

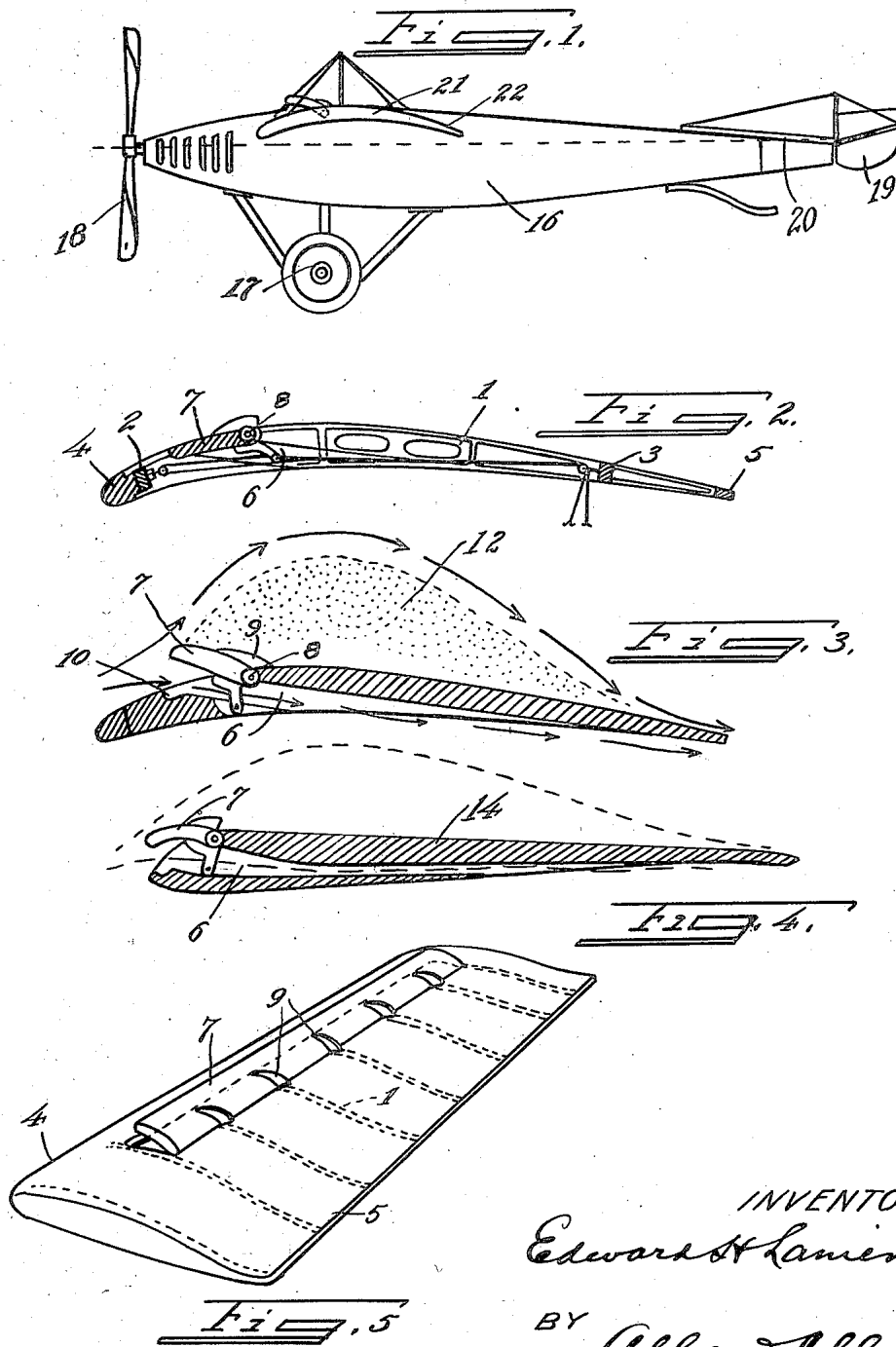
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E. H. LANIER

AEROPLANE

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INVENTOR:

Edward H. Lanier

BY

Allen & Allen

ATTORNEYS.

UNITED STATES PATENT OFFICE.

EDWARD H. LANIER, OF NEWPORT, KENTUCKY.

AEROPLANE.

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To all whom it may concern:

Be it known that I, EDWARD H. LANIER, a citizen of the United States, and a resident of Newport, in the county of Campbell and State of Kentucky, have invented certain new and useful Improvements in Aeroplanes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My improvements relate to construction of cambered aerofoils for aeroplanes and the object is to provide for changing at will the angle of incidence of the aerofoil so that lift of the machine may be greatly increased when rising from the ground or alighting.

Cambered aerofoils as ordinarily constructed are rigid and to a great extent inflexible and in designing the aerofoil a much greater angle of incidence is usually provided for the slow moving planes than for racing planes. By angle of incidence I refer to the angle formed between a horizontal line and a line drawn through the leading edge and the trailing edge of the aerofoil.

Heretofore after the plane is built there has been no provision for combining an auxiliary vane of variable angle of incidence with a fixed aerofoil so that, as a result a slow moving construction, no matter how powerful the motor, can never be propelled beyond a certain speed, while with the racing planes with a fixed aerofoil the angle of incidence is so slight, that it requires a very long distance and very high speed before the machine can be raised from the ground, and for the same reason a very large landing field is required to permit the machine to land.

It is the object of my invention, therefore, to provide an auxiliary vane cooperating with the trailing edge of an aerofoil for changing the angle of incidence of the trailing edge aerofoil, and this I attain by that certain novel construction and arrangement of parts to be hereinafter particularly pointed out and claimed, in which I provide vanes a short distance inside the leading edge of the aerofoils, which are hinged so that they can be opened or closed under control of the operator and thus may automatically vary the angle of the trailing edge of the aerofoil in its passage through the air.

In the drawings:

Figure 1 is a side elevation of an aeroplane, somewhat diagrammatically shown.

Figure 2 is a transverse section of my improved aerofoil, with the angle of incidence vane closed.

Figure 3 is a similar section with the vane open.

Figure 4 is a similar view of a modified construction of aerofoil designed for a racing plane, and

Figure 5 is a perspective view of one of the aerofoils.

The construction of the aerofoil is of the usual cambered type, with ribs 1, a front spar 2 and a rear spar 3, with a leading edge 4, and trailing edge 5, the structure covered with varnished linen or other suitable material.

Immediately to the rear of the leading edge, I provide a long slot or passage-way 6, through the aerofoil from the upper surface running back in an almost horizontal direction opening through the undersurface of the aerofoil. The front opening of this passage-way is controlled by a vane 7 which is hinged to open forwardly on a substantial cross brace of the frame. As there is great strain on this vane when open, I provide a number of hinges 8, and also a series of back braces 9 for the vane which bear against the ribs of the aerofoil when the vane is opened. This vane is provided with a top surface to register with the top surface of the aerofoil when the vane is closed, and a depression 10 is formed to permit the vane to close down flush. The vane is provided with an arm for opening and closing which is actuated by wires running to a control lever within convenient access to the driver.

The aerofoil is designed to be mounted without any or with a very slight angle of incidence for the leading and trailing edge and the angle of incidence from the front edge of the vane to the trailing edge should be from 8 degrees to 10 degrees for safe flying. When an aeroplane with such aerofoils is being driven through the air at the height desired with the vanes closed, there is no angle of incidence and maximum speed can be attained without any undesirable lifting resistance.

For rising from the ground the operator opens the vane and the lifting power of the aerofoil is then obtained by the area

of reduced pressure on top of the aerofoil from the leading edge of the vane as indicated at 12 assisted by the positive pressure of the current against the undersurface of the aerofoil.

5 A plane equipped with such aerofoils will thus rise easily in a short distance and in the same way it can be landed in a comparatively short distance. There have been developed a great variety of designs for aerofoils and I have shown in Figure 4 a design for high speed, almost flat in cross section. With this flat racing form 14, the vane 7 gives an angle of incidence permitting the plane to be lifted from the ground in a much shorter space and a very much less speed than without the vane.

10 It will be understood that I do not wish to limit my invention, however, to any particular design of aerofoil as it will be found of great advantage for any form of construction, nor to any construction of aeroplane all of which require wings or aerofoils.

15 I have made no attempt to show the various necessary parts of an aeroplane other than in a very diagrammatic form as shown in Figure 1 with fuselage 16, landing gear 17, propeller 18, rudder 19, stabilizer 20, monoplane 21 and ailerons 22.

20 Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. An aerofoil for aeroplanes having a

leading and a trailing edge and provided with an elongated passageway from the upper surface of the aerofoil to the undersurface with its forward opening at the rear of the leading edge, and a vane adjustably mounted at the front opening to close the passageway and adapted to present an additional leading edge with an increased angle of incidence and an increased angle of resistance.

2. In a cambered aerofoil for aeroplanes having an elongated passageway from the upper surface of the aerofoil at the rear of the leading edge extending towards the trailing edge, of a vane hinged at the rear edge of the front opening to close the opening and means for opening said vane to present an additional leading edge with an increased angle of incidence to provide additional lift of the aerofoil.

3. In a cambered aerofoil for aeroplanes having an elongated passageway from the upper surface of the aerofoil at the rear of the leading edge extending towards the trailing edge, of a vane hinged at the rear edge of the front opening to close the opening and means for opening said vane to present an additional leading edge with an increased angle of incidence to provide additional lift of the aerofoil, with braces to hold the vane when opened in position against the increased air pressure.

EDWARD H. LANIER.