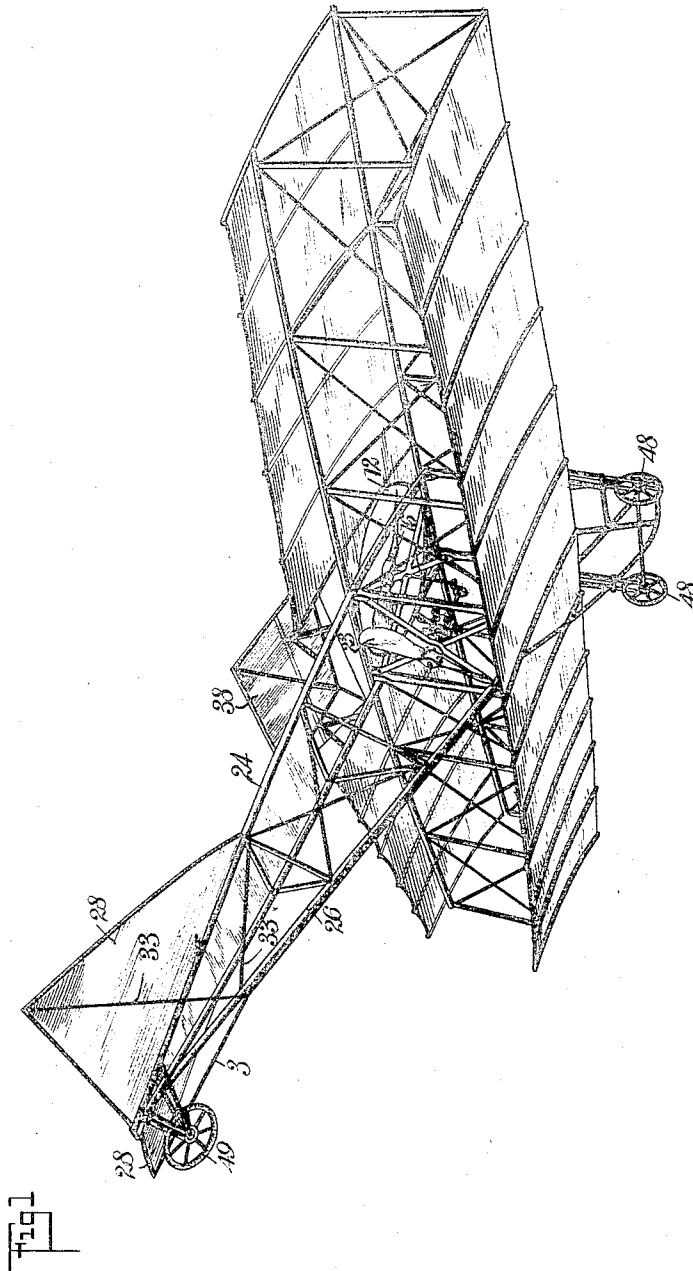


A. E. PETRUCCI.
AEROPLANE.
APPLICATION FILED JUNE 3, 1911.

1,037,657.

Patented Sept. 3, 1912.

3 SHEETS—SHEET 1.



WITNESSES

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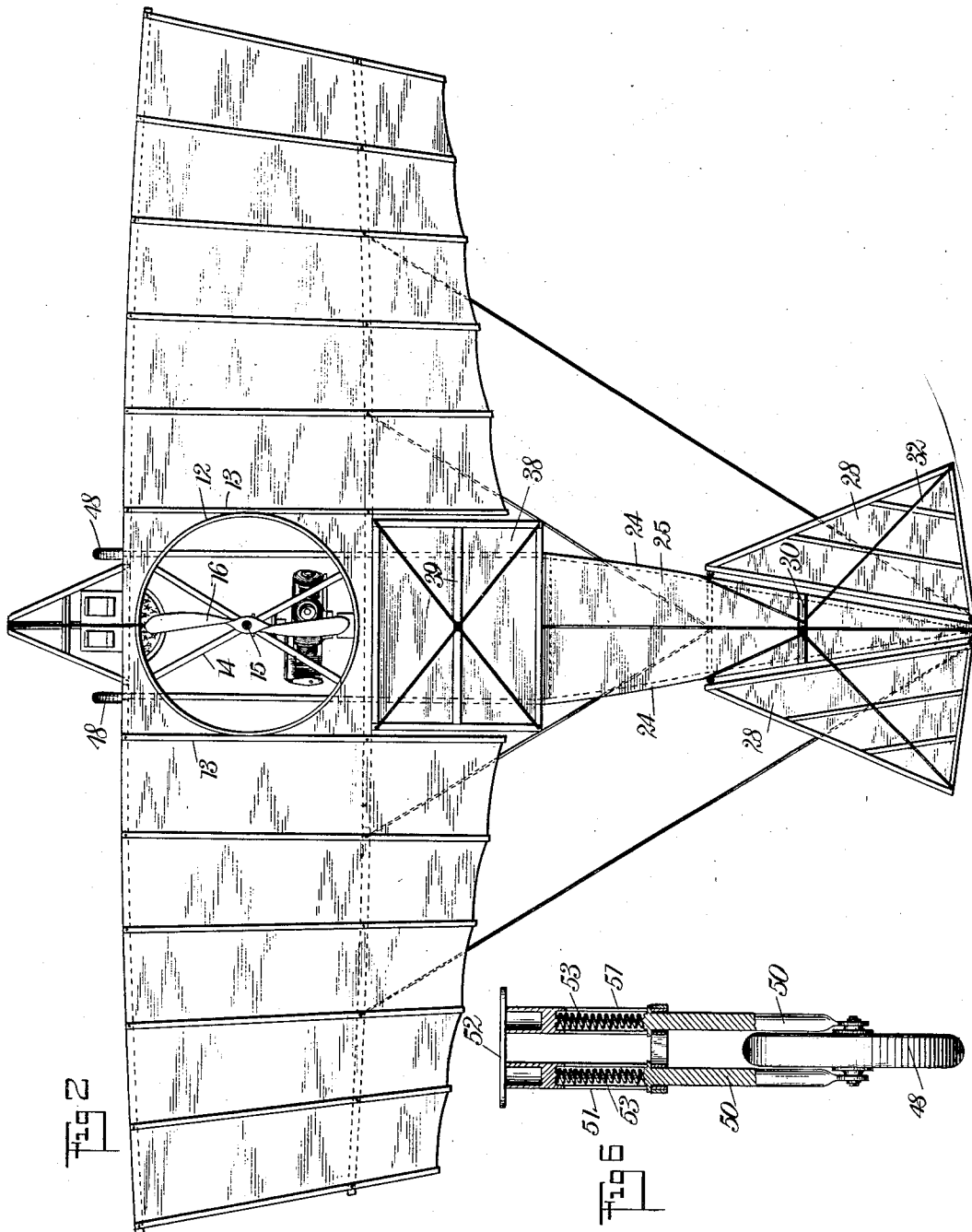
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3 SHEETS—SHEET 2.



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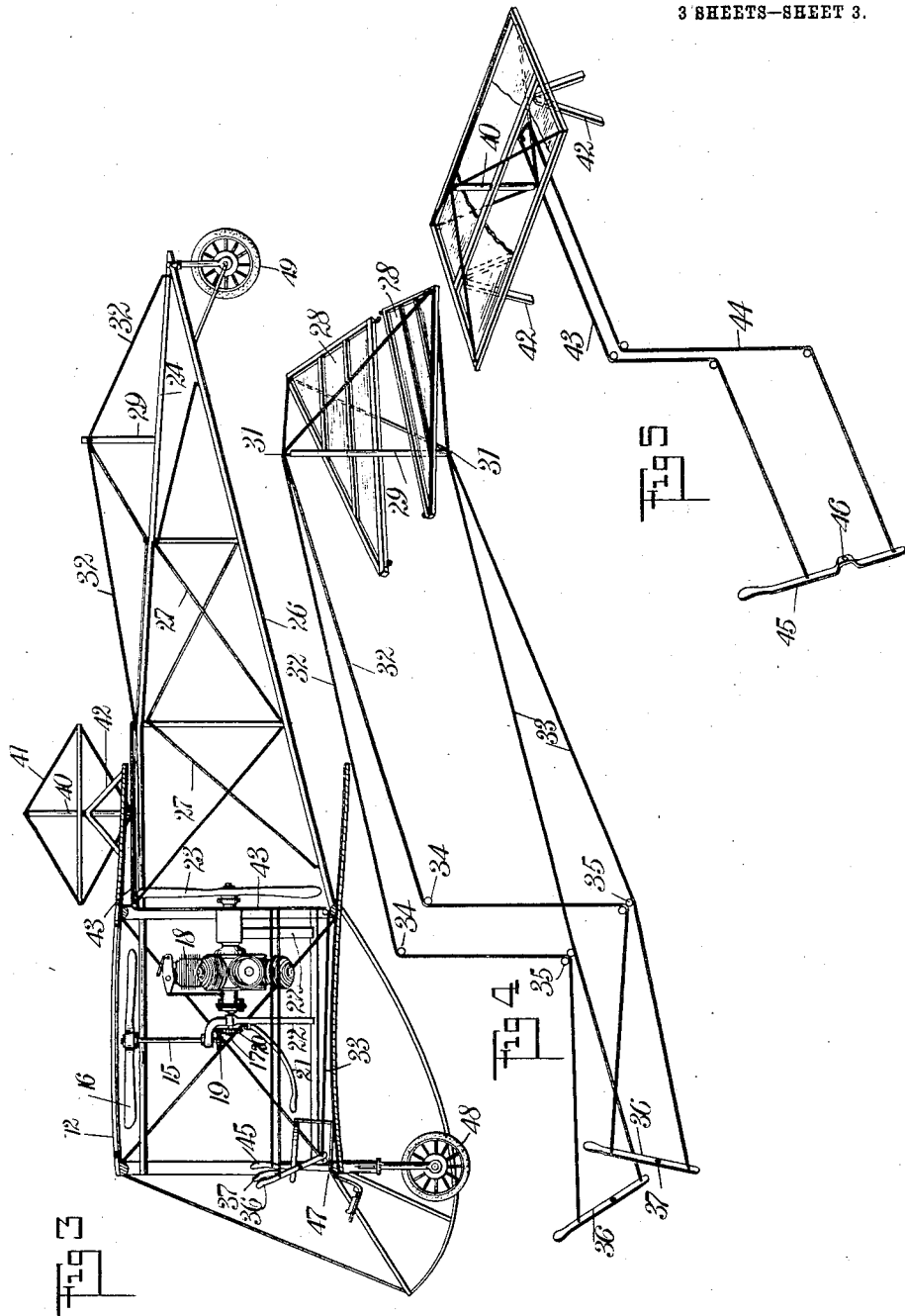
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UNITED STATES PATENT OFFICE.

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AEROPLANE.

Specification of Letters Patent.

Patented Sept. 3, 1912.

1,037,657.

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To all whom it may concern:

Be it known that I, ALBERT E. PETRUCCI, a citizen of the United States, and a resident of the city of New York, borough of the Bronx, in the county and State of New York, have invented a new and Improved Aeroplane, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: to furnish an aeroplane with propeller means to lift the said aeroplane in a vertical direction to assist in the initial levitation of the machine and in the alighting thereof; to furnish controlling means for an aeroplane constructed substantially as described whereby the horizontal and the vertical propelling means may be selectively discontinued or operated; to furnish an aeroplane with a steering apparatus adapted for operation to alter the line of flight; and to furnish an aeroplane the carrying planes whereof operate as self-righting members to preserve the equilibrium of the machine in air.

One embodiment of the present invention is disclosed in the structure illustrated in the accompanying drawings, in which like characters of reference denote corresponding parts in all the views, and in which—

Figure 1 is a perspective view of an aeroplane constructed and arranged in accordance with the present invention and as seen from the rear; Fig. 2 is a plan top view of an aeroplane constructed and arranged in accordance with the present invention; Fig. 3 is a longitudinal vertical section of an aeroplane constructed in accordance with the present invention, the section being taken on the median line; Fig. 4 is a diagrammatic view in perspective showing the arrangement of the tail pieces and means for operating the same; Fig. 5 is a diagrammatic view in perspective showing an auxiliary levitating plane constructed and arranged in accordance with the present invention and means for operating the same; and Fig. 6 is a detail view, on an enlarged scale, showing in vertical elevation the construction and arrangement of the forked standards for the aeroplane.

With the above mentioned objects in view the invention consists in providing an aeroplane with a horizontally disposed vertically mounted auxiliary or lifting propeller, the same being arranged to be operated at

will from the driving shaft of the motor for propelling the aeroplane, and to which shaft is likewise geared the driving propeller of the aeroplane.

The invention further consists in providing an extended tail frame having a carrying plane stationary section secured thereto and a plurality of plane hinged or movable sections disposed in triangular arrangement to form forwardly opening pockets when lifted above or below the said stationary section, and plane sections inclined to the line of flight to change the said line of flight when either of the said planes is independently lifted or lowered.

The invention further consists in providing a carrying plane with a central or delivery opening to relieve the air pressure thereunder and to thereby equalize the lateral pressures on the said planes.

As shown in the accompanying drawings the invention is adapted to that type of aeroplane known as bi-planes. As is usual in this type of machine the upper and lower planes are warped laterally so that the extreme ends of the two planes are approximated closer than at the centers thereof. The planes in the present instance are covered with any suitable material which is stretched upon the frame and there reinforced by suitable stays or ribs. The structure of the frame is guyed in much the same manner as at present employed. The upper plane in the present construction is provided with a central circular opening. The opening is bound by the hoop 12. The hoop 12, as shown best in Fig. 2 of the drawings, is securely mounted between the fore and aft ribs 13, 13. As seen by reference to Fig. 2, the opening of the hoop 12 is centrally located between the lateral edges of the upper carrying plane to form a spill for the air held under the plane. When rapidly descending or when falling the spill thus formed serves to equilibrate the machine by dividing and equalizing the lateral pressures of the said plane. Below the said hoop, and preferably secured to the structural frame, is a cross frame 14, which frame serves as a support for the shaft 15 of the propeller 16.

The propeller 16, as shown in the drawings, is disposed to rotate in a horizontal plane, the shaft 15 being depended vertically therefrom and connected with the main driving shaft 17 of the motor 18 by means

of the mated gear wheels 19 and 20. It will be understood that at all times the wheels 19 and 20 are meshed, and that the wheel 20 is loosely mounted on the shaft 17 and is operatively connected therewith at will by a clutch of any suitable construction, to operate which a lever 21 is provided, as shown best in Fig. 3 of the drawings. While I have here shown a single propeller, the blades whereof are inclined sharply in the path of rotation, it will be understood that I may, by the usual duplication and coupling, substitute the double and oppositely rotated propellers common to the so-called helicopters, and this without broadening the scope of the present invention. In the construction as at present employed I find that for the short term needed for the employment of the propeller 16 the simple form of single propeller serves the purpose for which it is intended.

The motor 18 is of the gnome type. Any suitable motor may be substituted for the one shown. The motor is mounted on standards 22, and is directly connected with the driving propeller 23. It will be understood that suitable clutch mechanism of usual construction is employed whereby the aviator may control the connection between the shaft 17 and the motor 18. This construction forms no part of the present invention, and is therefore not shown in the accompanying drawings.

In the present invention there is employed a tail frame which is triangular in shape, as best seen in Figs. 2 and 3. The upper braces 24, 24 are converged and bound at the extreme rear. The frame thus formed is covered by a suitable fabric to form the plane 25. The braces 24, 24 are reinforced and held in position by a brace 26. The three braces 24, 24 and 26 are secured in relative position by the guys 27, 27. The arrangement of the tail frame disposes the plane 25 substantially on the same level with the upper plane. In monoplanes the plane 25 would be maintained level with the main carrying plane. This disposition of the plane 25 augments the lifting surface and serves to level the machine in flight.

Hingedly secured to the braces 24 are the equal triangular frames forming the movable plane sections or tail pieces 28, 28. The tail pieces 28 are secured to the extreme end of the plane 25 and braces 24 thereof, and where the said braces are sharply converged to form a section the shape whereof is a rearwardly-pointed triangle. The tail pieces 28 are triangular in form, as seen in Fig. 2. The hinged side thereof is forwardly flared from the line of flight. From this it will be seen that in the operation, where the tail pieces are lifted above or depressed below the plane 25, the surface presented by the said tail pieces to the air through which the

machine is rushing, is inclined to the line of flight. By the elevation or depression of one or other of the said tail pieces it will be seen that the same operate as rudders to deflect the machine to the right or left in the horizontal plane of flight, and this in accord with the tail piece which is lifted. That is, if the left hand tail piece, as viewed in Fig. 2 of the drawings, be lifted above the plane 25, the aeroplane will turn toward the right of the line of flight, and vice versa if the tail piece on the right hand side of the plane 25 be lifted.

To manipulate the tail pieces 28 a mast 29 is extended through a short cross brace 30, which cross brace is fixedly mounted between and upon the braces 24. At the upper and lower ends of the mast are provided eyelets 31, 31 through which are threaded the tiller ropes 32, 32 and 33, 33. The tiller ropes 32 and 33 are guided over pulleys 34 and 35, or other suitable devices, and are connected to the levers 36 at opposite sides of the pivots 37 thereof. By rocking the levers 36 separately the tiller ropes 32 and 33 connected therewith are extended and drawn upon to lift or lower the outer angle of the tail piece 28 to which the said tiller ropes are connected. It will be understood that the operation of the levers 36 is independent, and that the separate operation of each serves to vary the horizontal line of flight. It will also be understood that the simultaneous operation of the two to lift or lower both of the tail pieces 28 results in the uptilt or dive of the aeroplane. When thus operated simultaneously the levers 36 dispose the tail pieces 28 to form perpendicular pockets erected above or depended below the plane 25, which, catching the wind, operate by the pressure thereof to swing the aeroplane on its transverse axis.

Suspended above the main or upper plane of the aeroplane is a levitating plane 38. The plane 38 is rectangular in form, as shown in Fig. 2 of the drawings. The cross bar 39 is provided with a short mast 40 located above and below the level of the plane and serves as a stay for the guy ropes 41 which lead to the corners of the plane 38. The cross bar 39 is mounted in bearings on the tressel 42 supported above the braces 24. Connected with the lower end of the mast 40 are the ends of the operating cables 43 and 44. The said cables are each connected with a lever 45 which is pivoted at 46 on the structural frame of the aeroplane adjacent the aviator's seat 47. The cable 44 is guided around suitable pulleys to the rear of the plane 38, and when drawn upon rocks the plane to depress the forward edge thereof. The cable 43 is directly connected with the mast 40, and when drawn upon elevates the forward edge of the said plane.

By manipulating the various levers 36, 36 and 45 the aviator may control the line of flight by the tail pieces 28, 28 and the levitating plane 38. By connecting and disconnecting the propeller 16 operatively with the driving shaft of the motor 18 the aeroplane may be lifted to assist the operation of the carrying planes or independently thereof.

10 The aeroplane is provided with three ground friction wheels 48, 48 and 49. The wheels 48, 48 are each disposed at the forward end of the machine, and are mounted on a short axle between the arms 50. The arms 50 are mounted as plungers in the cylinders 51, 51 erected from the base plate 52. Mounted within the cylinders 51 are the spiral cushion springs 53 which serve to cushion the blow of the wheels 48 when striking the ground during the alighting of the machine.

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

25 1. An aeroplane having in combination a plurality of superposed transversely elongated carrying planes, the upper of said planes being downwardly bowed to the lateral extremes and having centrally located a circular opening for the delivery of air trapped thereunder, the lower of said planes being upwardly bowed to the lateral extremes thereof, said planes forming a horizontal passage therebetween enlarged in line with the longitudinal center of the aeroplane; and an aero-propelling mechanism for said aeroplane having two propellers one of which is disposed between said planes and the other in said circular opening.

40 2. An aeroplane having in combination a plurality of superposed transversely elongated carrying planes, the upper of said planes being downwardly bowed to the lateral extremes and having centrally located a circular opening for the delivery of air

trapped thereunder, the lower of said planes being upwardly bowed to the lateral extremes thereof, said planes forming a passage therebetween, said passage being enlarged in line with the longitudinal axis of the aeroplane; and an aero-propelling mechanism for said aeroplane disposed between said planes, said mechanism having a plurality of propellers one of which is disposed to rotate in a horizontal plane and concentric with the opening in the upper of said carrying planes and the other to rotate in a vertical plane and concentric with the axis of the machine.

3. An aeroplane having in combination a plurality of superposed transversely elongated carrying planes, the upper of said planes being downwardly bowed to the lateral extremes and having centrally located a circular opening for the delivery of air trapped thereunder, the lower of said planes being upwardly bowed to the lateral extremes thereof, said planes forming a passage in line with the longitudinal axis of the aeroplane; an aero-propelling mechanism for said aeroplane, disposed between said planes, said mechanism having a plurality of propellers one of which is disposed to rotate in a plane perpendicular to said axis and having a driving shaft disposed parallel to the said axis, the other of said planes being disposed to rotate in a horizontal plane and having a shaft concentric with the said opening in the upper carrying plane; a motor unit for said shafts; and means operable by the aviator for selectively connecting said prime mover and said shafts.

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

ALBERT E. PETRUCCI.

Witnesses:

E. F. MURDOCK,

PHILIP D. ROLLHAUS.