

T. L. EGGLESTON.

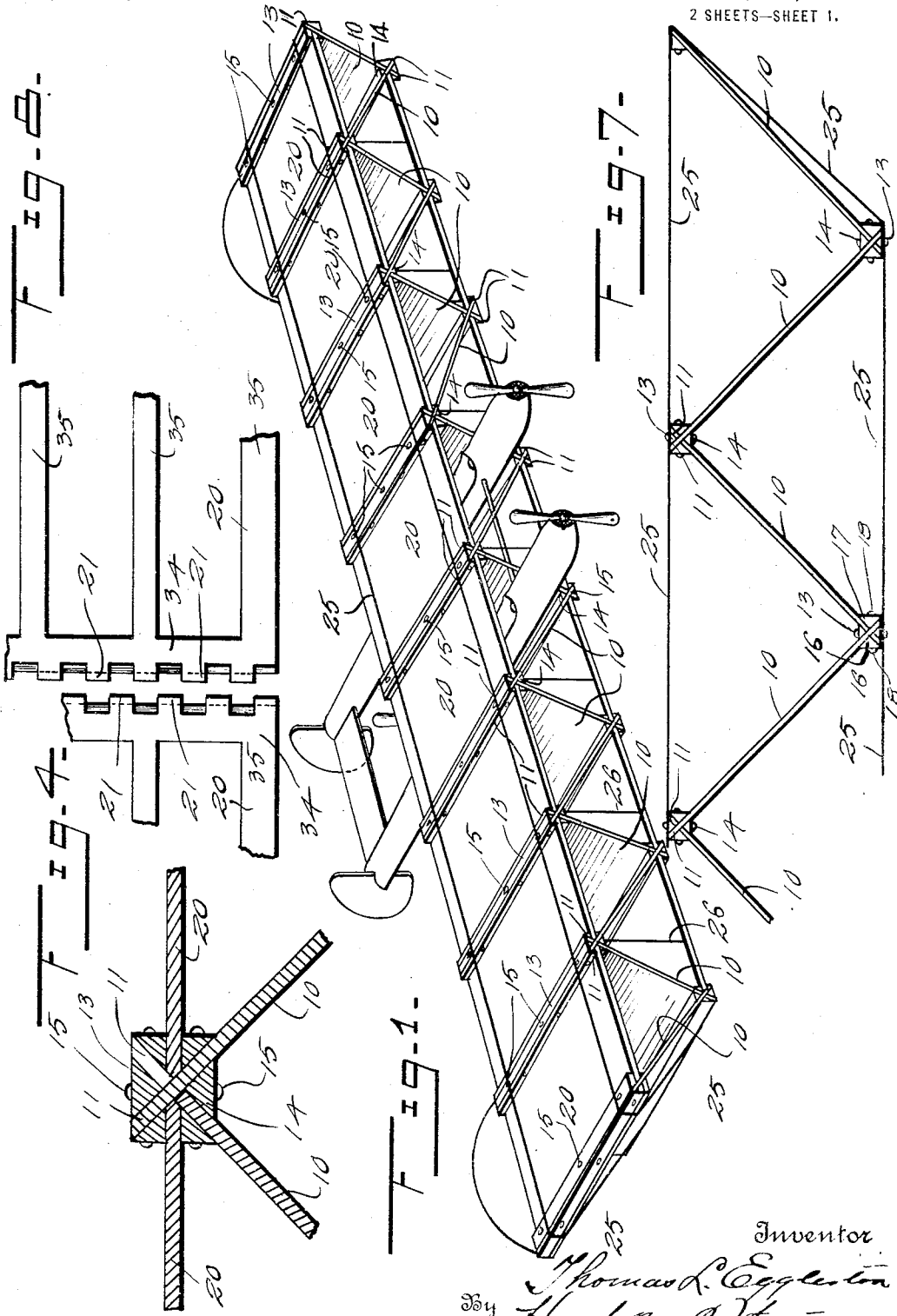
AIRPLANE.

APPLICATION FILED JULY 9, 1918. RENEWED OCT. 9, 1919.

1,347,084.

Patented July 20, 1920.

2 SHEETS—SHEET 1.



Inventor
Thomas L. Eggleston
By Hugh M. R. Krieger
Attorney

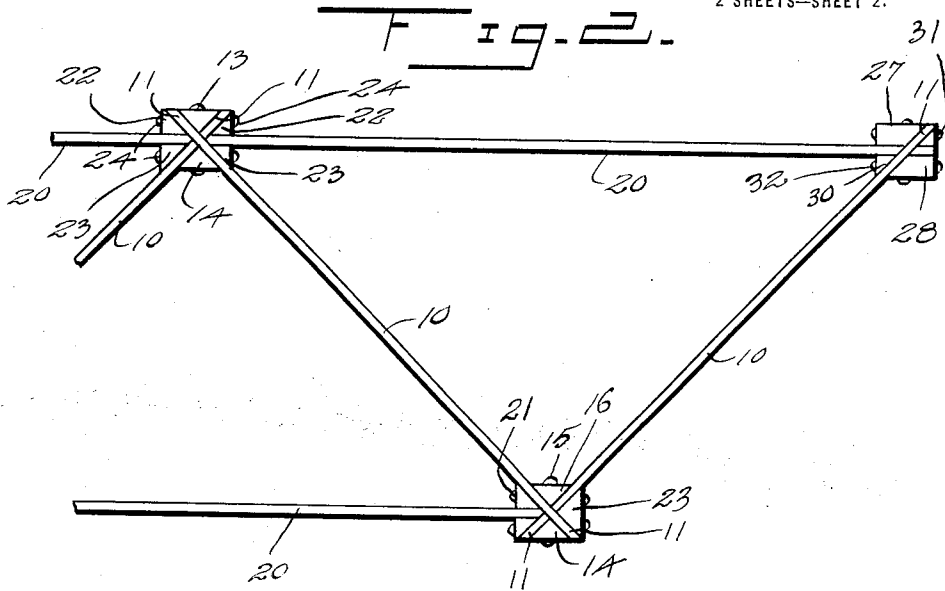
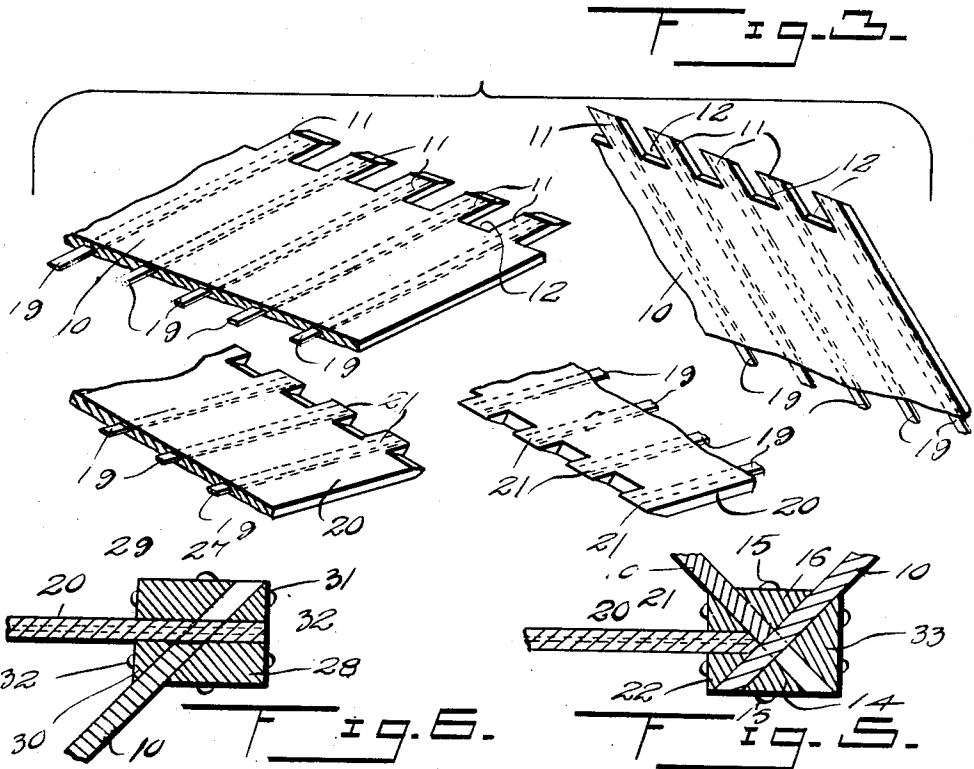
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Inventor

Thomas L. Eggleston
334 *Hugh M. Sterling*
Attorney

UNITED STATES PATENT OFFICE.

THOMAS L. EGGLESTON, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO
EGGLESTON AIR-CELL AEROPLANE COMPANY, A CORPORATION OF DELA-
WARE.

AIRPLANE.

1,347,084.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, THOMAS L. EGGLESTON, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Airplanes, of which the following is a specification.

My invention relates to the construction of airplanes and other built-up structures in which lightness and strength are the main factors to be considered, and especially such structures as the spans of bridges which require great supporting strength between the points of support, and the object of my invention is to provide a structure especially adapted for the planes of airplanes, in order that the size of the planes may be greatly increased by reason of the employment of units or sections so arranged and united as to be productive of greater supporting strength as a whole by reason of the distribution throughout of all strain, and one that will be strongest at the points of union of the units or sections, with the aim in view of making it entirely practicable to construct airplanes with the wings or planes at least two hundred feet long without the attendant weakness and undesirable increase in weight that follows from increased wing spread.

A further object is to secure the above result by constituting the units or sections referred to planes in themselves which by their disposition or arrangement in the entire structure will form lifting surfaces and thus perform the two fold function of increasing strength and capacity for great increase in size of the airplane, and also increasing the lifting force of the structure. Therefore the invention consists first, in the formation of a plane or spanning structure by overlapping the end portions of units or sections, one with the other, and in oblique arrangement, and employing locking means arranged transversely above and below and on opposite sides of the end portions and securely clamping the said units between the elements of the locking means; and second, in employing the said unit construction by forming the units of planes provided with end portions adapted to overlap contiguous end portions of the adjacent

units, and constitute when assembled a plane in which the units are disposed in oblique arrangement one to the other.

Further the invention consists in uniting with the above mentioned obliquely arranged units, one or more planes formed by uniting to the obliquely arranged units like units in alined arrangement and each uniting its overlapping end portion with the adjacent oblique units to span the space between the same at their separated ends and form a cellular structure of great resisting strength, in which the cells are united by the transverse locking means mentioned to produce a strong union by virtue of the reinforcing and locking of the elements united.

The invention also consists in other novel features in the arrangement and construction of parts, all, as hereinafter described and as specifically set out in the appended claims.

In the accompanying drawings, illustrating my invention,

Figure 1, represents an airplane constructed in accordance with the invention and intended to show the same adapted for the larger types having two cars and driven by three propellers;

Fig. 2 is a front view in elevation of a portion of the wing structure;

Fig. 3, represents in perspective end portions of the several units or sections shown detached and exposing reinforcing bars, employed when the units are constructed of fiber board or other sheet material;

Fig. 4 is an enlarged detail showing a transverse cross section through the union of the obliquely arranged units or sections;

Fig. 5 is an enlarged detail showing a transverse section through the union of the units or sections with locking bars as constructed when only three of the units or sections are united, as in the lower ends of the complete airplane;

Fig. 6 is an enlarged detail showing the manner of employing the overlapping end portions and the locking bars, when a horizontal unit is united to an oblique unit as required in the upper ends of the completed airplanes;

Fig. 7 is a modification in which a form of

plane is shown consisting of the units or sections united in oblique arrangement suitably trussed; and

Fig. 8 represents part of two adjacent end portions, showing the manner in which the units are constructed when made up of framing to be covered with fabric, or other material.

Referring to the drawings in greater detail, the units or sections 10, as shown in Fig. 1, constitute when combined and interior plane formed of a series of angular arches which support and unite the upper and lower planes and take the place of the vertical struts and much of the wire stays now commonly employed, but it is obvious, as shown in Fig. 7, that one or more planes may be formed of the units 10 and used either singly or combined as practice may determine. These units 10, as clearly shown in Fig. 3, are formed with end portions that provide projections or tenons 11, so formed that the projections of one unit overlap and fit in between the projections of the adjacent unit, the units being made preferably alike and with the projections of one end opposite the spaces between the projections of the other end. It will also be seen that the end faces 12 between the projections 11 permit the projections of the adjacent unit to lie thereon and have a firm bearing, and the end faces of the projections are formed or beveled preferably so that the end faces will lie in the same horizontal plane when the projections are in their united position. The units 10 when arranged in their oblique supporting relation are so held by the upper and lower locking bars 13 and 14 arranged transversely of the units and fitting, one the angle above the intersection of the projections 11, and the other, the angle below the intersection, these bars being firmly clamped together on the interposed structure to maintain their uniting, supporting, and reinforcing function, by means of bolts 15 or other suitable and preferably adjustable means. And in like manner, as shown in Fig. 7 similar bars 16 and 17 are employed one in each lateral angle formed by the intersecting projections 11, being similarly united under strain by bolts 18 or suitable means. Thus a locking of the units in their oblique arrangement is effected that is very rugged by virtue of the distribution of any strain to which it may be subjected, over a comparatively large area of bearing surface, and at the same time causing the locking of the parts together more firmly by reason of any strain coming thereon. It will also be seen that a reinforcing of the union is made by this construction, which gives to the union a strength greater than other portions of the units, which units depend largely for strength upon their arched or angular arrangement and consequently may be of

lighter and thinner material and permit the building of larger planes with less proportional increase of weight and what is known as parasitic air resistance. In this connection there is shown, as a preferred form of construction, units formed from sheets of fiber board of great strength and toughness, which are reinforced by embedded strips 19 of metal or other suitable material which also reinforce the interlocking projections 11.

When upper and lower planes are employed, as in the preferred showing of Fig. 1, the same are formed of the units or sections 20 which, as shown in Figs. 3 and 8, are likewise provided with end portions having beveled projections 21 between which when brought into abutment with the interlocking projections 11, the abutting projections lie, while the beveled faces coincide with the incline of the obliquely arranged units against which they rest. When the units 20 are included in the interlocked parts, instead of the single locking bars of Fig. 7, a pair of bars 22 and 23 is employed on each side to fit the lateral angles, as shown in Figs. 1, 2 and 4, the same being clamped together in upper and lower pairs by the bolts 24, and the whole structure reinforced by wire trusses as at 25, which preferably encircle the structure longitudinally as shown and are placed under a suitable tension. Other trussing of the parts may be employed as occasion may require to reinforce against any tendency of buckling of any unit and vertical wire stays 26 may be employed when desirable.

In uniting the outer units or sections, as shown, the top outer union employs the modification shown in Fig. 6, in which the locking bars 27 and 28 are bolted together by bolts 29 and the bars 30 and 31 bolted by means of bolts 32, and in uniting the lower outer unit with the two outer oblique units, as shown in Fig. 5, the outer bar 33 is of the same character as the single lateral bar of Fig. 7 and is bolted to each side bar 21 and 22. The locking bars referred to may be of wood or other suitable material and when metal bars are used they would preferably be of the same general cross section shown and of hollow construction and consequently of comparatively light weight.

In Fig. 8, in which the units are shown as a frame structure the transverse frame bars 34 will be employed with the projections 11 formed thereon, and the longitudinal bars 35 will be arranged preferably to form by their projection some of the interlocking projections 11 of the unit, as shown.

From the foregoing it will be seen that by the unit construction described it is practicable to build airplanes and spanning structures of considerable extent by virtue of the series of arches or cells produced by

the arrangement of the units, and their firm and reinforced locking, while in the airplane structure alone, the obliquely arranged units constitute lifting planes. The lifting function of the oblique units increases and becomes important and desirable, as the size of the airplane is increased as the upper and lower planes are spaced apart sufficiently so as to prevent any serious choking of the air in its passage through the cells, and when it is considered to what extent this structure eliminates the employment of large struts with their concomitant of parasitic resistance which together with the increased weight have made difficult the problem of building suitable airplanes of great size, it will be appreciated what are its possibilities in the construction of battle planes and such as are desired for weight carrying and for ocean crossing flights.

It will also be appreciated that in illustrating the invention no attempt is made to adhere to correct proportions or measurements as to size and thickness of the parts, as the purpose of the drawing is primarily to show clearly the details of the structure employed, and practice will show what the proportions shall be to secure the requisite strength with the minimum of weight and dead resistance.

What I claim is:

1. The hereindescribed structure for airplanes and for other purposes, comprising units or sections adapted to be arranged in oblique supporting relation one to the other and having end portions to overlap the end portions of the contiguous unit or section, transversely arranged bars disposed within the spaces between the said units or sections and their overlapping portions, and means for securing the said bars to lock the parts together.

2. The hereindescribed structure for airplanes and for other purposes, comprising

units or sections adapted to be arranged in oblique supporting relation one to the other and having end portions to overlap the end portions of the contiguous units or sections, units or sections having end portions to overlap said obliquely arranged units or sections contiguous thereto, locking bars transversely arranged above and below the overlapping portions of said obliquely arranged units, locking bars transversely arranged above and below the other units in the angle formed by the obliquely intersecting units, and means for uniting firmly together opposing pairs of bars to clamp and lock the parts.

3. The hereindescribed structure for airplanes and for other purposes, comprising units or sections adapted to be arranged in oblique supporting relation one to the other and having end portions to overlap the end portions of the contiguous units or sections, transversely arranged bars disposed within the angles formed by the overlapping and intersection of said units, and means for maintaining said bars in binding relation upon the said unit, and one or more surrounding trusses under tension.

4. The hereindescribed structure for airplanes and for other purposes, comprising units or sections forming each a plane and adapted to be arranged in oblique supporting relation one to the other and having end portions adapted to provide extending overlapping portions when united with contiguous units or sections, other plane units adapted for alined arrangement and to unite with the end portions of the oblique units and be disposed between the separated ends of each pair to provide upper and lower plane surfaces, and transversely arranged locking bars for clamping the parts united, disposed within the angles formed thereby.

In testimony whereof I affix my signature.

THOMAS L. EGGLESTON.