J. A. BLONDIN.

FLYING MACHINE.

APPLICATION FILED AUG. 8, 1910.

1,036,178.

Patented Aug. 20, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

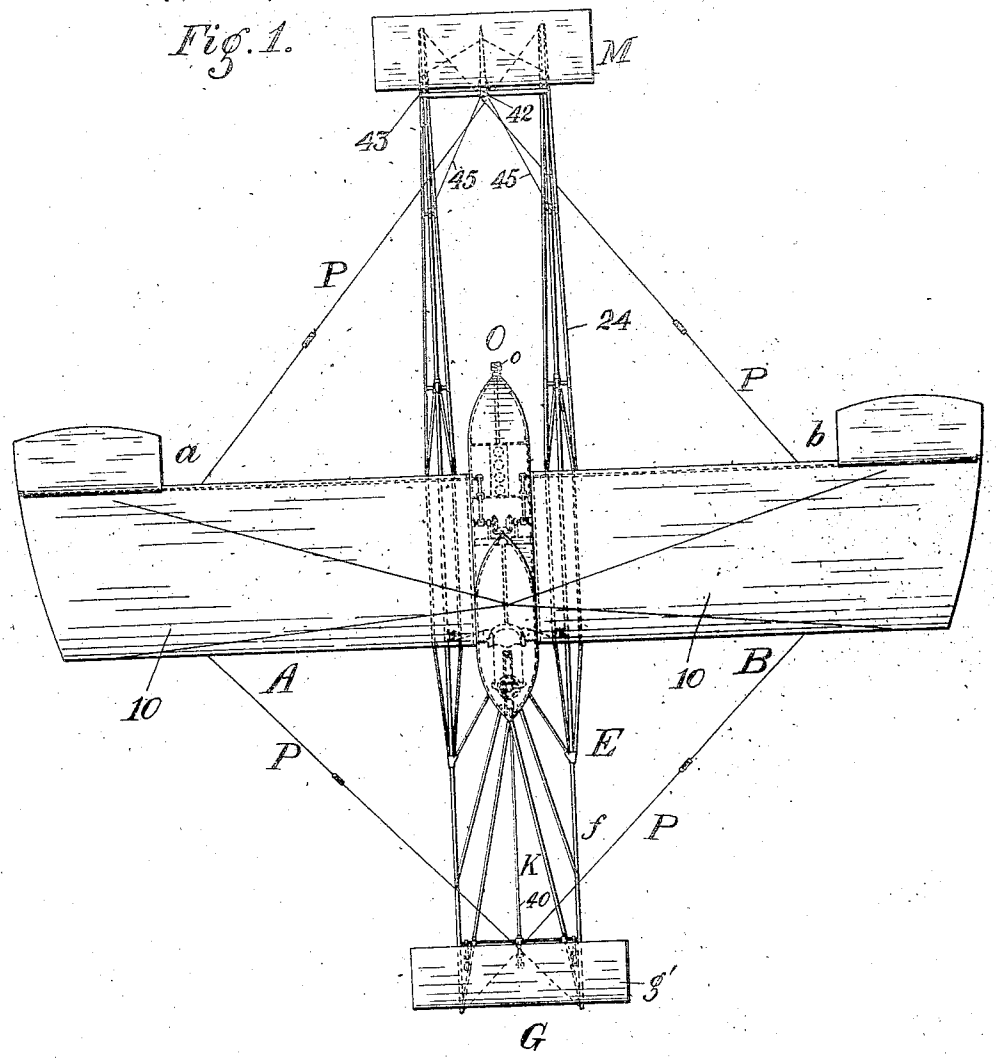
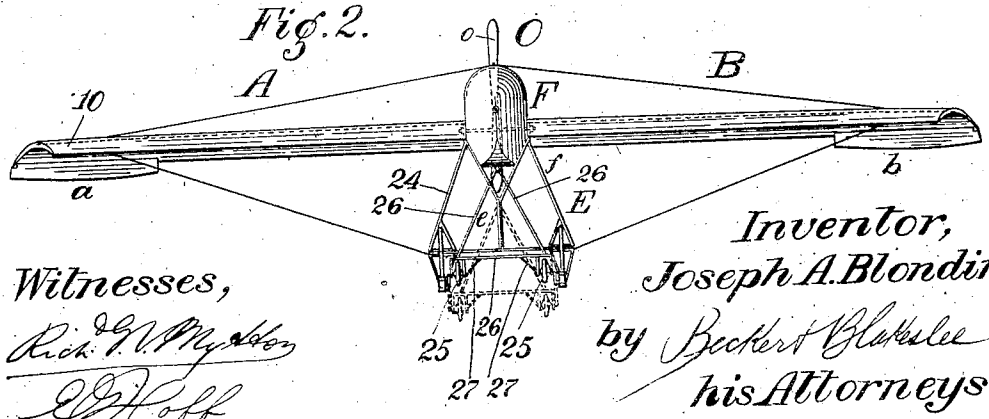



Fig. 2.

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2 SHEETS—SHEET 2.

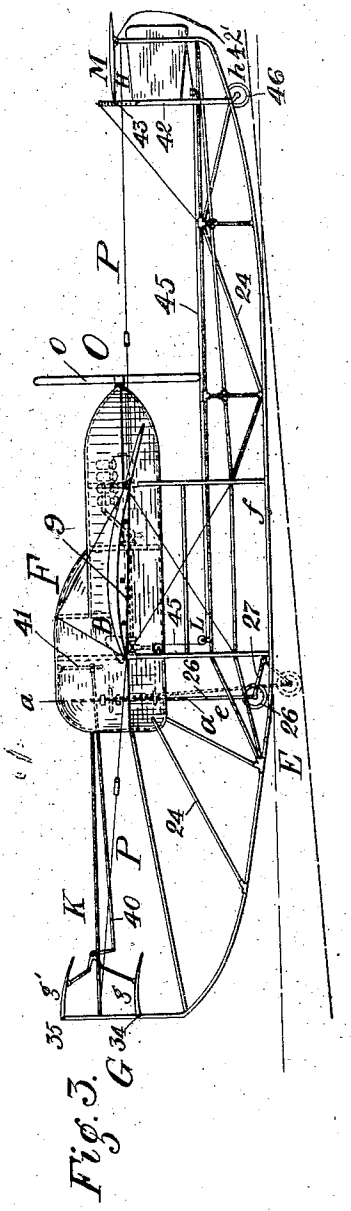

Fig. 3.

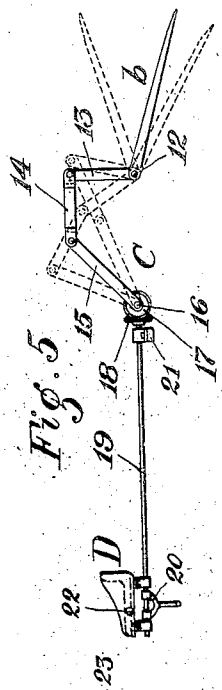

Fig. 5

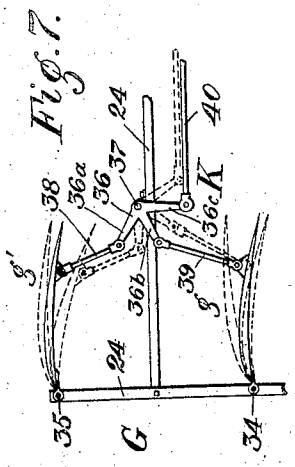

Fig. 7.

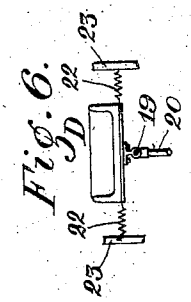

Fig. 6.

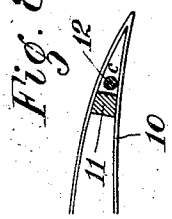

Fig. 8.

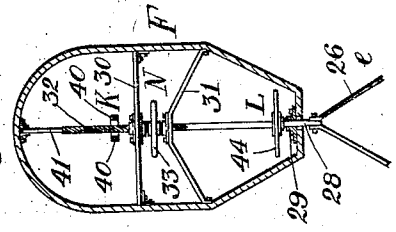

Fig. 4.

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# UNITED STATES PATENT OFFICE.

JOSEPH A. BLONDIN, OF LOS ANGELES, CALIFORNIA.

## FLYING-MACHINE.

1,036,178. Specification of Letters Patent. Patented Aug. 20, 1912.

Application filed August 3, 1910. Serial No. 576,211.

*To all whom it may concern:*

Be it known that I, JOSEPH A. BLONDIN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Flying-Machines, of which the following is a specification.

This invention relates to flying machines. It has for its object to provide improvements in several features of flying machine construction and organization, relative to structure, control, and operation, which will be superior in point of relative simplicity inexpensiveness, positiveness, durability, sensitiveness and responsiveness and which will be generally superior in point of efficiency and serviceability.

The invention consists in the novel provision, formation, construction, combination and association of parts, members and features, all as hereinafter described, shown in the drawings and finally pointed out in claims.

In the drawings:—Figure 1 is a top plan view of a flying machine constructed and organized in accordance with the invention; Fig. 2 is a front end elevation of the same; Fig. 3 is a side elevation of the same; Fig. 4 is a vertical transverse sectional view, partly in full lines for fullness of illustration, and parts being omitted for clearness of illustration, taken upon the line *a*—*a*, Fig. 3; the same being upon an enlarged scale; Fig. 5 is a detail fragmentary view, upon a similarly enlarged scale, of lateral stabilizing means and the controlling means therefor organized according to the invention; Fig. 6 is a front elevation of an aviator's seat in detached position, shown in the other figures, the same being included in the controlling means for the lateral stabilizing means, and being likewise shown upon a similarly enlarged scale; Fig. 7 is a fragmentary view, upon a similarly enlarged scale, showing the construction and operation of longitudinal stabilizing means organized according to the invention; and Fig. 8 is a similarly enlarged fragmentary sectional view of the rearward portion of one of the supporting structures which co-acts with the atmosphere in sustentation of the flying machine, and showing the disposition of a certain feature of the controlling means for the lateral stabilizing means.

Corresponding parts in all the figures are denoted by the same reference characters.

Referring with particularity to the drawings, A. and B designate, respectively, aerocurves or supporting structures upon which the atmosphere reacts to sustain the flying machine in flight; said structures hereinafter being referred to as wings, and being each provided at its posterior margin, and adjacent to its outer end portion with an aileron, *a* and *b* respectively, which comprise lateral stabilizing means the operation of which is performed through controlling means C which include as a feature or element the aviator's seat D.

E designates starting and alighting gear, the same being connected directly with the flying machine body or car F and extending forwardly and rearwardly beyond the same, there being an elevator or horizontal steering means G mounted upon the forward projecting portion of the gear E, and a rudder or vertical steering means H mounted upon the rearward projecting portion of the gear E.

K designates controlling means for the elevator G; and L designates controlling means for the rudder H.

M designates a supplemental rear supporting structure which is mounted upon the rearward portion of the alighting gear, and co-acts with the wings A and B. The starting and alighting gear E comprises two members, a wheeled member *e* and a skid member *f* respectively, the same being mounted for relative movement, preferably by positive actuation of the wheeled member *e*, through controlling means N, the wheeled member *e* being movably mounted in connection with the skid member *f*, which latter member is directly connected with the body or car F.

O designates propelling means for the flying machine, the same being disposed rearwardly of the body or car F, and between the wings A and B and the rudder H, a wheeled steering element *h* is connected with the rudder H. The wings A and B constitute the supporting structures of a monoplane, and such supporting structures or wings are, in accordance with the invention, disposed between the elevator and the propelling means, the propelling means being in turn disposed between the supporting structures or wings and the rudder.

The car or body F contains and accommodates the aviator's seat D, and the operating means or motive means for the propelling means O, (indicated in dotted lines, and of any suitable type), together with terminal portions of the controlling means K, N and L, the aviator's seat D being the terminal portion of the controlling means C, all as above outlined.

The walls of the car or body F are transparent, being formed of or provided with large expanses of suitable transparent sheeting; the aviator being thus entirely housed within the body or car and thus protected from air-rush, at the same time having an unobstructed view of the region and territory traversed by the machine, and of the actuating and working portions and elements of the latter.

The elevator G is differentially actuated by the controlling means K, comprising two relatively movable members $g$ and $g^1$; and the ailerons $a$ and $b$ are differentially actuated by the controlling means C, to produce a more positive, accurate and responsive action, and a more perfect definition of course of flight and the relation of the entire flying machine structure thereto.

A particular or preferred form of construction, organization, arrangement and association of parts, members and features, inclusive of the main features herein above recited is as follows: The wings A and B are demountably connected with the car or body F, which latter may be framed in any suitable manner, by baseboards or endboards 9, and are of the usual or any preferred formation and construction, having textile surface portions 10 stretched over frames 11, and preferably having fore and aft curvature which is participated in, or continued by, the ailerons $a$ and $b$ which are organized similarly to the wings A and B, or in any preferred manner. Each aileron $a$ and $b$ is rigidly connected at its anterior portion with a rocking shaft 12 which is accommodated within the structure respectively of the wings A and B, and between the upper and lower textile surfacings thereof. The shafts 12 extend throughout the length of the respective wings A and B, and the rocking of each of the same varies the inclination of the respective aileron in the well-known manner. Each shaft 12 is provided at its inner end with a crank 13; and said cranks 13 are respectively connected by links 14 with other cranks 15 respectively connected with the outer ends of rocking shafts 16 journaled upon the body or car and provided respectively with bevel gears 17 oppositely operated by a bevel gear 18 fixed to the rearward end of a shaft 19 ranging longitudinally of and within the body F; the seat D being fixed to the forward end of shaft 19 which is suitably supported and journaled, as at 20 at said forward end, and as at 21 at the rearward end. The seat D is normally maintained in a horizontal position by tension means consisting of coil springs 22 disposed respectively between the opposite sides of the seat and frame portions 23 of the body. The propeller $o$ of the propelling means is suitably journaled at the rear end of the body F and the motive means therefor are accomodated within the body rearwardly of the shaft 19. The skid member $f$ of the gear E is built up of triangular truss factors, constructed of suitably connected frame rods 24, the entire skid construction broadening laterally in downward projection, in spaced portions, and being connected with the body F in such suitable manner as shall permit the forward and rearward projecting portions of the skid to be detached and compactly packed within the central portion of the skid construction for shipment or storage. The skid construction may be jointed in any suitable manner, not shown, to this end and whereby the body and the starting and alighting gear, together with the wings A and B, may be reduced to compact form and the several parts arranged side by side in vertical extension.

The wheeled member $e$ of the gear E comprises transversely arranged spaced wheels 25 carried upon a triangle frame 26 adapted to be moved substantially vertically by the controlling means N; the frame 26 being movably connected with the skid member $f$ by link arms 27, confining the frame and the wheels in their movement and bracing the entirety substantially fore and aft, as well as laterally. From the upper end of the frame 26 extends a shaft 28 guided in a sleeve 29 fixed to the frame of the body F, and in transverse braces 30 and 31 within said body. The upper end of the shaft 28 is threaded as at 32, and a hand wheel 33 is mounted upon the same, having threaded engagement therewith, between the braces 30 and 31, and whereby the shaft 28 may be vertically adjusted to raise or lower the wheeled member $e$, in the operation of the controlling means N.

The elevator G, comprising the two pivoted members $g$ and $g^1$ movably connected at their anterior portions, as at 34 and 35, with the forwardly projecting portion of the skid member $f$, in spaced superposed relation, are operated through the controlling means K, differentially. Such controlling means comprise a bell-crank 36 mounted upon the skid member $f$, pivotally, as at 37, said bell-crank having an upper member $36^a$, an intermediate member $36^b$, and a lower member $36^c$, of which the upper member is connected with the upper elevator member $g^1$ by a link 38; the intermediate member is connected with the lower elevator member $g$ by a link 39; and the lower member

is connected with a link rod 40, or push-rod, which ranges rearwardly into the body F, through a suitable opening, and is pivotally connected at its rearward end, which is bifurcated to straddle the shaft 28, with a pendent lever 41, which movably supports the inner end of said rod 40.

The rudder H is fixed upon a rudder post 42 mounted at the rearward end of the skid member *f*, beneath the supplementary rear supporting structure M, which latter, as well as the rudder H, may be of framed textile construction, or otherwise, as may be the elevator member *g* and *g*$^1$; such structure M being pivotally supported adjacent to its rearward edge portion, as at 42$^1$, and adjustably connected at its anterior edge portion at each side with a vertical side skid member 43. The controlling means L for the rudder H comprises a foot lever 44 within the body F, centrally loosely pivoted upon the shaft 28, together with the tiller ropes or cords 45 guided rearwardly from the respective ends of the foot lever 44 and connected with the rudder H. The wheeled steering element *h* comprises a small wheel 46 which is mounted upon the lower end of the rudder post 42, and is normally out of contact with the ground, being only so in contact when the wheels 26 of the member *e* are depressed and the skid member *f* is raised clear of the ground.

The operation, method of use and advantages, and the features of superiority with reference to prior practice of and attaching to the improved flying machine constituting the invention as herein above described are as follows: In starting the operation of the flying machine, or in initiating flight, the wheeled member *e* is depressed through the controlling means N, raising the skid member *f* from the ground, and supporting the entire machine upon the wheels 25 and 46. After the machine has left the ground, or before descent thereof, the wheeled support *e* is elevated, by the controlling means N, so that the machine returns to the ground upon the skid member *f*, which frictionally terminates the movement of the machine. Thus the wheels are only used in initiating flight, and are not subjected to the disruptive and racking effects of receiving the impact of the descending machine and acting to partially or wholly support it during the period of terminating motion.

It will be noted that when the machine in entirety is raised, as above described, as it rests solely upon the wheels 26 and 46, the forward portion of the machine is elevated relatively more than the rearward portion of the machine, as indicated in Fig. 3 in the drawings; whereby the angle of incidence at the wings A and B is increased, imparting a greater lifting effect of the impingement of the atmosphere upon the wings in initiating flight.

By projecting the skid member *f* both forwardly and rearwardly beyond the body F, I provide suitable and advantageous mountings for the elevator and the rudder, the former being in a higher plane than the latter, which latter is disposed beneath the center of gravity of the machine, and thus augments the action of the lateral stabilizing means comprised in ailerons *a* and *b*. These ailerons are actuated through the controlling means C, by the lateral oscillation of the entire body of the aviator resting upon the seat D and such movement of the body will be accompanied instinctively by actuation of the foot lever 44 of the controlling means L of the rudder H in such manner that the rudder will present increased resistance at the side of the machine which has risen from normal balanced position, thus tending to restore equilibrium or stability. As the seat D is rocked with the shaft 19, the rock shafts 12 are differentially affected, as will be evident by inspection of Fig. 5 of the drawings in which the aileron *b*, shown in full lines in normal position, and in dotted lines in operative depressed and elevated positions, respectively. As one rock shaft 12 causes the depression of its respective aileron, the other rock shaft 12 causes the elevation of its respective aileron, and through different arcs of travel, due to the variations in angular travel of the cranks 13 of the rock shafts 12, under actuation of the links 14 and the cranks 15 on the shafts 16. The normal position of each aileron, above referred to, is one of slight depression from the horizontal, and such aileron may be either of plane formation or of curve formation as above set forth. The differential operation of the ailerons *a* and *b*, consisting of relatively greater angular elevation than angular depression, causes relatively greater deflection of the elevated aileron than that of the depressed aileron. As the air beneath the aileron and the wings is always more compressed or dense than that above the wings and ailerons, such lower strata of air being cushioned or compressed, so to speak, by the weight and impact of the machine, it requires less downward inclination of each aileron than upward inclination of the opposite aileron to produce the same stabilizing tendency or effect. Thus, the ailerons differentially actuated, respectively upwardly and downwardly, exert substantially equal stabilizings effects, transversely, upon the machine. It will be noted that the ailerons *a* and *b*, in operation, move through paths of predetermined unequal extent, because of the particular and peculiar organization of the controlling means C, comprising the shafts 12, the cranks 13, the cranks 15, the links 14,

and the rocking shafts 16, in combination with a single shaft 19, and operative connections between the same and the shafts 16, said shaft 19 primarily, and by a single simple movement, actuating the other parts and features to produce always exactly the same operative results with respect to the ailerons, and whereby the unequal movements of the ailerons are always unequal in the same manner and to the same extent when the shaft 19 is actuated so as to cause it to turn to the same extent. Thus, rocking of the seat D to any degree of angularity, always produces an exactly proportionate unequal actuation of the ailerons. The elevator G acts also upon the differential principle, in the following manner. Because of the relative arrangement of the members $36^a$, $36^b$, and $36^c$ of the bell-crank 36, and their relative angularity with respect to their pivotal support at $3^7$, the rocking of the bell-crank through the push-rod 40 will cause the lower member $g$ to play through a lesser arc, upon its descent below the normal, than that traversed by the upper member $g^1$. And, conversely, operation of the push-rod 40 to elevate the members $g$ and $g^1$ above the normal, will cause the upper member $g^1$ to describe a lesser arc than that described by the member $g$. These operations and the effect thereof are clearly shown in Fig. 7, in which the normal positions of the members $g$ and $g^1$ are shown in full lines, the elevated and depressed positions being shown in dotted lines. The bell-crank 36 is also shown in full lines in normal position, and in dotted lines in the position accompanying depression of both members of the elevator. The differential action of the elevator members is such that in the operation of the same to cause depression of the machine, longitudinally, the upper elevator member is given the relatively lesser inclination; and in operation of the elevator to produce longitudinal elevation of the machine, the lower elevator member is given lesser relative depression. Thus, in either depression or elevation of the machine longitudinally, to vary the travel thereof with respect to a course theoretically parallel with the surface of the earth, the elevator member which takes the inner arc of travel of the elevator, receives the greatest deflection, and its co-action with the air is thus substantially equalized with that of the other elevator member.

The supplemental rear supporting structure M, which, is auxiliary in its action to that of the wings A and B, may be adjusted at its anterior portion to vary its working angle of incidence, all in accordance with obtaining working conditions relative to speed of propulsion and imposition of load. When the machine is on the ground, in initiating movement, the wheel 46 upon the rudder post supplements the action of the rudder in directing the course of the machine. The transparent walls of the body or car F allow the aviator, at all times, to have unobstructed vision of the course of the movement of the machine and of the various working parts and elements thereof.

The braces P, which I have not herein above defined specifically as to extension, connection and relation, serve to effectively brace the wings in connection with the body of the machine, and also in connection with the skid member of the frame; this latter bracing, particularly the fore and aft feature thereof, results in a stability and rigidity of mounting and holding of the wings which it is not possible to obtain in connection with the standard types of monoplanes which are lacking in the forward and rearward projection of frame structure.

I desire to particularly point out the advantage of including the aviator's seat in entirety in the controlling means C for the lateral stabilizing means. Thus utilizing the seat, and mounting it to rock laterally, the entire weight of the aviator's body may be utilized in the proper direction of inclination of the body to rock the ailerons; and the aviator's body will instinctively incline toward the side of the machine which becomes relatively elevated in disturbance of transverse equilibrium. The inclination of the body in that direction will cause the seat to rock properly to actuate the ailerons in the proper manner to restore transverse equilibrium.

I do not desire to be understood as limiting myself to the specific provision, construction, combination, association and relative arrangement of parts, members and features shown and described; but reserve the right to vary the same, in adapting the improvements to varied conditions of use and service, without departing from the spirit of the invention and the terms of the following claims:—

Having thus described my invention, I claim and desire to secure by Letters Patent:—

1. In a flying machine, an elevator, comprising a plurality of members adapted for co-action with the air, and means for jointly moving the members through paths of predetermined unequal extent.

2. In a flying machine, an elevator, comprising two pivoted superposed members, and means for jointly pivotally moving the members and for imparting relatively greater pivotal movement to the member having the shorter course of travel.

3. In a flying machine, an elevator, comprising two pivotally supported superposed members, a bell-crank, members of which are respectively and directly operatively connected with the elevator members, and means for operating the bell-crank.

4. In a flying machine, lateral stabilizing means, comprising members at opposite sides of the machine, and means for moving the members through paths of predetermined unequal extent.

5. In a flying machine, lateral stabilizing means, comprising members at opposite sides of the machine, and means for moving the members jointly and oppositely through paths of predetermined unequal extent.

6. In a flying machine, a body, wings projecting laterally from the body, ailerons pivotally connected with the respective wings, shafts upon which the ailerons are mounted, cranks upon the shafts, a rock shaft, a seat fixed upon the rock shaft, and operative differential connections between the rock shaft and said cranks whereby the ailerons are moved through paths of predetermined unequal extent.

7. A flying machine of the monoplane type, having a frame projecting forwardly and rearwardly of the wing surface, an elevator mounted upon the forward projecting portion of the frame, a rudder mounted upon the rearward projecting portion of the frame, wings projecting laterally from the body, ailerons pivotally connected with the respective wings, shafts upon which the ailerons are mounted, cranks upon the shafts, a rock shaft, a seat fixed upon the rock shaft, and other cranks operatively connected with the rock shaft and operatively connected with said first named cranks and whereby the ailerons are moved through paths of unequal extent.

8. In a flying machine, an elevator, comprising superposed relatively movable members, and means for jointly moving the members both upwardly or downwardly through paths of predetermined unequal extent.

9. In a flying machine, lateral stabilizing means, comprising members at opposite sides of the machine, cranks with which the members are respectively operatively connected, other cranks, links connecting the first-named cranks and the second-named cranks in pairs, and single pivotal means for actuating all of said cranks and links and whereby the members are moved oppositely through paths of predetermined unequal extent.

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

JOSEPH A. BLONDIN.

Witnesses:

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