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L. BREGUET

CONSTRUCTION OF AEROPLANE WINGS OF VARIABLE RELATIVE THICKNESS FOR THE PURPOSE OF IMPROVING THEIR AERODYNAMIC QUALITIES

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FIG. 1

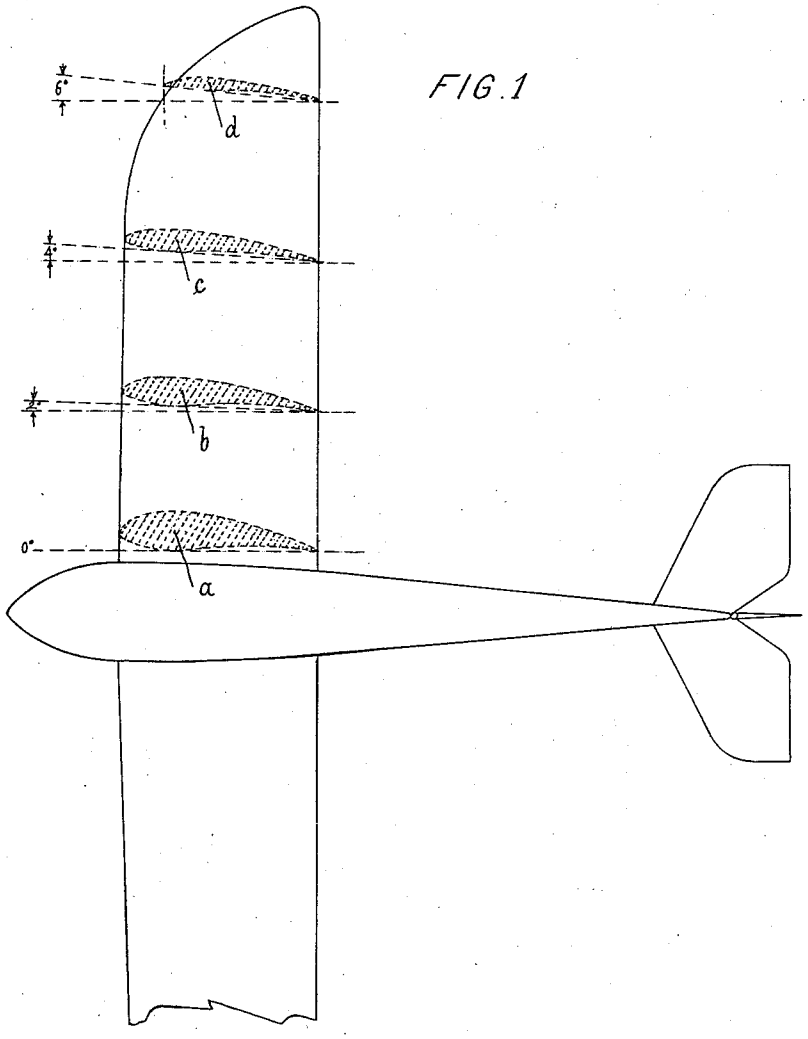
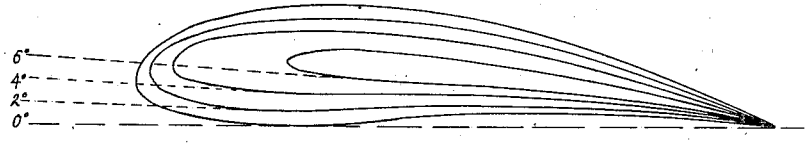


FIG. 2



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UNITED STATES PATENT OFFICE.

LOUIS BREGUET, OF PARIS, FRANCE, ASSIGNOR TO SOCIETE ANONYME DES ATELIERS D'AVIATION LOUIS BREGUET, OF PARIS, FRANCE.

CONSTRUCTION OF AEROPLANE WINGS OF VARIABLE RELATIVE THICKNESS FOR THE PURPOSE OF IMPROVING THEIR AERODYNAMIC QUALITIES.

Application filed November 3, 1922. Serial No. 598,909.

To all whom it may concern:

Be it known that I, LOUIS BREGUET, a citizen of France, and a resident of Paris, France, have invented new and useful Improvements in the Construction of Aeroplane Wings of Variable Relative Thickness for the Purpose of Improving Their Aerodynamic Qualities, which is fully set forth in the following specification.

The improvement of the aerodynamic qualities of avions is a question with which all constructors are occupied.

The present invention relates to the improvement of these qualities in the case of aeroplanes provided with wings wherein the relation between width and thickness, or the relative thickness, is variable, as now prevails in practice for the construction of wings without the use of guy wires.

Up to the present time all avions have been so constructed that the values of the incidence for the various elements or wing outlines in monoplanes, as well as in biplanes and multi-planes, were practically constant; these incidence values are determined by the inclination of the chord of the wing outlines according to the sense of travel, relative to the trajectory of the avion, this trajectory coinciding with the direction of the relative speed of the air with respect to the avion.

For monoplanes with thick wings and with little or no wire bracing, the preferable practice is to make use of a form of solid having an equal resistance to flexion in all the parts which are in the overhang position. The adoption of this form of solid of uniform strength will lead to the use of a relative thickness which gradually decreases towards the ends, and the wings are given a form which as observed in plan view is trapezoidal, with the small side of the trapezoid at the end, and the various outlines or wing elements have been hitherto given practically uniform angles of incidence.

The present invention relates to a form of construction of aeroplane wings wherein the relative thickness is variable, as for example the wings of monoplanes without wire bracing, and it is essentially characterized in that the incidence value for the different outlines varies inversely with the relative thickness, and in such manner that the lifting power of each element of different outlines shall be practically constant. This construction is found to considerably improve the aerodynamic qualities of these wings.

The accompanying drawing shews by way of example in Fig. 1 a monoplane without wire bracing wherein the relative thickness of the sections *a b c d* indicated by the broken lines is:

Section *a*, adjacent the main body	1/6
Section *b*, at about one-third distance	1/8
Section *c*, at about two-thirds distance	1/10,5
Section *d*, near the end	1/14

According to the invention, in order to obtain the best flying shape and the greatest mechanical efficiency it is found desirable to give to the outline having a relative thickness of 1/14 (section *d*) an incidence of 6° relative to the outline next the body *a* having a relative thickness of 1/6. In these conditions, if the outline *a* has an incidence value of 0 degrees relative to the air streams, it would appear that the incidence values should be:

Section *b*, at 1/3 distance	+2°
Section *c*, at 2/3 distance	+4°
Section *d*, at the end of the wing	+6°

This accounts for the great difference of 10% between the inclination of the outlines next the body and at the ends of the wings, as measured by their chords on the direction of travel of the avion.

Fig. 2 is an end view and on a larger scale, of a wing constructed according to this invention.

The advantages obtained by the said arrangement are considerable, and they have a marked effect upon the greatest distances to be covered by an areoplane, the greatest altitudes, and the speed of rising from the ground.

What I claim is:—

A method and form of construction of wings having a variable relative thickness for the purpose of improving their aero-

dynamic qualities and particularly the improvement in the flying shape and the mechanical efficiency, said construction being characterized in that the incidence of action upon the air of the different elements or outlines of the wings, as measured by the angle made by the chord of the outlines with the direction of the relative speed of the air, varies inversely with the relative thickness of said outlines.

In testimony whereof I have signed this specification.

LOUIS BREGUET.