E. H. SKINNER.

FLYING MACHINE.

APPLICATION FILED APR. 4, 1910.

1,000,560. Patented Aug. 15, 1911.

Fig. 1.

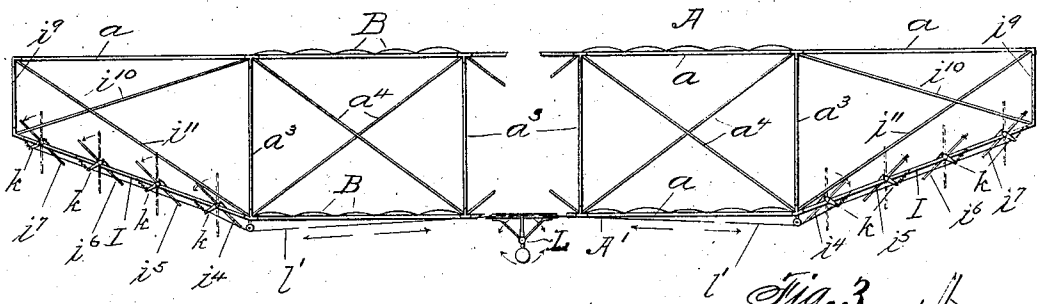


Fig. 2.

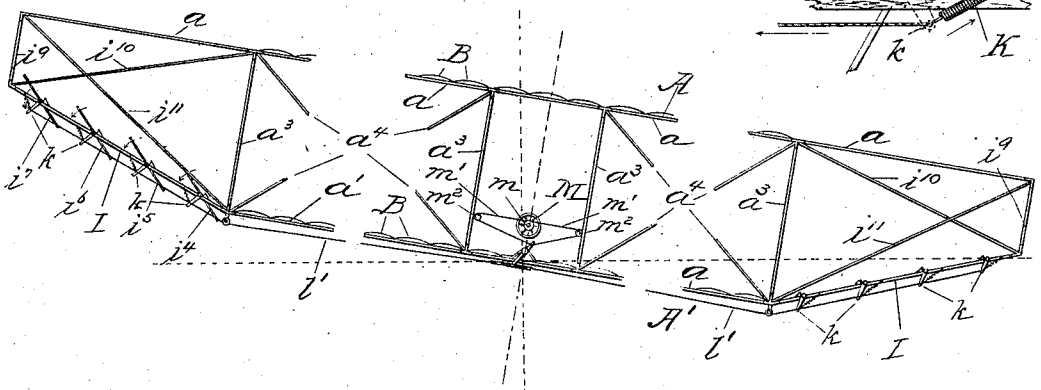


Fig. 3.

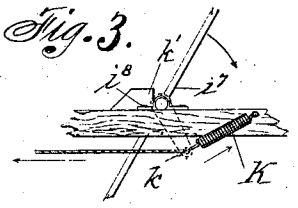


Fig. 4.

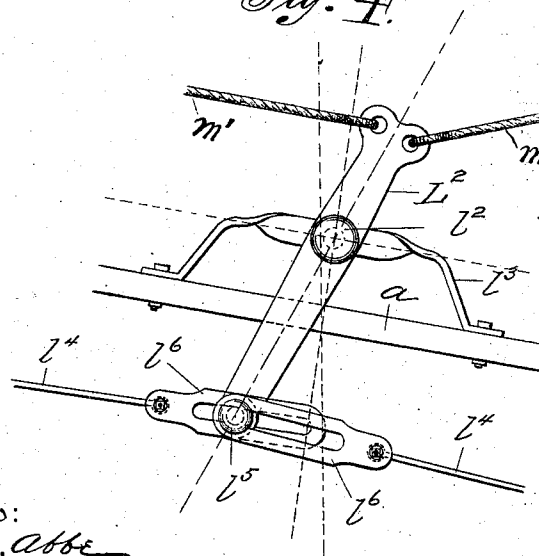
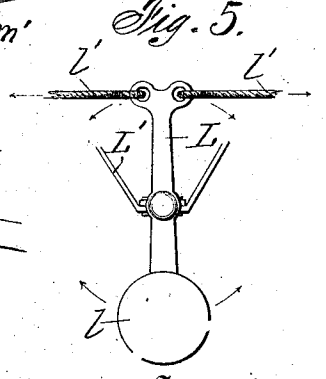


Fig. 5.



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EDWIN H. SKINNER, OF ARROCHAR, NEW YORK.

FLYING-MACHINE.

1,000,560. Specification of Letters Patent. Patented Aug. 15, 1911.

Application filed April 4, 1910. Serial No. 553,194.

To all whom it may concern:

Be it known that I, EDWIN H. SKINNER, a citizen of the United States, and a resident of Arrochar, in the county of Richmond and city and State of New York, have invented a certain new and useful Improvement in Flying-Machines, of which the following is a specification.

My invention, while relating to flying machines generally, has reference more particularly to that form thereof which is heavier than air, and which employs one or more aeroplanes as its sustaining means when moving or gliding through the air.

With machines of this character, when moving or being forced through the air, various disturbing conditions are encountered, such, for instance, as unfavorable currents of air, which affects their balance or equilibrium and cause them to shift or tilt from the position which they should occupy, thereby endangering the machine and affecting its efficiency more or less. To overcome the objection thus noted various expedients have been adopted, among which may be instanced the twisting of the aeroplane or aeroplanes about an axis transversely to the line of flight, whereby it or they may be caused to present at one of its or their ends a greater angle of incidence to the atmosphere than at its or their other; while the same result has sought to be accomplished by employing at each end of the aeroplane or aeroplanes an auxiliary surface or plane which is capable of rotation around an axis extending transversely of the line of flight, whereby when the machine is tilted in one or the other direction around an axis extending longitudinally of the line of flight these auxiliary surfaces or planes may be so adjusted around the transverse axis as to present at the end or ends of the aeroplane or aeroplanes that is or are descending a greater angle of incidence to the atmosphere than at the other. These arrangements, while efficient to a certain extent in arresting the shifting or tilting movement of the machine, and thereby restoring its balance or equilibrium, have involved in the one case the flexible connection of the aeroplanes, when a plurality are employed, whereby the twisting effect may be accomplished, while in the other the operations of the auxiliary planes have been found more or less difficult of accomplishment when the machine is in motion.

The object of my invention is therefore to overcome these defects and to provide simple and efficient means for arresting the shifting or tilting movement of the aeroplane or aeroplanes, and for restoring the equilibrium of the machine thereby when desired.

To this end my invention consists in certain new and useful constructions and combinations of parts, of which the forms preferred in practice will be hereinafter first specifically described, and the features of invention then particularly pointed out in the subjoined claims.

In the accompanying drawing, which forms a part of this specification, Figure 1 is a front elevation, partly diagrammatic, showing a preferred form of my machine, with certain of the parts omitted, and others broken away for convenience of illustration, the aeroplanes occupying a horizontal position. Fig. 2 is a similar front elevation, partly diagrammatic, of the construction shown in Fig. 1, tilted at an angle to the horizontal, with certain of the parts omitted, others broken away, and still others in a slightly different position from that occupied by them in Fig. 1. Fig. 3 is an enlarged detailed elevation of a part of the tilting-arresting mechanism shown in Figs. 1 and 2 detached, and Figs. 4 and 5 illustrate slightly modified arrangements of actuating means for controlling the movement of the tilting-arresting mechanism.

Referring to the drawings, A indicates the upper, and A′ the under, of two aeroplanes, which are severally constructed with an appropriate frame work, these aeroplanes being secured together, the one above the other at the proper distance apart, by vertically arranged struts a^3 and diagonally arranged tension members a^4, which, with the struts, extend from one aeroplane to the other and are connected at their opposite ends to them, whereby to impart to the structure the requisite degree of strength and rigidity.

My invention has reference more particularly to the means made use of for arresting the tilting movement of the machine when its equilibrium has been disturbed, and for aiding in restoring it thereafter to its normal position. These means consist of the outwardly and upwardly inclined end portions I, and may be applied in connection with a flying machine that employs either a single aeroplane, or a plu-

rality of such aeroplanes, and may be located either above, below, or opposite the aeroplane, when a single aeroplane is made use of, or above, below, or opposite either of the aeroplanes when a plurality of such aeroplanes are employed. In the form of the invention which I have selected for purposes of illustration however, they are shown as applied in connection with a flying machine having a plurality of aeroplanes, and, when thus applied, these end portions I are located at the opposite ends of the under aeroplanes A′ and extend outwardly and upwardly from it, as shown, and are provided with suitable coverings made up of pivoted sections i^4, i^5, i^6, i^7, etc., which are severally constructed in the form of a rectangular frame covered with fabric or other similar material, or in the form of sheets that will possess the requisite degree of stiffness to retain their required shape under all conditions of use, as illustrated in Figs. 1, 2 and 3. When thus made up from sections these sections will preferably extend across the upwardly inclined end portions I from front to rear, and will be journaled at their opposite ends in suitable bearings i^8 on the upwardly inclined bars or end portions I, so as to be capable of turning movements on their pivots to bring them all into approximately the same line or plane, as shown at the right in Fig. 2, or into parallel relationship with respect to one another and at an angle to such plane, as shown in Fig. 1 and at the left in Fig. 2. In thus applying pivoted sections to the upwardly inclined ends of an aeroplane the sustaining surface of that aeroplane will be increased at each of its ends by the area afforded by the inclined surface located thereat, which, when the machine is occupying a horizontal position, as shown in Fig. 1, will be equal at both of its ends. On the other hand, when the machine is tilted in one or the other directions from the horizontal, as shown, for instance in Fig. 2, the sustaining surface opposed to the action of the atmosphere and across the line of gravitational force at the end that is descending will, in consequence of being brought into a position more or less at right angles thereto, gradually increase, while the corresponding surface at the opposite end of the aeroplane that is ascending will gradually decrease, with the result that the tendency of the machine to tilt, when its equilibrium is disturbed, will be gradually overcome, and through the difference in area of the supporting surfaces opposed to the action of the atmosphere and of gravity on the opposite sides of its axis of oscillation, the machine will be returned to its horizontal position and its equilibrium thereby reestablished. When the covering for the upwardly inclined end of an aeroplane is made up from sections i^4, i^5, i^6, i^7, etc., then the sustaining area added by it to that of the aeroplane at each of its ends, will, when the machine is occupying a horizontal position, be somewhat less than would be the case if the covering were made continuous throughout, as the sections, instead of being so adjusted as to bring them all into the same plane at each end of the aeroplane, will severally occupy an inclined relationship with respect thereto, as shown in Fig. 1, which is their normal position when the machine is in equilibrium. While the sections i^4, i^5, i^6, i^7, etc., are thus normally arranged, and while occupying an inclined relationship with respect to the general line of their particular surface or plane I at each end of the aeroplane when the flying machine is occupying a horizontal position, whenever the machine is tilted in one or the other direction therefrom, then the sections of the surface or plane I toward which it is tilted are so rotated as to bring them all into the same line or plane, whereby a continuous surface throughout is opposed to the action of the atmosphere and of gravity, as shown at the right in Fig. 2, while the sections of the surface or plane on the opposite side of the axis of oscillation of the machine are either left undisturbed in their inclined relationship, as shown in Fig. 2, or so rotated as to carry them into a more vertical position, as shown by dotted lines in Fig. 1. The result of this operation will be to arrest the tilting action of the machine, and return it to its normal position, after which the sections will be rotated or turned back to their normal positions and thus held until the machine is again tilted, when the same operation will be repeated, and so on. Thus, through the operation of the upwardly inclined end portions I of the aeroplanes, when made up from sections, the tilting action of the machine is arrested and the machine restored to its normal horizontal position and its equilibrium thereby reestablished.

For normally holding the sections i^4, i^5, i^6, i^7, etc., in their inclined positions with respect to the upwardly inclined end portions I of the aeroplane, and for returning them thereto when they are changed from these positions, I make use of springs K, each of which is connected at one end to one of the upwardly inclined bars or end portions I and at its other end to an arm k fixedly secured to the pivot or axis of a section, suitable stops k' being employed in connection with the sections for limiting their turning movements under the influences of their respective springs K, as shown more particularly in Fig. 3. With the sections i^4, i^5, i^6, i^7 etc. thus normally held in these inclined positions, their rotation to bring them all into approximately the same plane at each end

of the aeroplane A^1, when they are brought into action to resist the tilting movement of the machine, may be effected in various ways. In Figs. 1 and 5 I have shown this rotation as accomplished through the medium of a pendulous lever L, which, provided at its lower end with a weight l, is fulcrumed near its middle point upon a bracket L^1 secured to and preferably depending from the under side of one or the other of the rods or spars a or a^1 of the under aeroplane A^1, with the upper end of this lever connected with the arms k of the sections i^4, i^5, i^6, i^7, etc., at each end of the aeroplane A^1, by a cord l^1, whereby when the machine is tilted in one direction or the other, the sections toward which this tilting action takes place, will, through the action of the pendulous lever, be automatically rotated in the proper direction to bring them all in approximately the same plane to resist such tilting movement, to be again returned to their normal positions by the action of their coöperating springs K when the equilibrium of the machine has been reëstablished and the machine restored to a horizontal position. In Figs. 2 and 4, on the other hand, I have shown this rotation of the sections as being effected by the hand of the operator, and, when thus rotated, various means through which he may accomplish that result may be employed. I prefer however to adopt for this purpose a lever L^2, which, pivoted at an intermediate point, by a pivot l^2, to a bracket l^3 secured to the rod or spar a on the under aeroplane, is connected at its lower end to the arms k of the sections i^4, i^5, i^6, i^7 etc. at each end of the aeroplane by a rod or cord l^4, which may be jointed at its inner end to a stud l^5 that projects outward from the lower end of the lever L^2, either directly or through the intervention of a slotted plate l^6, as shown more particularly in Figs. 5 and 7. With the lever L^2 thus connected at its lower end with the arms k, the rotation of the sections i^4, i^5, i^6, i^7 etc. may be accomplished by a movement of the lever in the required direction by the hand of the operator applied to its upper end. It is preferred however to impart this vibratory motion thereto from a hand-wheel M, through the intervention of a drum m and a cord m^1, secured to and extending outward from such drum toward each end of the machine, around a guide-pulley m^2, and thence backward to the upper end of the lever to which it is fixedly secured. As thus arranged the rotation of the sections i^4, i^5, i^6, i^7 etc., at either end of the aeroplane A^1, to bring them all into approximately the same plane when desired, may be effected by the rotation of the hand-wheel M in the required direction, the slots in the plates l^6 permitting of the proper movement of the lever L^2 to rotate the sections at each end of the aeroplane without disturbing the sections at the other end thereof, even when a rod is employed as a connecting means between the lever and the arms k upon them.

While, in the foregoing, I have described the movement of the sections i^4, i^5, i^6, i^7 etc. under the action of the springs K as limited by appropriate stops k^1, these stops may be omitted when the pendulous lever L is employed as the operating means for bringing them into approximately the same line or plane, and their movement in the opposite direction, under the action of their respective springs, limited from that lever through the appropriate connecting cords l^1, in which case the sections at the end of the aeroplane opposite to that in which the sections are being rotated to bring them into an approximately straight line or plane, instead of being left in their normal position, as when the machine is in a horizontal position, will, through the action of the lever, be permitted to rotate into planes that are somewhat more nearly vertical, as shown by dotted lines in Fig. 4. From the foregoing therefore it will be seen that I provide means for arresting the tilting action of a flying machine in one or the other lateral directions when its equilibrium has been disturbed and for aiding in restoring it to its normal horizontal position, which is at once simple in construction, efficient in operation, and so arranged as not to interfere with the ordinary and general operations of the machine.

Having thus described my invention and specified certain of the ways in which it is or may be carried into effect, I claim and desire to secure by Letters Patent of the United States:—

1. In a flying machine, a normally horizontal aeroplane having upwardly and outwardly inclined end portions carrying pivoted aeroplane sections normally inclined relative to the said inclined end portions in which they are mounted, and capable of movement to different positions about axes which are parallel to the line of flight, whereby different areas of surface are presented to the action of the atmosphere at the opposite ends of the aeroplane, and across the line of gravitational force, combined with means for moving said sections into different planes.

2. In a flying machine, a normally horizontal aeroplane having upwardly and outwardly inclined end portions carrying pivoted aeroplane sections normally inclined relative to the said inclined end portions in which they are mounted, and capable of movement to different positions about axes which are parallel to the line of flight, whereby different areas of surface are presented to the action of the atmosphere at the opposite ends of the aeroplane, and across the line of gravitational force, combined

with means for moving said sections into different planes, the pivoted sections of the opposite ends of the aeroplane being connected so as to be simultaneously moved in opposite directions when adjusted to different planes.

3. The combination, with an aeroplane having end portions extending upwardly and outwardly at an angle to the surface thereof, and a covering for such end portions made up from sections which are normally inclined relative to the inclined parts in which they are mounted and which are capable of rotation to different positions about axes that are parallel to the line of flight, of springs for returning such sections to their normal positions when displaced therefrom, a lever, and connections between such lever and the axes of the sections, whereby these sections may be adjusted and different areas of surface presented to the action of the atmosphere at the opposite ends of the aeroplane across the line of gravitational force, substantially as described.

4. In a flying machine, a normally horizontal aeroplane having upwardly and outwardly inclined end portions carrying pivoted aeroplane sections normally inclined relative to the said inclined end portions in which they are mounted, and capable of movement to different positions about axes which are parallel to the line of flight, whereby different areas of surface are presented to the action of the atmosphere at the opposite ends of the aeroplane, and across the line of gravitational force, combined with means for automatically moving said sections into different planes.

5. In a flying machine, a normally horizontal aeroplane having upwardly and outwardly inclined end portions carrying pivoted aeroplane sections normally inclined relative to the said inclined end portions in which they are mounted, and capable of movement to different positions about axes which are parallel to the line of flight, whereby different areas of surface are presented to the action of the atmosphere at the opposite ends of the aeroplane, and across the line of gravitational force, combined with means for automatically moving said sections into different planes, the pivoted sections of the aeroplane being connected so as to be simultaneously moved in opposite directions when adjusted to different planes.

In testimony whereof I have hereunto set my hand in the presence of two witnesses this 26th day of March, 1910.

EDWIN H. SKINNER.

Witnesses:

WILLIAM A. KNAPP,

GRACE T. DIXON.