown is for a span of 480 feet;

Fig. 2 is a top plan view thereof, also diagrammatic, the floor plan appearing at the left and the top chord plan and bracing at the right;

Fig. 3 is a detail view in side elevation, showing the members of the cantilever frame extending between the top chord and the webbing.

Fig. 4 is a view like Fig. 1 of another embodiment of my invention.

Referring to the drawings, the truss shown comprises a top chord 10 and a bottom chord 11, and Warren type webbing consisting of the diagonal members 12 and the sub-verticals 13 the panel points of the two chords being located so that the bottom chord panels 1—2; 2—3; etc., are half as long as the top chord panels A—B; B—C; etc. In the truss shown in the drawings, which as I have stated is for a span of 480 feet, the top chord panels are 80 feet and the bottom chord panels are 40 feet, from which dimensions an idea of the magnitude of the structure can be obtained.

At each side of each top chord panel point, a strut 14 extends between the top chord and a diagonal member 12, inclining upward and outward from the latter and between the lower ends of the two struts 14 a horizontal strut 15 extends, these various parts being riveted together, as shown, so that it will be seen a frame work is provided that extends around the top chord panel point, or the apex, as a center, by which the length of the top chord section between adjacent panel points is divided and the weight thereof supported so that excessive bending stress is avoided. In the case shown in Figs. 1 to 3 in the drawings the top chord sections are supported by the inclined struts 14 at a point 20 feet from the panel point. The frame work formed by the struts 14 and 15 is indicated diagrammatically in Fig. 1 by the lines *d*, *e*, *f* and *g*.

It will be observed that each of the struts 14 and 15 acts in compression, the struts 14 being in a sense cantilever arms and the intermediate strut 15 sustaining the thrust of the arms.

It will be seen that as the struts 14 (corresponding to the members *d*, *e* and *f* and *g* of Fig. 1) are comparatively short, secondary stresses in the top chord sections due to stress in the diagonal members 13 of the webbing stretching or elongating said diagonal members, are largely eliminated.

To stiffen the diagonal web members 12 I connect them above each lower chord panel point by a horizontal brace, or tie 16 which opposes the tendency of said diagonal members to bow outwards under load. The braces 16, it will be noted, alternate with the struts 15 of the cantilever frame and each, it will be noted, is joined to the web member at a point that is a fraction of their height or the distance from chord to chord, which preferably is about a quarter thereof.

The floor plan, as shown at the left of Fig. 2, includes floor beams 17, laterals 18 and stringers 19, and the top chord bracing, as shown at the right of Fig. 2, consists of laterals 20.

The cantilever framework acts the same way, whether the apex of the truss is one of a single span, or one supported at its ends, or a draw bridge truss. The weight is supported by the members of the frame work by cantilever action by the balancing of the loads, or if there is any difference in the loads, that is taken up by flexure in all the members meeting at the apex.

Referring to what is shown in Fig. 4 which illustrates a design for a span 470 feet centers, the struts, 140, corresponding with the inclined struts, 14 of Fig. 1 extend from a point on the top chord, 100 midway between the panel points and to the diagonal, 120, of the webbing at a point substantially midlength thereof where they are joined to the strut, 150, corresponding to the strut, 15, of Fig. 1; and the framework thus formed by said struts is applied only to alternate panels. The arrangement illustrated in Fig. 4 works out very economically of material in practice.

By my invention a truss as provided that uses a minium of material, it has great stiffness and it eliminates, or greatly reduces secondary stresses.

Having thus described my invention what I claim is—

1. In a bridge truss, the combination of top and bottom chords, webbing connecting the two chords that comprises diagonal members that meet in an apex at the top chord, and a frame comprising struts constituting compression members which extend from points on the top chord on opposite sides of said apex downward to said diagonal members and supporting respectively the portions of the top chord to which they extend which lies between the supported extremities of said portions of the top chord, said frame including a compression member extending between said diagonal members at the points where the lower ends of said top chord engaging members join said diagonal members.

2. In a bridge truss, the combination of top and bottom chords, webbing connecting the two chords that comprises diagonal members that meet in an apex at the top chord, and a frame at alternate panels comprising struts constituting compression members which extend from points on the top chord on opposite sides of said apex downward to said diagonal members and supporting respectively the portion of the top chord to which they extend which lies between the supported extremities of said portion of the top chord, said frame including a compression member extending between said diagonal members at the points where the lower ends of said top chord-engaging members join said diagonal members.

In testimony that I claim the foregoing I have hereunto set my hand.

CLAUDE A. P. TURNER.

Witnesses:

CHAS. J. WILLIAMSON,

A. T. HAYES.