E. K. A. BAUMANN.

AEROPLANE.

APPLICATION FILED JUNE 25, 1910.

985,126. Patented Feb. 28, 1911.

Fig.1.

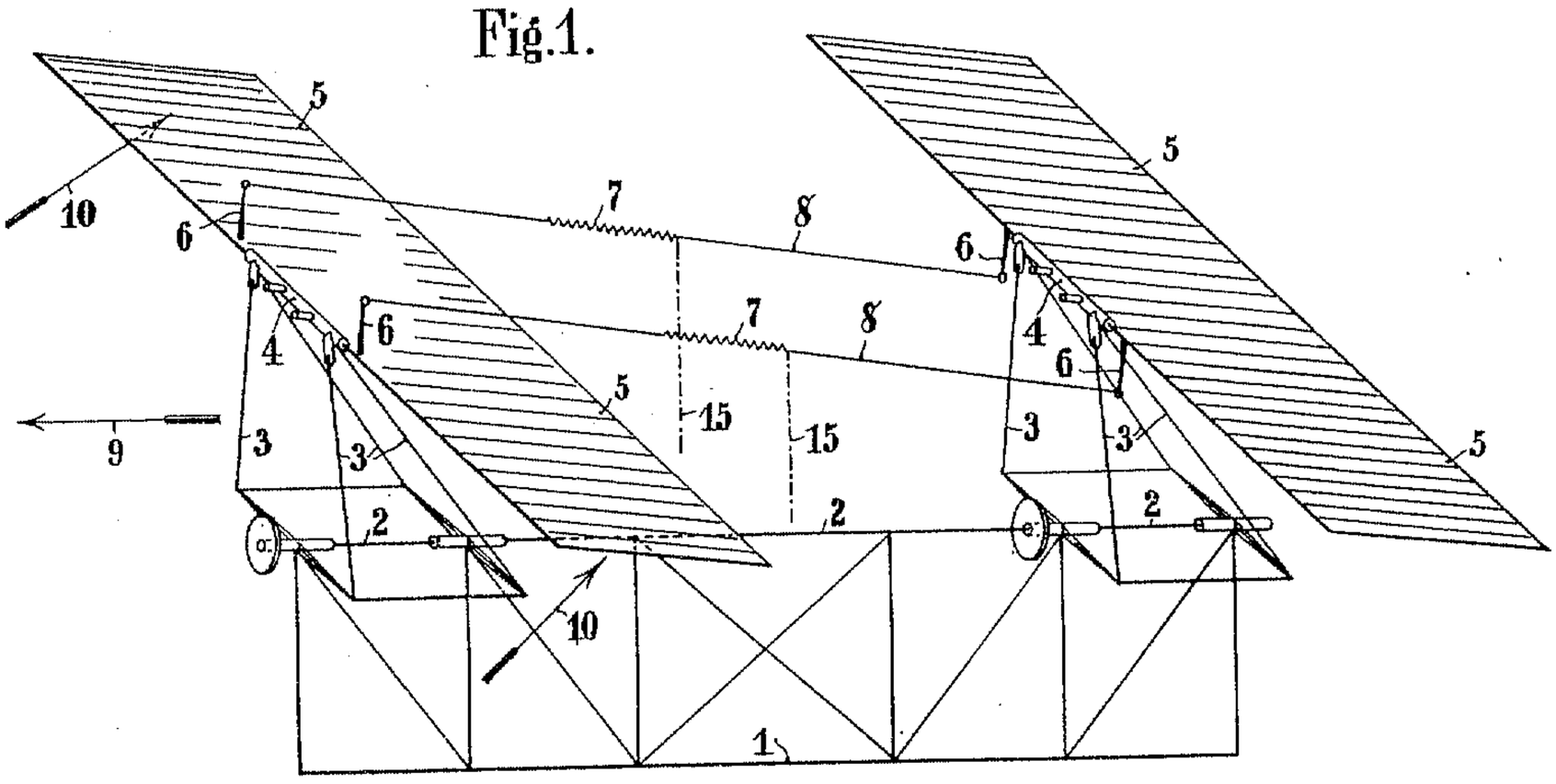


Fig.2.

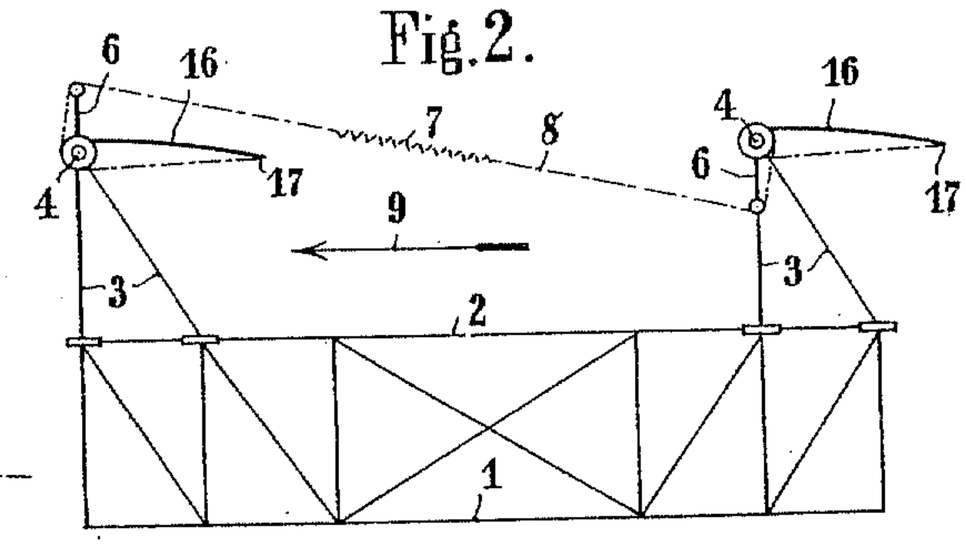
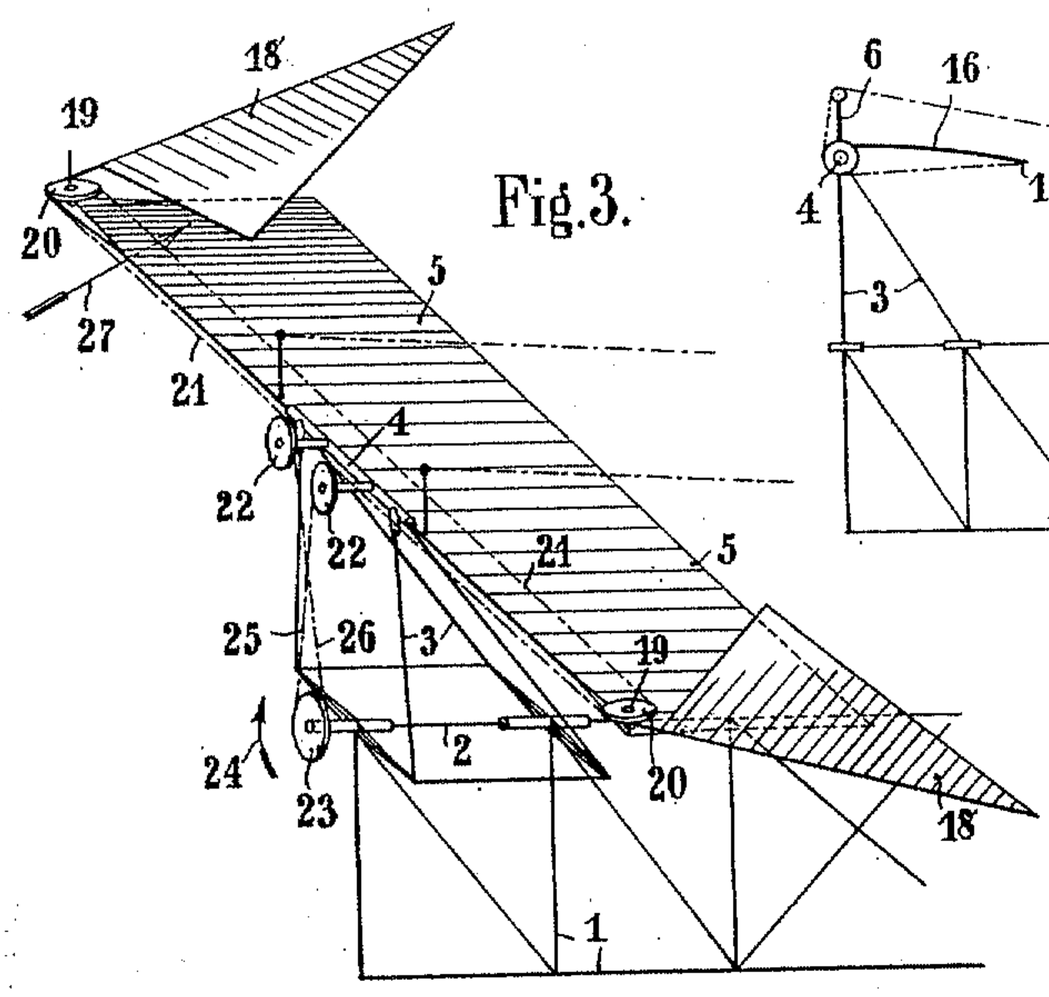


Fig.3.



WITNESSES:

H. H. Berrigan.

F. H. Logan.

INVENTOR,

ERNST KARL ALEXANDER BAUMANN

by Wanderdenmeel

Attorney.

UNITED STATES PATENT OFFICE.

ERNST KARL ALEXANDER BAUMANN, OF STUTTGART-OBERTURKHEIM, GERMANY, ASSIGNOR OF ONE-HALF TO ERNST EMIL FREYTAG, OF ZWICKAU, GERMANY.

AEROPLANE.

985,126. Specification of Letters Patent. Patented Feb. 28, 1911.

Application filed June 25, 1910. Serial No. 568,854.

To all whom it may concern:

Be it known that I, ERNST KARL ALEXANDER BAUMANN, a subject of the German Emperor, and resident of Stuttgart-Oberturkheim, Germany, have invented a certain new and useful Improvement in Aeroplanes, of which the following is a specification.

This invention relates to aeroplanes and has for its object to produce automatically both lateral and longitudinal balance.

The essential feature of the invention resides in this, that the supporting surfaces are pivotally mounted in the frame about transverse axes and together with these axes are pivotally mounted about a common longitudinal axis. The movements of the supporting surfaces about the longitudinal axes may take place independently and serve for the adjustment of ailerons pivotally or movably arranged at the ends of the supporting surfaces parallel to their planes and insuring stability about the longitudinal axis and the movements of the supporting surfaces about the transverse axes however are dependent on one another so that with constant distance apart of the ends of the levers an upward movement of the one surface will cause a downward movement of the other supporting surface, stability of the aeroplane about the transverse axes being obtained thereby.

In the accompanying drawing illustrating the invention Figure 1 shows the aeroplane diagrammatically in perspective, the ailerons being omitted. Fig. 2 shows diagrammatically an aeroplane in which the supporting surfaces have a variable curvature and are dependent on one another. Fig. 3 shows in perspective the front portion of the aeroplane with ailerons adjustably attached to the supporting surfaces or planes at the ends of the frame 1.

Referring to Fig. 1 at the ends of the frame 1 for holding the operator's seat the motor and the propeller are arranged frames 3 pivotally mounted about a longitudinal axis 2. On these frames are pivotally mounted the planes 5 which may have any suitable form. The planes 5 do not move independently of one another about the transverse axes 4 but are provided with levers 6 opposite in direction and connected by a resilient intermediate member which may be formed of cords 8 controlled by springs 7. It is clear that so long as the distance between the ends of the levers remain constant upward movement of the one plane must cause a downward movement of the other plane, while by increasing this distance an upward movement of the one plane will cause an upward movement of the other, by reducing this distance a downward movement of the one will cause a downward movement of the other. On driving the aeroplane against stationary air, the planes 5 adjust themselves exactly parallel to one another and at an inclination depending on the velocity of the aeroplane, and the tension of the springs 7 because only then in consequence of the uniform wind pressure on the surfaces 5, is the system 5. 6. 7. and 8. balanced. Should a sudden gust come in the direction of the arrow 10 against the front plane the wind pressure on this surface is increased, the plane turns upward and causes a corresponding downward movement of the rear plane 5, while the angle of the front surface 5 to the aeroplane is reduced that of the rear plane is increased by the same amount. The force on the front plane is diminished, that on the rear increased and the pressure of the gust of wind moving in the direction of the arrow 10 and which tends to tilt the aeroplane is relieved. On the other hand in order to vary the height of flight, the planes 5 can be adjusted by variation of the distance between the ends of the levers 6 by the operator. For instance a cord 15 extending to the operator's seat may be provided for varying the tension of the spring 7. The necessity for a special elevating plane would thereby be avoided. An undulating flight can be obtained by periodically varying this distance either mechanically or otherwise.

In the constructions shown in Fig. 2 instead of plane surfaces, curved surfaces 16 are used, said surfaces being suspended in the same manner as those 5 about the transverse axes 4 on the frame 1. The movements of these curved surfaces 16 are dependent on one another said surfaces being actuated by levers 6 connected by means of resilient intermediate members 7 8. Instead of securing the intermediate members rigidly to the ends of the lever 6, the members are preferably guided over rollers as shown in Fig. 2 and attached to the ends 17 of the curved surfaces 16. If these surfaces have variable surfaces, not only do movements of the sur-

faces in opposite directions take place but variation of the curvatures of the surfaces in opposite directions are caused and thereby a quicker return of balance is obtained.

In order to secure stability about the longitudinal axes as well as stability about the transverse axes, should the stability be disturbed by gusts striking at an angle or by movement of the center of gravity about the transverse axis, as shown in Fig. 3 supporting surfaces 5 with adjustable ailerons 18 parallel with their plane are provided. These ailerons are for example pivoted about axes 19 at right angles to the planes 5. The movements of these wings 18 are made interdependent in such manner that on inward movement of the one aileron taking place a corresponding outward movement of the other aileron occurs. This is effected by providing rollers 20 on axes 19 around which rollers runs an endless band 21 which is led by means of auxiliary rollers 22 around a fixed roller 23 on the frame 1. As the planes 5 with the frame 3 are attached to the longitudinal axes 2 of the framework, on movement of the planes 5 and of the frame 3 about the axes 2 in the direction of the arrow 24, the portion 25 of the cord is wound on the fixed roller 23 while the portion 26 is unwound from the fixed roller 23 by the same amount. The rollers 19 are thus rotated in opposite directions. The right hand aileron 18 is turned outward, the left hand aileron 18 being turned inward by the same amount. The *modus operandi* of this arrangement is as follows:—Should a gust of wind strike the planes 5 at one side in the direction of the arrow 27, the planes 5 are turned in the direction of the arrow 24 about the longitudinal axes of the frame 1; the left hand aileron 18 is thereby turned inward and the right hand aileron 18 outward by the same amount. The effective surface of the left hand half of the plane 5 is thus reduced and that of the right hand half increased, the pressure on the left hand half being reduced and that on the right hand half being increased. The effect of the gust of wind in the direction of the arrow 27 on the left hand half of the supporting surfaces 5 is thus removed. At the same time leverage on the left hand side for the action of the wind pressure is reduced while it is increased on the right hand half, the same effect being produced as by simultaneous increase and reduction in the areas of the supporting surfaces. This regulation is thus extremely suitable because the forces of inertia brought into play are greater, the greater the disturbance of the equilibrium, that is the greater the gust of wind. To these forces of inertia must be added purely statical forces which come into play on disturbance of the equilibrium. In the same manner any movement of the center of gravity of the system in the longitudinal axis of the aeroplane is balanced, any such movement in the first place causes an inclined position of the frame 1 in the transverse axis relatively to the planes 5. The ailerons 18 are thereby turned to the one side of the longitudinal axes whereby return to a position of equilibrium is effected. If the rollers 23 are so arranged as to be controlled by the operator the supporting planes 5 can be inclined and a curving effect produced. The apparatus thus serves simultaneously for elevating purposes.

Having now described my invention I declare that what I claim and desire to secure by Letters Patent of the United States is:—

1. In an aeroplane, the combination with a frame work and supporting surfaces pivoted each about a transverse axis and about a common longitudinal axis, of levers oppositely attached in pairs to each of said surfaces, intermediate members connecting the levers of one of said surfaces with the corresponding levers of another of said surfaces, resilient members located between the ends of said intermediate members, and means for manually controlling the intermediate members, substantially as and for the purposes set forth.

2. In an aeroplane, the combination with a frame work and supporting surfaces pivoted each about a transverse axis and about a common longitudinal axis, of levers oppositely attached in pairs to each of said surfaces, intermediate members connecting the levers of one of said surfaces with the corresponding levers of another of said surfaces, resilient members located between the ends of said intermediate members, means for manually controlling said intermediate members, ailerons attached to said surfaces, and intermediate members connecting said ailerons, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ERNST KARL ALEXANDER BAUMANN.

Witnesses:
LUISE BRECHTEL,
RICHARD BAUMANN.