Feb. 9, 1926.

1,571,989

P. G. ZIMMERMANN

AEROFOIL

Filed May 29, 1922

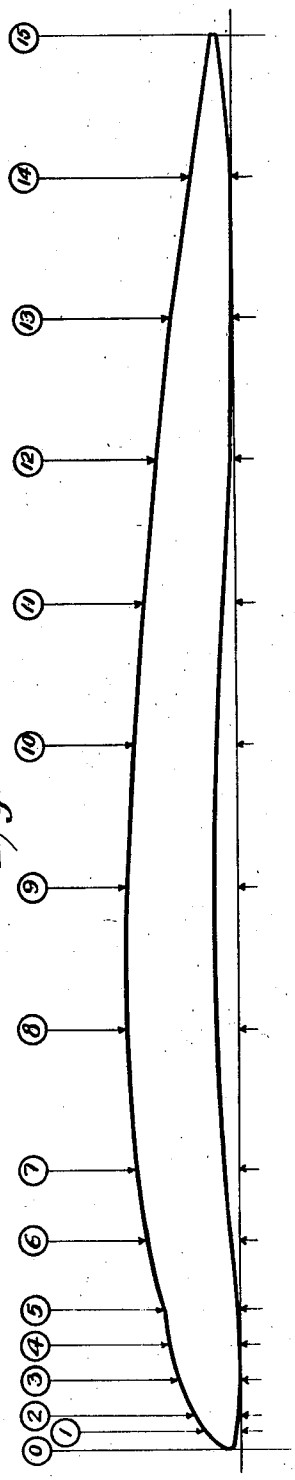

Fig. 1.

Fig. 2.

Station No.	Distance From L.E. % Chord	Upper Camber % Chord	Lower Camber % Chord
0	0	1.00	1.00
1	1.25	2.43	.30
2	2.5	3.37	.10
3	5	4.50	.00
4	1.5	5.03	.03
5	10	5.33	.10
6	15	6.50	.40
7	20	7.07	.77
8	30	7.70	1.33
9	40	7.67	1.47
10	50	7.17	1.13
11	60	6.33	.67
12	70	5.33	.17
13	80	4.23	.10
14	90	3.00	.17
15	100	1.27	1.27

INVENTOR

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BY

ATTORNEY

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UNITED STATES PATENT OFFICE.

PAUL G. ZIMMERMANN, OF KEYPORT, NEW JERSEY, ASSIGNOR TO AEROMARINE PLANE & MOTOR COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

AEROFOIL.

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To all whom it may concern:

Be it known that I, PAUL G. ZIMMERMANN, a citizen of the United States, and resident of Keyport, in the county of Monmouth and State of New Jersey, have invented a certain new and useful Improvement in Aerofoils, of which the following is a specification.

The invention is an aerofoil characterized by a section or contour which gives a greatly increased efficiency for a high speed wing.

In the accompanying drawing illustrating the invention:

Fig. 1 is an outline section of the aerofoil; and

Fig. 2 is a table.

In explanation of the table it may be stated that the chord is the portion of the imaginary base line, touched by the two lowest portions of the bottom surface, which is included between perpendiculars from the leading and trailing edges. Perpendiculars or offsets spaced at such arbitrary distances apart as will sufficiently define the curve are erected at stations 0 to 15, station 0 being at the leading edge and 15 at the trailing edge. At the forward region, where the slopes are steepest and where the form of the curves is most important, the stations are naturally nearest together. The second column of the table shows the distance rearward from the leading edge of the several stations, expressed in per cents of the length of the chord. The third column shows the vertical distance from the chord of the points where the several perpendiculars intersect the upper surface or camber, also expressed in per cents of the chord. The fourth column gives the same data for the lower camber.

Particular importance is attached to the contour in the upper camber, more especially between the leading edge and the point of maximum camber or elevation, which is at station 8. It will be seen that from the leading edge the surface rises in a curve of decreasing upward slope to a point which is in the forward half of the aerofoil section and in advance of the point of maximum camber. In the best embodiment now known to me, this point is at the station marked 5, which is nearer the leading edge than the point of maximum camber, and in terms of the chord is ten per cent of the chord length rearward from the leading edge. I do not, however, limit myself to precise dimensions and proportions. The dip should, however, occur within about the first 20% of the chord length. At the rear end of this forward curve, the surface rises again in a second curve or slope, this curve being shown as rising initially more steeply than the concluding portion of the first curve, though not so steeply as the initial portion of that curve, the second curve extending rearward in a comparatively long sweep with a gradually decreasing slope to the point of maximum camber at station 8, behind which it slopes downward toward the leading edge. This contour of the upper camber, characterized by the two curves or slopes, the continuity of which is interrupted by a break or dip, behind which the second slope rises in a hump to the greater height in rear, is of great advantage as stated, for a high speed wing. The precise form may be varied.

Other features and advantages of the wing section will suggest themselves to those skilled in the art.

What I claim as new is:

1. An aerofoil, the upper cambered surface of which rises from the forward region with a decreasing slope rearward to a point in advance of the region of maximum camber, and within about the first 20% of the chord at which point a longitudinally extending break or dip in the curve occurs, from which the surface rises again in a second slope rearward toward the point of maximum camber.

2. An aerofoil, the upper cambered surface of which rises from the forward region with a decreasing slope rearward to a point in advance of the region of maximum camber and near the leading edge, at which point a single longitudinally extending break or dip in the curve occurs, from behind which the surface rises again in a second slope rearward toward the point of maximum camber.

3. An aerofoil the general upper surface of which comprises a front curve extending rearward from the leading edge with a decreasing upward slope to a point which is nearer the leading edge than the point of maximum camber and within approximately the first 20% of the chord, succeeded by another curve which rises initially with a slope greater than the concluding portion of

the front curve and extends rearward with decreasing upward slope to the point of maximum camber beyond which it slopes downward toward the trailing edge.

4. An aerofoil the upper surface of which consists of two distinct curves the meeting of which is marked by a longitudinally extending dip within about the first 20% of the chord.

5. An aerofoil characterized by two slopes in its upper camber separated by a dip or break at a point located at a distance rearward from the leading edge equal approximately to ten per cent of the length of the chord, the second slope rising in a hump behind said break.

PAUL G. ZIMMERMANN.