R. H. HARRIS.

AEROPLANE.

APPLICATION FILED JULY 27, 1916.

1,233,227.

Patented July 10, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

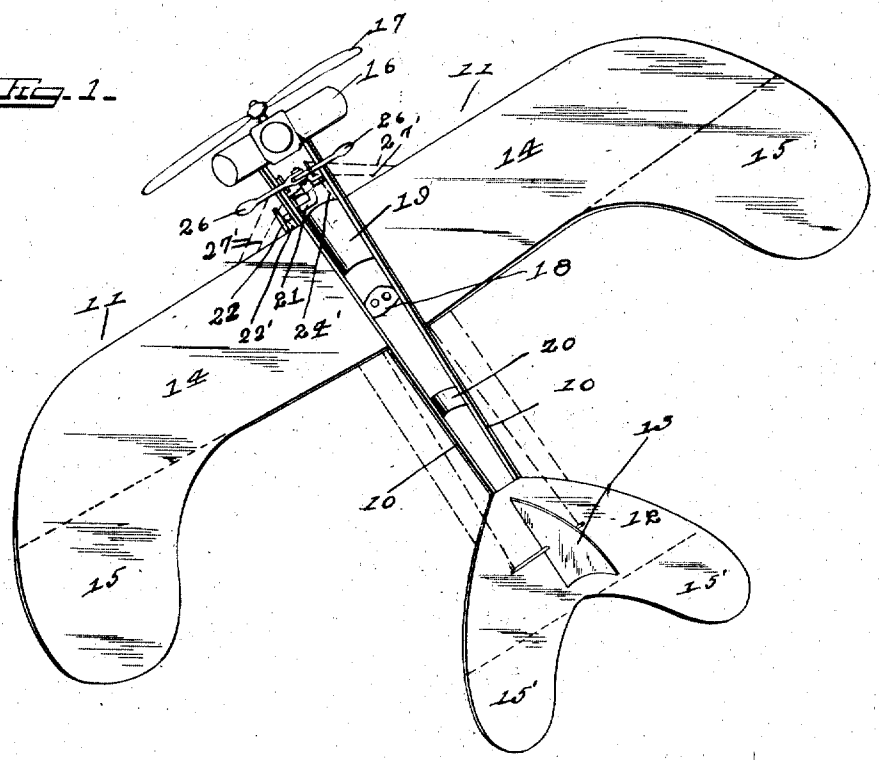
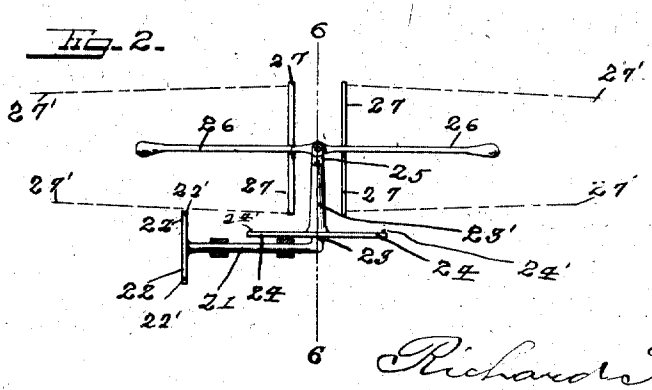


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

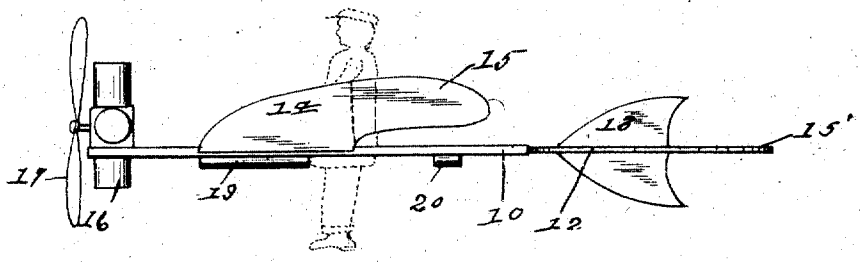


Fig. 4.

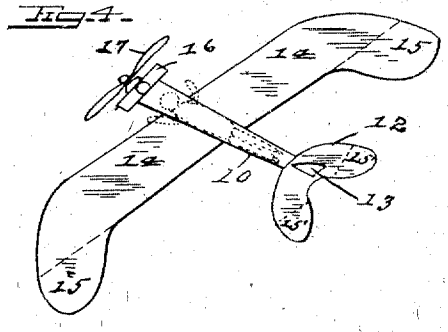


Fig. 5.

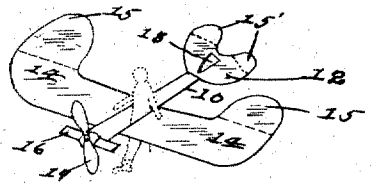
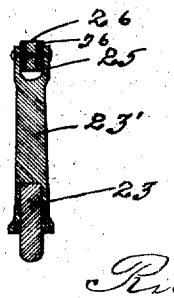


Fig. 6.



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UNITED STATES PATENT OFFICE.

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AEROPLANE.

1,233,227. Specification of Letters Patent. Patented July 10, 1917.

Application filed July 27, 1916. Serial No. 111,615.

To all whom it may concern:

Be it known that I, RICHARD H. HARRIS, a citizen of the United States, residing at Greensboro, in the county of Greene and State of Georgia, have invented certain new and useful Improvements in Aeroplanes, of which the following is a specification.

My invention relates to improvements in aeroplanes and appertains to a flying machine in which all the present forms of heavy and complicated landing gear is entirely eliminated.

The primary object of my invention is the provision of an aeroplane of the character set forth which will be composed of simply a pair of wings that fit on the operator's body having a suitable tail surface at the rear for steering and stabilizing purposes and a small lightweight motor mounted in front and having a propeller attached thereto for supplying power for flight.

A further object of my invention is the provision of a flying machine in which the operator utilizes his feet in starting and alighting, thereby dispensing with the usual heavy landing gear and producing a simple, light, safe and compact aeroplane.

A still further object of my invention is the provision of a flying machine of the character and for the purposes stated which will have the stability and safety of a machine equipped with the present complicated landing and stabilizing mechanism, and one which from every point of view will be practical and efficient.

With the above and other objects in view which will appear as the description proceeds, the invention consists in the novel construction, combination and arrangement of parts, hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made without departing from the spirit of the invention.

In the accompanying drawings, I have illustrated one complete example of the physical embodiment of my invention constructed according to the best mode I have so far devised for the practical application of the principles of my invention.

Figure 1 represents a perspective view of the complete machine.

Fig. 2 represents a detail view of the controlling levers detached.

Fig. 3 represents a side elevation of my apparatus in position for starting, the controlling mechanism being omitted for sake of clearness.

Fig. 4 represents a diagrammatic view illustrating the machine in flight, the position of the operator being shown in dotted lines.

Fig. 5 represents a similar view illustrating the machine preparatory to alighting, the operator being in the position shown by dotted lines, and

Fig. 6 represents a sectional view taken on line 6—6 of Fig. 2.

The apparatus consists substantially of the two members 10 arranged parallel in a horizontal plane and forming a frame, the two wings 11 secured near the front of the frame, the tail surface 12 secured at the rear thereof, and the vertical rudder 13 attached to the tail surface.

The wings 11 are arranged on the frame as shown and have the main portions 14 made rigid by any suitable bracings so that they will not be distorted with the air pressure, and the flexible tips or flaps 15, capable of being flexed up or down to present a positive or negative angle of incidence to forward movement.

These movements of the tips 15 can be made independent of each other or in unison, as one hand of the operator controls one tip and his other hand the other tip, as will be hereinafter described.

The flaps or tips 15 are normally held at a zero angle of incidence, but if the apparauts tips to one side, the flap or tip on the low side is flexed to a positive angle while the flap or tip of the high side is given a negative angle; this action will restore the equilibrium of the apparatus. It is to be noted that these flexible portions extend out to the rear of the other portions of the wings.

Mounted on the rear end of the frame is the tail surface 12 which is very light in weight as it does not carry any weight, its function being merely that of a stabilizing and balancing surface. This surface 12 has the two flexible tips or flaps 15′ normally held at a zero angle of incidence, but are capable of being flexed so as to present a positive or negative angle of incidence to forward movement. By these movements longitudinal balance is maintained, also vertical steering.

Mounted on the front end of the frame formed by the frame pieces 10, is a light mo-

tor 16 having a propeller 17 secured thereto. The motor and the weight of the frame and the tail surface in the rear is so adjusted that they balance at the point where the operator is attached to the frame, hence, when he is standing on the ground the apparatus is balanced about him in all directions and the operator will not be bothered with one side of the apparatus being heavier than the other.

The operator is attached to the frame by means of a harness or corset 18 which securely holds him in the apparatus and at the same time allows him free use of his limbs. When on the ground he stands in an upright position and supports the weight of the apparatus on his feet and when ready to make a flight, the motor is started and the propeller begins to draw the apparatus, with the operator in place, forward, the operator running along the ground. Owing to the lifting effect of the wings, the operator is soon relieved of the weight of the apparatus when he starts forward and as speed is gained the wings gradually lift the weight of the operator.

Thus the faster the operator runs the lighter he becomes which enables him with the aid of the traction effort of the propeller to run still faster until he is lifted clear of the ground.

When clear of the ground the operator can swing himself down into a prone position, a suitable hammock or support 19 being placed just in front of him and in which he lies when in a prone position; his feet being supported in stirrups 20 on the frame members to the rear of the wings. By adapting this position a great deal of head resistance is eliminated, consequently the apparatus can fly faster than when the operator remains in an upright position. The operator is fastened to the apparatus at the center of gravity of his body so that by changing from an upright to a prone position or vice versa will not shift the center of gravity of the machine as a whole and disturb the balance of the apparatus.

The controlling mechanism (see Figs. 2 and 6) is mounted just in front of the operator so that he can reach them when in an upright position and holds them when in a prone position with his arms partly folded or drawn back, and consists of the horizontal rod 21 having its outer end formed with the arms 22 at right angles thereto and its inner end 23 bent up and pivoted in the vertical standard 23′ formed at its lower end with the pair of horizontal arms 24 and having its upper end forked as at 25. Pivoted in the forked end 25 of the standard 23′ are the pair of levers 26 having near their inner ends the pair of arms 27.

Thus it will be seen that leading from the arms 22 are the wires 22′ which lead to the flexible tips or flaps 15′ of the tail surface, from the arms 24 lead the wires 24′ to the vertical rudder 13, and from the two pairs of arms 27 lead the two pairs of wires 27′ to the flaps or tips 15 of the wings 11.

The apparatus is made to rise or descend by moving the levers 26 toward or away from the operator, this moving the arms 22 which in turn through the wires 22′ flex the flaps or tips 15′ to present either a positive or negative angle of incidence to forward movement. Lateral steering is effected by revolving the levers 26 to the right or left in a horizontal plane, this in turn revolving arms 24 which operate the vertical rudder 13 through the wires 24′. And lateral balance is maintained by moving the levers 26 up or down in a vertical plane, this operating arms 27 which in turn flex either up or down, as the case may be, the tips or flaps 15 of the wings 11.

As stated before, the wing tips or flaps 15 are operated individually, one by each hand. This is done by having the levers 26 pivoted at their inner ends so that they can be moved up or down independent of each other, as when the lever is moved up, the wing tip is flexed up.

It is desirable to have the flaps 15 operated individually for the following reasons:—When making a turn with an aeroplane it has to be banked so that the wing on the side toward which it is desired to turn will be lower than the other, and the wing on the high side must move faster than the wing on the lower side. To facilitate this action in my apparatus, when it is desired to make a turn, the flap on the high side or the side toward which it is desired to turn, is flexed upwardly so as to present a negative angle of incidence to the air, the other flap remaining in a neutral position.

The action will force the wing tip on this side below the level of the other and at the same time cause considerable drag or resistance to forward movement on this end and cause it to move slower than the other. Thus the apparatus is banked properly and made to turn by merely flexing the flap to a negative angle on the wing toward which it is desired to turn. Also in some cases it may be desirable to lower or raise one wing without disturbing the other and this is done by manipulating the flap on the wing that is to be lowered or raised.

In order to correct any lateral tilting without causing the apparatus to turn, the wing flap on the low side is given a positive angle and the flap on the high side is given an equal negative angle, thus the resistances on the wing tips are the same and no turning will take place.

Thus it will be readily seen that the rudder 13 steers the apparatus in its horizontal plane and that by flexing both wing tips

15 to a positive or negative angle simultaneously, an effective braking action is obtained.

I claim:

1. A flying apparatus comprising a frame adapted to fasten to a person's body, a pair of outspreading wings connected to the frame, a horizontal tail at the rear of the frame, means for flexing the wings and tail consisting of a horizontal rod pivoted to the frame, a pair of arms formed on one end thereof, connections between said arms and the tail, a standard pivotally secured to the horizontal rod at its other end, and means carried by the standard and connected with the wings, and means for propelling the apparatus.

2. In a flying machine, the combination with a supporting frame and its wings and tail carried thereby, of a harness suspended from said frame for allowing the operator to be in upright position when starting or alighting, a hammock and stirrup also suspended from said frame to allow the operator to swing himself into a prone position when in flight, and means for controlling and propelling the apparatus, substantially as described.

3. In a flying machine, the combination with a supporting frame, of a pair of outspreading wings at the forward end of said frame, a horizontal tail at the rear of the frame, a vertical rudder pivoted to the tail, flexible tips carried by said wings and tail, means mounted on said frame and within easy reach of the operator for flexing said tips and operating the rudder for controlling the apparatus, means for propelling the apparatus, and means for allowing the operator to keep either a prone or an upright position, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

RICHARD HILLMAN HARRIS.

Witnesses:
W. F. GEER,
T. B. RICE.