

984,311.

Fig. 1.



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UNITED STATES PATENT OFFICE.

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AERIAL MACHINE.

984,311.

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To all whom it may concern:

Be it known that I, ROBERT W. STEWART, citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Aerial Machines, of which the following is a specification.

This invention relates to aerial machines, and particularly to aeroplanes.

My invention has for its purpose the provision of an aerial machine involving a novel and advantageous arrangement of supporting planes, and to provide an aeroplane introducing special features of design and construction whereby efficiency and stability are increased, and control is rendered easier and more reliable.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a plan view of the apparatus. Fig. 2 is a side elevation of the same, on a slightly larger scale. Fig. 3 is an end view showing the forward, balancing planes.

I have illustrated my invention as embodying a bi-plane structure or frame A, though manifestly the principle is equally adaptable to a monoplane. The frame A may be made of any desired material having the requisite strength and proportions, and comprises longitudinal main bars 2 suitably braced apart the desired distance, and having extended between its forward horizontal ends, primary, concavo-convex supporting and lifting head plane sections 3 preferably arranged at a slight upward, forward inclination and superposed.

An important feature of my invention resides in forming, in addition to the forward plane section or sections 3, a plurality of lateral follower plane sections, the foremost of which 4—4 are rear of and slightly overlap the central head plane or planes 3, and are fastened upon the outer portions of a forward transverse frame 5. Outermost follower plane sections 6—6, forming extreme wings, are disposed beyond, and to the rear of, the planes 4—4; thus the symmetrical step arrangement of sections 4—4, 6—6, and 3 forms a substantially integral monoplane having its surface so designed and arranged as to allow each subdivision 3—4—6 to present a series of successive, longitudinally off-

set planes having a transverse width much greater than the depth centrally of the plane. This construction of my plane affords a successive series of almost individual units, thereby presenting a plurality of parallel transverse lines of balance *a—b—c* giving great stability and yet not exceeding the depth efficiency, which would inevitably result if a single plane of depth as great as my construction affords were used.

The rear portion of the body frame A is extended transversely, as at 7—7 and is provided with outwardly projecting, fixed, balancing single planes 8—8 having a space between their inner edges equal to the width of the frame A, and within this space are vertically pivoted to cross-bars 9, a set of parallel steering rudders 10 connected by suitable means, as a cable 10' which is led forward over suitable guide pulleys 11, its ends being secured to a turnable drum 12 conveniently mounted near the aviator's saddle 13 which is preferably disposed above the lower main plane, as in a monoplane.

Pivoted to the rear cross-bars 14 of frame A are a pair of linked horizontal rudders 15—15 having a positive connection by means of links 16—17 to a lever 18 fulcrumed at 19, and which is actuated by means of a push rod 20 having a handle 21 at the control of the operator. If the handle 21 be pushed it will raise the horizontal rudders 15 in unison; if it be pulled, it will lower them, thus giving the operator perfect control of the machine.

The poise or transverse equilibrium of the major plane sections 3—4—6 is sustained and governed by means of suitably shaped and sized wings or vanes 22—23, Figs. 2 and 3, which are connected in series by a cable 24, the terminals of which are secured to pedal levers 25—26. While these oppositely movable vanes may be mounted at any desirable location, it is found advantageous to mount them horizontally between the superposed outermost follower units 6—6, as they then act upon a stratum of least disturbed air, and also, by reason of their distance from the axis of the frame A, have greater leverage. The pedals 25—26 are pivoted convenient to the operator and rock in opposite directions. When one pedal, as 25, is pressed, it pulls on its end of cable 24 and lowers or dips its companion vane 22, and simultaneously lifts or upwardly tilts the

other vane 23; and when pedal 26 is pressed, it dips vane 23 and lifts vane 22 synchronously. By referring to Fig. 1, it will be seen that this peculiar design and arrangement of the sub-planes provides a relatively deep area effective constantly in a stratum or volume of comparatively undisturbed air, no plane is directly behind another; nor is any one plane of itself sufficiently long to have an ineffective area. An important advantage and result of this structure is the formation of a central opening 27 between the tip planes 6—6 and behind the second followers 4—4 and the primary or head plane 3.

In the space behind the planes 3—4 I mount a plurality of propellers 28 in bearings 29, and derive power from a suitable motor 30 to drive them. In this location the propellers constantly operate in free, unrestrained air, and do not churn the air or create undesirable retarding currents therein adjacent to the planes.

My invention enables me to construct the machine with all its movable members well removed from the first plane which thus is not subjected to abnormal local disturbing air currents. The vertical, parallel steering rudders 10 are unhampered by surrounding planes, as also are the horizontal elevating or tilting planes 15.

The horizontal planes 22—23 operating in unison oppositely on opposite sides of the frame and between the superposed tip-follower 6—6 control, most sensitively, the equilibrium of the machine, and by connecting these planes to pedals directly acted upon by the aviator, he is enabled to feel at once the least inclination of the plane to tilt, and can instantly actuate the pedals to right the machine.

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

1. In an aerial machine, the combination of a plane comprising a series of following, laterally offset, integral sections arranged in echelon formation, and a propeller located between the rear following sections of the plane.

2. In an aerial machine, a monoplane having a central leading section, and laterally offset following sections, integrally connected thereto, the sections being arranged in echelon formation with the following sec-

tions symmetrically behind and to each side of the central leading section, and balancing planes mounted adjacent to the lateral sections.

3. In an aerial machine, a plane having a central leading section, successive laterally offset sections connected thereto, and adjustable balancing planes mounted adjacent to the extreme lateral sections of the plane.

4. In an aerial machine, a plane with a central leading section, a plurality of laterally offset connected sections, a frame supporting the plane sections, and a propelling mechanism including a propeller located between the rear following sections of the plane, and a motor.

5. An aerial machine comprising a plane having a series of sections arranged in echelon symmetrically behind and to each side of a central leading section, a frame carrying the plane, rear or tail planes secured to and projecting outwardly from the frame, and steering rudders mounted in the space between the tail planes.

6. An aerial machine comprising a plane having a series of sections arranged in echelon symmetrically behind and to each side of a central leading section; a frame carrying the plane, rear or tail planes secured to and projecting outwardly from the frame, steering rudders mounted in the space between the tail planes, and horizontal parallel rudders mounted at the extreme end of the frame.

7. An aerial machine comprising sectionally divided superposed planes having a central leading unit, a longitudinal frame, adjustable balancing planes mounted between the extreme transverse sections of the planes, a pair of fixed monoplanes projecting oppositely from the rear end of the frame, adjustable, parallel, vertical steering rudders operable in the central space at the rear of the frame to which they are mounted, parallel horizontal planes pivoted to the extreme end of the frame, and means whereby said planes may be operated in unison.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ROBERT W. STEWART.

Witnesses:

CHARLES EDELMAN,
J. PUCKERMANN.