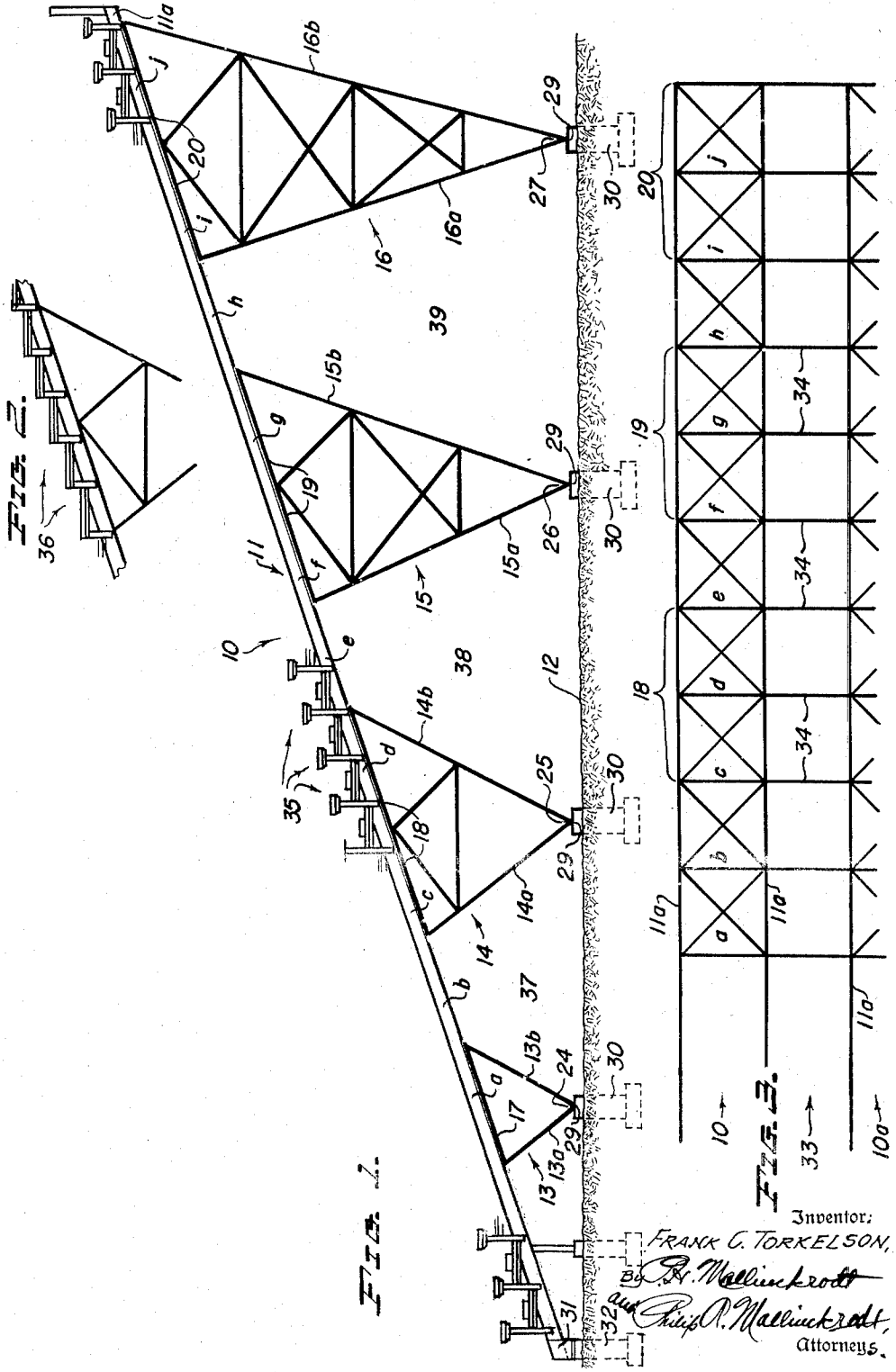
Jan. 29, 1952 F. C. TORKELSON 2,584,066

BLEACHER FRAME CONSTRUCTION

Filed March 15, 1949 2 SHEETS—SHEET 1



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FIG. 4.

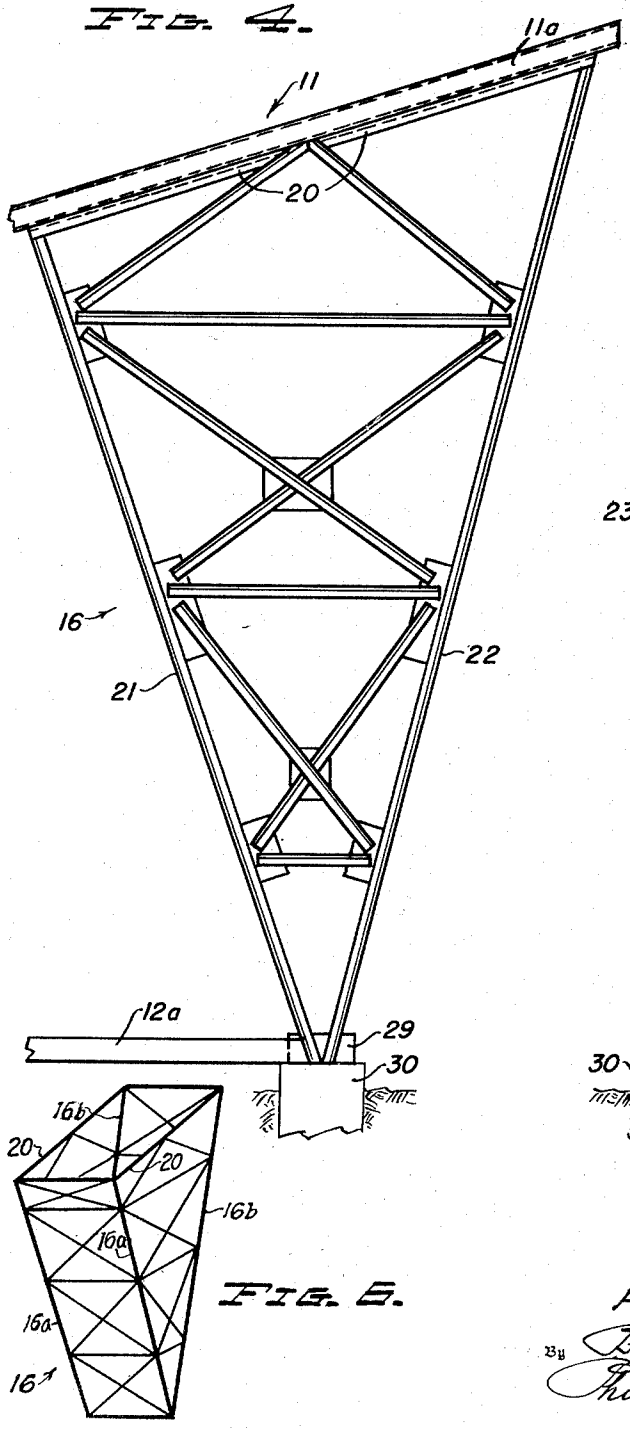
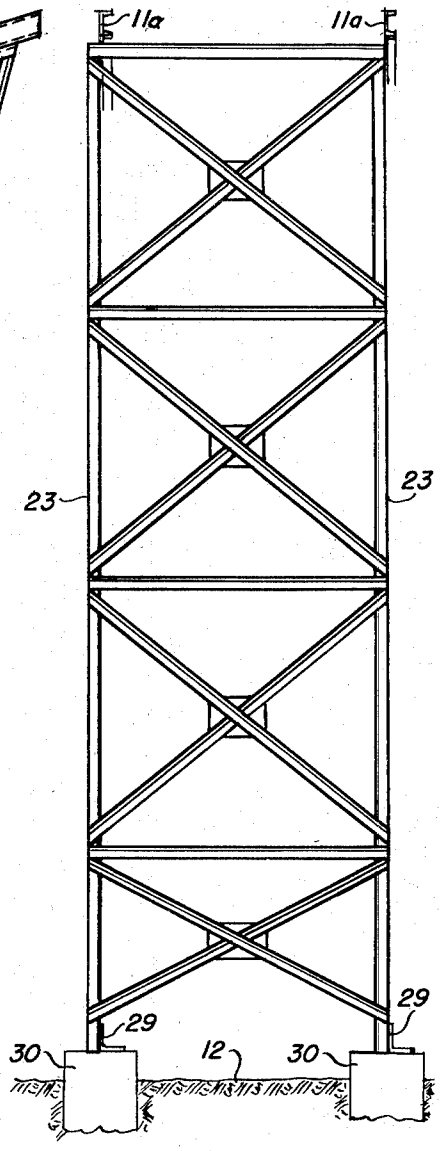


FIG. 6.

FIG. 5.



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Patented Jan. 29, 1952 2,584,066

UNITED STATES PATENT OFFICE

2,584,066

BLEACHER FRAME CONSTRUCTION

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Application March 15, 1949, Serial No. 81,486

8 Claims. (Cl. 20—1.126)

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This invention relates chiefly to bleacher construction but is not necessarily limited thereto.

The principal object of the invention is to provide structural integrity coupled with simplicity of design which embodies inherent measures of safety. Other important objects include the attainment of economy in fabrication and erection costs, portability, rapidity of assembling and disassembling the structural components, together with the conservation of usable ground space in the completed structure.

Still other objects will become self-evident during the progress of the following detailed description.

In achieving the objects of the invention, there is provided a trussed structure characterized by an inclined upper chord composed of structural members and a lower chord consisting of a ground portion located directly below the upper chord, the lower end-portion of the upper chord being anchored to the lower chord. One or more wedge-shaped members are arranged along and between the two chords so as to constitute the web of the trussed structure.

The upper chord is preferably formed of two structural members spaced apart from each other transversely and is divided lengthwise into a series of consecutive, lateral, bracing panels. These panels are preferably of substantially equal lengths for the purpose of effecting economy in fabrication.

Advantageously, the bases of the afore-mentioned wedge-shaped web members coincide with one or more of the chord bracing panels and are spaced apart as may be required. Each wedge member is preferably a framed entity composed of four columns located at the intersections of the sides of the wedge. These sides form two opposed rectangular faces which meet in an edge that is parallel to an edge of the afore-mentioned base, and two triangular ends. The rectangular faces and the triangular ends are each sway braced in triangular sub-panels to resist wind and other imposed stresses.

The end result of the construction thus briefly outlined, is that the weight imposed upon the area tributary to the trussed structure is uniquely transmitted to the ground, practically entirely through compression members, while at the time a most economical disposition of the structural material to resist swaying is attained.

In the accompanying drawings, which illustrate one embodiment of the invention,

Fig. 1 represents a side elevation, largely in diagram;

Fig. 2, a fragmentary portion of Fig. 1, showing a minor detail;

Fig. 3, a plan of the lateral bracing in the plane of the upper chord;

Fig. 4, a side elevation, in enlarged detail, of the trussed structure of Fig. 1; and

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Fig. 5, an end elevation corresponding to Fig. 4, looking in the direction of the arrow 5 in Fig. 4.

Fig. 6, a diagram in perspective, of the wedge member of Figs. 4 and 5 as seen from the left in Fig. 4.

Referring to the drawing, the numeral 10, Fig. 1, denotes a trussed structure 10, comprising the upper chord 11, the lower chord or ground portion 12, and a series of web members 13, 14, 15 and 16.

The upper chord includes longitudinally extending side members 11*a* that are preferably made of structural steel shapes, such as channels, and are spaced apart from each other to form a deck for lateral bracing. This deck is divided lengthwise into a series of X-braced panels designated *a* to *j* in Figs. 1 and 3. Preferably the panels are all of equal dimensions.

The web members 13 to 16 of the truss 10 are unique in that each one has essentially the overall form of a wedge-shaped frame. Each frame has a base that substantially coincides with one or more of the panels of the bracing deck. For illustration, in the present showing, base 17 of web member 13 matches panel *a*; the base 18 of web member 14 matches panels *c* plus *d*; base 19 of web member 15 matches panels *f* plus *g*; and base 20 of web member 16 matches panels *i* plus *j*. The panels *b*, *e* and *h* form spaces between members 13 to 16. While four web members are shown in this illustrative case, it is to be understood that the number of such members in general is not limited.

Advantageously, each web member is essentially a framed entity composed principally of four legs or columns springing from the corners of a respective base and arranged in dualities of pairs, 13*a* and 13*b*; 14*a* and 14*b*; 15*a* and 15*b*; and 16*a* and 16*b*; all as indicated in Fig. 1, and as typified in Fig. 6. Each web member thus fulfills the geometrical definition of a wedge since the four bounding columns define two opposed rectangular faces which meet in an edge 28 that is parallel to the edge of the base, and two opposed triangular end faces. As shown in the various figures, the rectangular faces and the triangular end faces of the wedge-shaped web members are braced in triangular sub-panels in accordance with recognized structural practice. The wedge bases 17 to 20 lie in the plane of the upper chord and are rigidly connected to the chord members 11 and 11*a*, preferably in the field, by means of riveting or welding.

The opposed rectangular faces of a wedge member lie in the planes exemplified at 21 and 22 in Fig. 4, while the opposed triangular end faces lie in two opposed planes 23, exemplified in Fig. 5. The vertices 24 to 27 of the respective wedge frames are preferably rigidly anchored to the lower chord or ground, by means of base connections 29 and piers 30. Similarly, the lower

end of upper chord 11 is anchored to the ground by means of a base connection 31 and a pier 32. If desired, the lower chord in some cases may consist of a structural member 12a, Fig. 4 connecting the succcessive vertices together.

A plurality of trussed structures 10 may be arranged side by side, and spaced as suggested in Fig. 3, so as to provide one or more bays, such as the one at 33, between the consecutive trussed structures. Obviously, the actual number and arrangements of the trussed structures varies in accordance with the seating capacity desired. Structural members 34 extend across bay 33 and serve to tie the parts into a finished structure. It is quite evident that the invention is not limited to bleachers.

The spans of upper chord panels *a* to *j* exemplified in Figs. 1 and 3, are determined by the safe carrying capacity of the particular constructional material used, and figured as beams of such spans.

The bleacher seat and walkway construction indicated fragmentarily at 35 in Fig. 1, can follow any conventional pattern. Another pattern is indicated fragmentarily at 36 in Fig. 2. Neither of these patterns per se however, is a part of the invention.

The wedge frames 13 to 16 vary consistently in height, as well as do the principal members 13a, 13b; 14a, 14b; and so on, of the successive frames. The bases, however, of the successive frames are preferably equal, as previously mentioned herein, while the angular magnitudes at the vertices 24, 25 and so on, usually vary. These frames are virtually inverted towers.

The unique trussed construction in addition to its other objective merits provides for making available ground space for a multitude of useful purposes, instead of wasting such space by an occupancy of the usual forests of struts and cross or sway braces. The saving in this respect is evident in Fig. 1 where the clear spaces 37, 38 and 39 extend transversely end to end of the entire bleacher structure, thus conserving substantially the entire ground area below.

Again, the distinctive arrangement makes possible the division of the lateral bracing area into the equalized panels as aforesaid, and so as to allot to the respective wedge members a substantially equalized load-bearing base area, from which in turn, an equalized load is transmitted to the respective piers 30, all of which contribute to structural efficiency.

It is to be noted that the ground chord 12 lies in a right plane dropped from the upper chord 11.

Whereas this invention is here illustrated and described with respect to a certain presently preferred embodiment thereof, it should be understood that various changes may be made in such preferred embodiment and various other forms may be constructed on the basis of the teachings hereof by those skilled in the art, without departing from the scope of the following claims.

I claim:

1. Bleacher construction comprising a trussed structure having an inclined upper chord composed of a plurality of lateral bracing panels lying substantially in the plane thereof; a lower chord rigidly connected to the lower end portion of the upper chord; a plurality of wedge-shaped web members each having a base that coincides with certain of said bracing panels and

having further, two opposed rectangular faces which meet in an edge that is parallel to an edge of said base, and two opposed triangular end panels; said parallel edge being located in said lower chord.

2. Bleacher construction according to claim 1, wherein each of said wedge-shaped web members is a framed entity composed of two dualities of paired columns springing from said base and located at the respective intersections of said rectangular faces with said triangular faces.

3. Bleacher construction according to claim 2, wherein said two dualities of paired columns define rectangular faces equipped with triangular bracing panels and triangular faces equipped with triangular bracing panels.

4. Bleacher construction according to claim 1, wherein said upper chord consists of two longitudinal members spaced apart from each and divided lengthwise thereof into said plurality of bracing panels and wherein said bracing panels are equal one to another.

5. Bleacher construction according to claim 1, wherein said lower chord consists of the ground portion located substantially in a right plane dropped from said upper chord.

6. Bleacher construction according to claim 1, wherein the said bases that coincide with certain of said bracing panels are spaced apart one from another to the extent of at least one bracing panel.

7. A framed entity adapted to serve as a web member in a trussed structure having an inclined upper chord composed of lateral panels, and a lower chord, said framed entity being arranged for securing to a lateral panel of said upper chord, and comprising a wedge-shaped frame having a base that coincides with said lateral panel; and a duality of paired column members springing from said base and defining two opposed rectangular faces which meet in a vertex edge parallel to an edge of said base, and defining further, two opposed triangular ends; the said vertex edge being adapted for securing to said lower chord.

8. A trussed structure having an inclined structural upper chord and a lower chord located in a right plane dropped from said upper chord; a plurality of wedge-shaped web members spaced apart from one another and extending from the upper chord so as to terminate in vertices located in said lower chord, the bases of said web members being equal one to another; and spanning members forming spacers between said bases; all arranged to provide open spaces of maximum extent along said lower chord.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,809,598	Oberdorfer et al.	June 9, 1931

FOREIGN PATENTS

Number	Country	Date
592,895	France	1925

OTHER REFERENCES

Engineering News-Record, April 1, 1938, page 53.