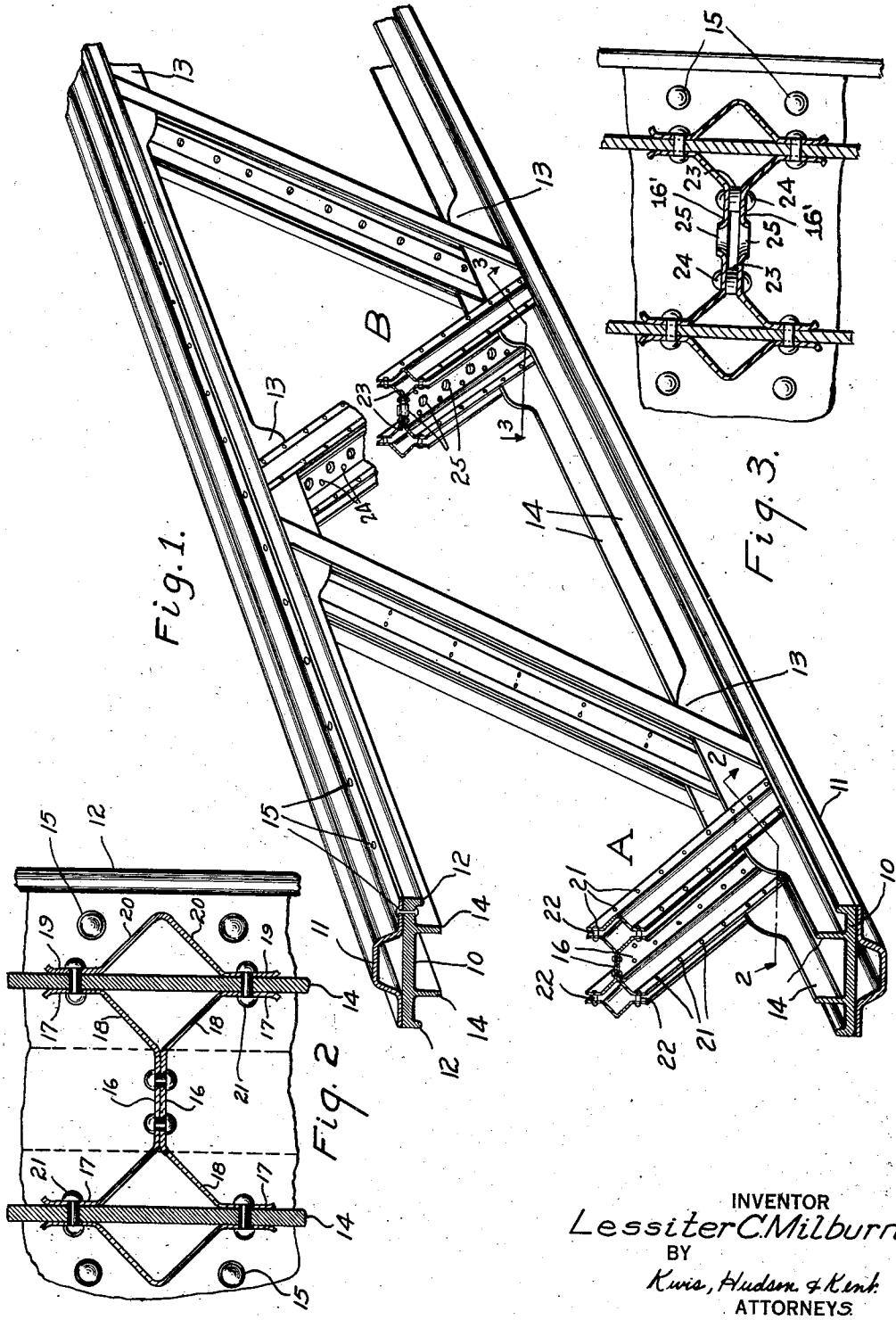
Feb. 10, 1931. L. C. MILBURN 1,791,827

TRUSS STRUCTURE

Filed Jan. 27, 1928



INVENTOR
Lessiter C. Milburn
BY
Kwis, Hudson & Kent
ATTORNEYS

Patented Feb. 10, 1931

1,791,827

UNITED STATES PATENT OFFICE

LESSITER C. MILBURN, OF WICKLIFFE, OHIO, ASSIGNOR TO THE GLENN L. MARTIN COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO

TRUSS STRUCTURE

Application filed January 27, 1928. Serial No. 249,820.

This invention relates to improvements in truss structures, particularly lightweight metal members for use in air craft where the strength-weight ratio must be high.

A principal object of the invention is the provision of members made up chiefly of thin metal parts so formed and proportioned as to give maximum strength for the weight of metal employed.

Another object is the provision of a novel composite chord structure having reinforcements both within and without the principal transverse web portion, the reinforcements on the inner side of a chord element serving also as fins for attachment of the struts.

Another object is the provision of a built up structural member for use as a strut in the truss, but capable of use in other connections also.

Other objects and features of novelty will appear as I proceed with the description of that embodiment of the invention which, for the purposes of the present application, I have illustrated in the accompanying drawing, in which—

Fig. 1 is a perspective view of a portion of a metal truss structure embodying the invention; and

Fig. 2 is a detail sectional view on a larger scale illustrating particularly the construction of one of the composite structural members A which I employ as struts, the section being taken substantially on the line 2—2 of Fig. 1; and

Fig. 3 is a detail sectional view on a larger scale illustrating particularly the construction of a composite structural member B which I employ to meet localized stress conditions, the section being taken substantially on the line 3—3 of Fig. 1.

The beam illustrated in the drawing is preferably formed throughout of aluminum alloy, when employed for air craft work. It has upper and lower chord members of identical form. These chord members each include an inner part 10 and an outer part 11. The part 10 may be fabricated from an extruded or milled shape, and has short edge flanges 12 and intermediate fins 13, all extending inwardly of the beam. The fins 13 are of sufficient width to constitute good anchorages for the struts of the beam, but in the regions between such strut connections these fins may be of reduced width, as shown at 14, in order to save weight. The outer part 11 of each chord consists of a transversely arched member, which may be formed by extrusion or braking and which is secured to the part 10 along the edges of the latter by any suitable means, as by rivets 15.

The struts of the beam are made up of thin sheet metal parts, preferably of the novel construction illustrated, in which there are two channel elements 16 with their web portions arranged back to back and secured together by rivets or the like. These channels have parallel flanges 17 that do not extend directly from the webs but are attached thereto by intermediate forwardly and outwardly inclined portions 18. The edges of the flanges 17 are curled or deflected toward the inside of the channel for the purpose of preventing "crinkling" or local bending of the thin metal under compression strains.

The intermediate portions 18 on each side of the member together constitute half of the wall of a tube-like section, the other half being constituted by a separate element having attaching flanges 19 in one plane and an interposed outwardly deflected portion made up of two parts 20 that are each opposed to one of the intermediate portions 18 of the channels. The flanges 19 have outward curls or deflections similar to those of the flanges 17, for the same purpose.

Each of the flanges 19 is secured to the opposite flange 17 by a series of rivets or the like 21 which extend through spacing washers 22. These washers are of substantially the same thickness as the fins 13. Consequently the removal or omission of rivets and washers at the ends of the struts enables the tube-like sections of the struts to straddle the fins 13, after which the rivets are replaced extending through the fins instead of through the washers. In this manner the struts are firmly and rigidly attached to the chord members.

As is well known the loads upon a beam differ considerably throughout the length of

the beam. In order to take care of this condition and at the same time economize weight as much as possible, I vary the proportions of the struts throughout the same beam, and to this end I have shown in connection with the beam of Fig. 1 struts A and B of somewhat different proportions, the strut A being designed to take heavier loads than the strut B. It will be noted that in strut A the channels 16 are secured together directly and that the tube-like sections of strut A are of larger cross sectional area than those of strut B. The thickness of sheet metal employed in the manufacture of these struts may vary also, if desired. On account of the smaller tube-like sections in strut B the web portions of the channels 16′ of that strut are necessarily wider than the corresponding portions 16 of strut A. I have found it to be of advantage in this lighter construction to space the channels 16 apart somewhat by means of interposed spacing washers 23, through which the securing rivets 24 extend. I also preferably form flanged holes 25 in the web portions of the channels of this strut for stiffening and lightening the same.

While in the accompanying drawing and in the foregoing description I have disclosed one form of my invention in considerable detail, this has been done for purposes of illustration only and is not intended to constitute any limitation upon the invention.

Having thus described my invention, what I claim is:

1. A strut comprising a pair of like channels arranged back to back and secured together, the side flanges of the channels being attached to the webs thereof by intermediate laterally and outwardly extending portions, the aligned channel flanges on each side of the member joined in spaced relation to and by an element having aligned attaching flanges and an intermediate laterally deflected portion, whereby a pair of spaced parallel tube-like sections are formed in the member.

2. A strut comprising a pair of like channels arranged back to back and secured together, the side flanges of the channels being attached to the webs thereof by intermediate laterally and outwardly extending portions, an element having attaching flanges in one plane and an intermediate portion comprising two parts each of which is substantially complementary to the said intermediate portions of the channels, one of said last named elements being attached at its flanges to and in spaced relation with the aligned channel flanges on each side of the member, whereby a pair of spaced parallel tube-like sections are formed in the member.

3. A strut comprising a pair of like channels arranged back to back, spaced apart and secured together, the side flanges of the channels being attached to the webs thereof by intermediate laterally and outwardly extending portions, an element having attaching flanges in one plane and an intermediate outwardly deflected portion, one of said last named elements being attached by its flanges to the aligned channel flanges on each side of the structural member with spacers interposed between the flanges of said element and the flanges of said channels, whereby a pair of spaced parallel tube-like square sections are formed in the member.

4. A strut comprising a pair of tube-like thin metal sections joined together by two webs spaced apart, said tube-like sections being each formed partially of continuations of said web and partially of separate upwardly arched elements having flanges joined to said continuations with spacers interposed between the flanges of said elements and said continuations.

5. In a light metal truss structure, composite chord members each comprising inner and outer parts secured together along their edges, the outer part being arched transversely of the chord, the inner part having intermediate inwardly extending longitudinal fins, and tubular struts straddling said fins and joining said chord members, said struts being secured at their ends to said fins.

6. In a light metal truss structure, chord members each comprising inner and outer elements secured together along their edges, the outer element part being arched transversely of the inner element, the inner part having inwardly extending intermediate longitudinal fins, struts comprising twin tube-like sections split at their ends to straddle said fins, and fastenings extending through said fins and the straddling portions of said tube-like sections.

7. In a light metal truss structure, chord members comprising inner and outer parts secured together along their edges, the inner part of each chord having a pair of inwardly extending spaced longitudinal fins, and struts joining said chord members, each strut comprising a pair of spaced tube-like sections joined together by a web, the tube-like sections being split to straddle said fins, and fastenings extending through said fins and the straddling portions of said tube-like sections.

In testimony whereof, I hereunto affix my signature.

LESSITER C. MILBURN.