July 15, 1924. 1,501,549

M. C. BAUMANN ET AL

AEROPLANE STRUCTURE

Filed July 23, 1920 2 Sheets-Sheet 1

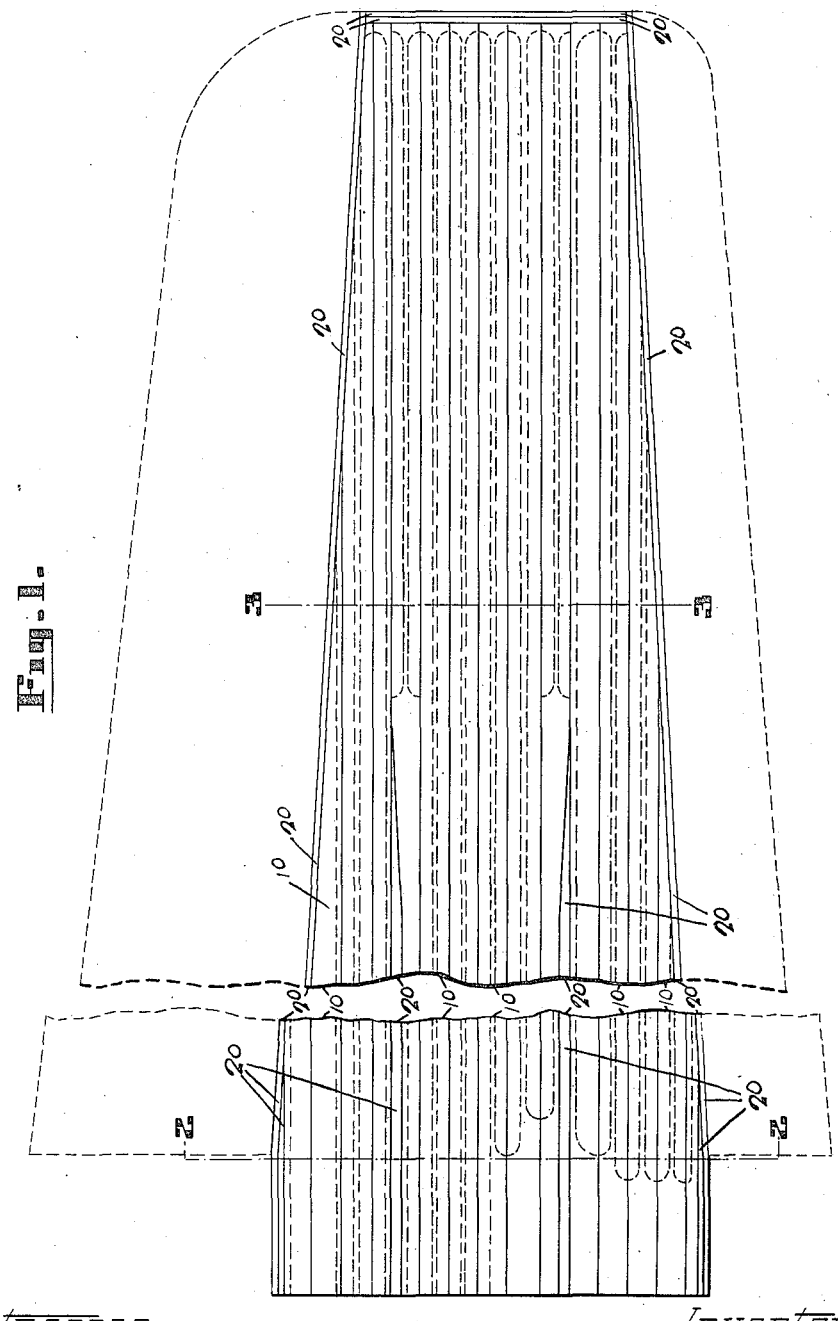

Fig. 1.

Witnesses
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AEROPLANE STRUCTURE

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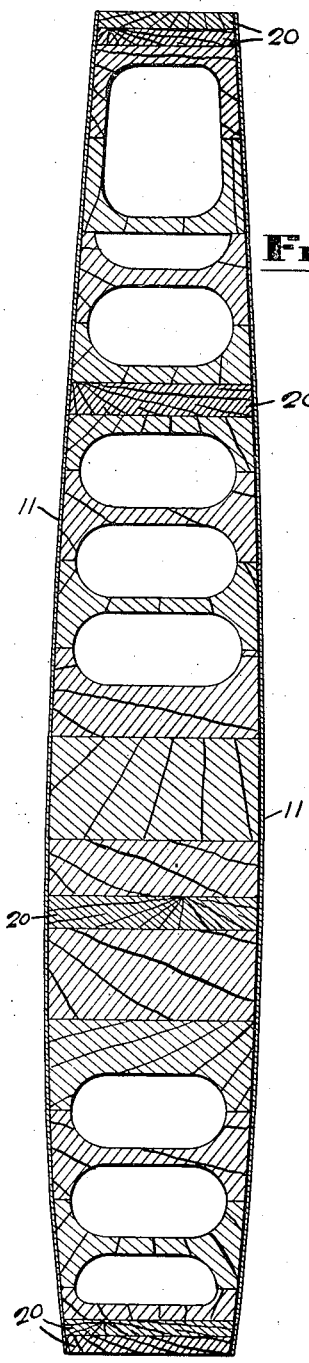

Fig. 2.

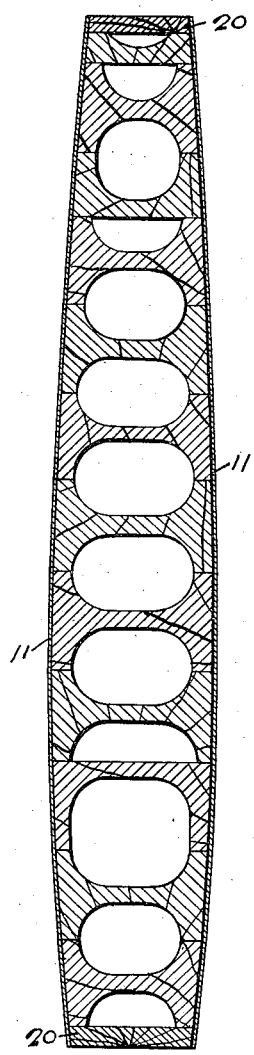

Fig. 3.

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Patented July 15, 1924. 1,501,549

UNITED STATES PATENT OFFICE.

MILTON C. BAUMANN AND HOWARD M. RINEHART, OF DAYTON, OHIO, ASSIGNORS TO DAYTON-WRIGHT COMPANY, OF DAYTON, OHIO, A CORPORATION OF DELAWARE.

AEROPLANE STRUCTURE.

Application filed July 28, 1920. Serial No. 399,517.

To all whom it may concern:

Be it known that we, MILTON C. BAUMANN and HOWARD M. RINEHART, citizens of the United States of America, residing at Dayton, county of Montgomery, State of Ohio, have invented certain new and useful Improvements in Aeroplane Structures, of which the following is a full, clear, and exact description.

The present invention relates to airplane structure, and particularly to the structure of the load supporting and controlling portions of airplanes.

Among the objects of the invention is to produce a plane or other load supporting or controlling member, which shall be more rigid and resistant to injury than those heretofore used, and in the case of the load supporting planes or wings, to greatly increase the efficiency.

Another object is the elimination from such parts of the usual rather delicate frame work and cloth covering and the substitution therefor of a more rigid structure furnishing support for every portion of the wing or other surfaces.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is a plan view of a wing or a plane with the top surface of veneer removed, and having the entering and trailing edge portions indicated in dotted lines.

Fig. 2 is a cross-section of the main portion of the plane, taken on the line 2—2 in Fig. 1.

Fig. 3 is also a cross-section of the main portion of the plane, but taken on the line 3—3 of Fig. 1.

Heretofore, in constructing, for example, a plane for airplanes, it has been customary to build up a frame work consisting of several longitudinal members or spars and a large number of cross members or ribs, the whole then being covered with one or more layers of a suitable cloth. The ribs consist usually of a large number of short pieces of spruce or other suitable wood so put together as to form a light, strong, well braced truss supporting member. These ribs are so designed as to give their contours the desired aerofoil shape.

One great disadvantage of this form of construction lies in the fact that these ribs are spaced at least a short distance from each other, and for this reason the greater part of the cloth covering is unsupported. In such construction there is accordingly very little resistance to snagging or tearing if the plane comes in contact with any projection or anything of that sort.

By the present construction these ribs and longitudinal members are eliminated and a plane is produced in which every portion of the surface is supported and the planes are thus less liable to injury.

Such a plane as is proposed to be produced under the present invention is illustrated more or less diagrammatically in the drawings.

As will be readily noted from the latter, the plane will be made up of a series of longitudinally extending strips of wood indicated on the drawing by the numeral 10.

In order to produce a plane which shall be of a sufficiently light weight, it has been found that these longitudinal strips may be prepared from certain light woods of which we have found balsa wood to be preferable. Balsa is a tropical wood which has a very good weight strength and is considerably lighter than cork.

The form of strip which has been found to give satisfaction is indicated clearly in the drawings. It will be noted that the strips are routed out on their lateral edges so as to produce a strip having an I-shaped cross section. This shape gives the maximum strength with the lightest weight, as is very well known. These strips are then glued or otherwise attached together as indicated in the drawings, particularly in Fig. 3, in such order as to lie substantially in the same geometric plane and the upper and lower surface of the plane covered with one or more layers of veneering of walnut, mahogany or other suitable harder wood, indicated in Figs. 2 and 3 by the numeral 11.

In order that metal fittings and the like may be attached to the plane by means of screws or similar means, there are inserted at intervals and between the light wood strips, strips of spruce or other hard wood. These strips are indicated in the drawings by the

numeral 20. Further, a strip of such hard wood is attached along the edges of the main portion of the plane, as indicated clearly in Fig. 1.

It will be readily noted that such a wing or other surface of an airplane, as described and illustrated, will be resistant to tearing and, in fact, it may be walked on and even punctured without materially affecting its ability to carry out its function.

One of the great advantages to be derived from the construction forming the present invention, is that the use of such construction in producing a wing or load supporting surface permits the production of a cantilever wing which has a considerably thinner aerofoil section than is ordinarily used in such wings and still have the same factor of safety or load factor. The advantage in so reducing the thickness of the wing is that it is much more efficient at high speeds.

It will be obvious that, while the description has been specific to a plane or wing and its construction, the invention may with advantage be utilized in constructing other parts of the load supporting and control portions of an aeroplane.

While balsa wood has been mentioned as being preferable for use in constructing such a plane, it is conceivable that other light woods might be substituted therefor and such substitution is contemplated as coming within the spirit of the invention.

While the form of construction herein shown and described constitutes a preferred form of embodiment of the invention, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What we claim is as follows:

1. In an airplane, a load supporting or control plane composed chiefly of longitudinally extending substantially I-section wood members positioned laterally in such close relation that the upper and lower surfaces of said members determine the contour of the top and bottom surfaces of the plane.

2. In an airplane, a load supporting or control aerofoil composed chiefly of a plurality of longitudinally extending wood members attached immediately adjacent one another, the top and bottom surfaces of said members forming continuous upper and lower surfaces of said aerofoil.

3. In an airplane, a load supporting or control plane composed chiefly of longitudinally extending substantially I-section wood members positioned side by side immediately adjacent one another.

4. In an airplane, a load supporting or control plane composed chiefly of longitudinally extending wood strips attached together, some of said strips having their lateral edges hollowed out thus forming a cellular structure.

5. An airplane wing, composed of strips of balsa wood, having intermediate strips of hard wood, the first mentioned strips being shaped to form a cellular structure, the said structure being provided with a covering of hard wood veneer.

6. In an airplane, a control plane composed of strips of balsa wood extending longitudinally, the strips being attached together and having attached thereto at intervals strips or pieces of hard wood, whereby metal fittings may be attached to the plane.

7. In an airplane, a load supporting or control plane having longitudinally extending spars of relatively strong material, and longitudinally extending contour forming integral members of relatively light material attached thereto, the upper surfaces of said integral members forming collectively the upper contour of the plane and the lower surfaces thereof the lower contour of the plane.

8. In an airplane, a load supporting or control plane having longitudinally extending spars of relatively strong material, and longitudinally extending contour forming members of balsa wood attached thereto, said contour members having a thickness transverse the plane substantially equal to the thickness of the plane.

9. An aerofoil having longitudinally extending spars of relatively strong material, and contour forming members of relatively light material attached thereto, said contour forming members having a thickness transverse the plane substantially equal to the thickness of the plane and presenting substantially continuous upper and lower contour surfaces.

10. An aerofoil having longitudinally extending spars of relatively strong material, and I-section contour forming members of balsa wood attached thereto, said contour forming members presenting substantially continuous upper and lower contour surfaces.

11. An aerofoil having longitudinally extending spars of relatively strong material, and longitudinally extending I-section contour forming members of balsa wood, said contour forming members presenting substantially continuous upper and lower contour surfaces.

12. An airplane wing composed of strips of balsa wood and having intermediate strips of hard wood; the first mentioned strips being shaped to form a cellular structure.

In testimony whereof we hereto affix our signatures.

MILTON C. BAUMANN.
HOWARD M. RINEHART.

Witnesses:
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