J. A. JUNG.

FLYING MACHINE.

APPLICATION FILED MAY 25, 1910.

1,023,937.

Patented Apr. 23, 1912.

4 SHEETS—SHEET 1.

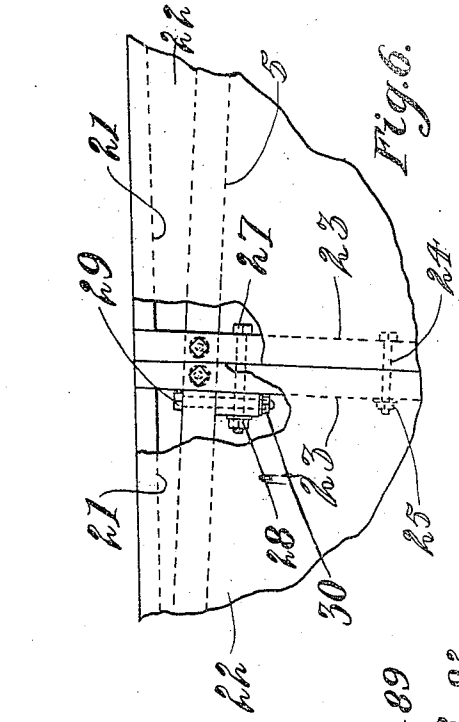

Fig. 6.

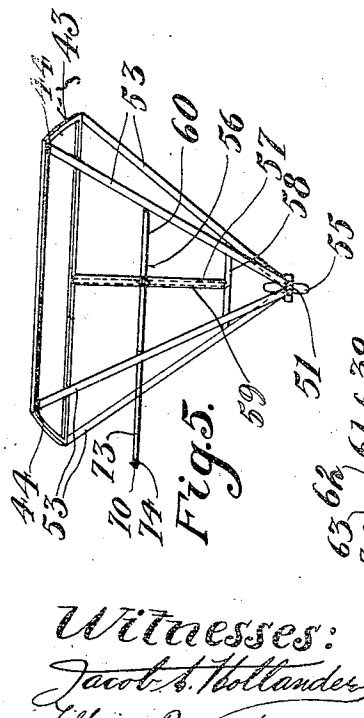

Fig. 5.

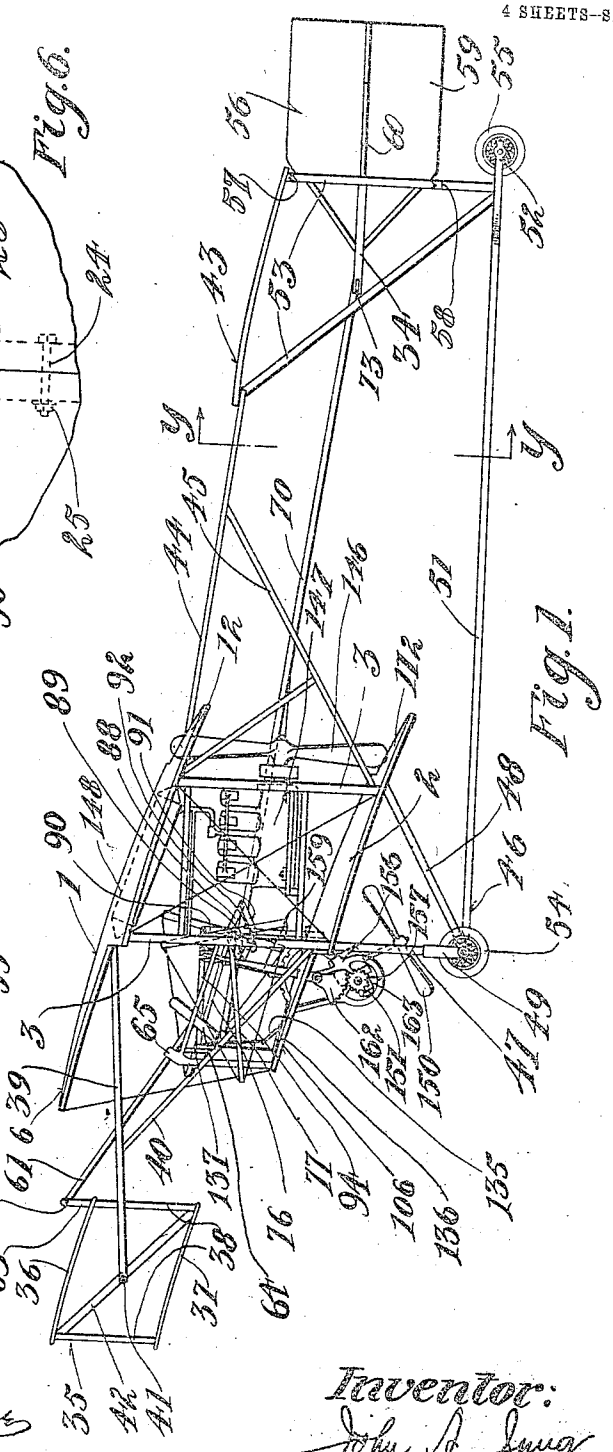

Fig. 1.

Witnesses:

Jacob A. Hollander

Lillian Burnett

Inventor:

John A. Jung

by A. D. Stockbridge

His Attorney.

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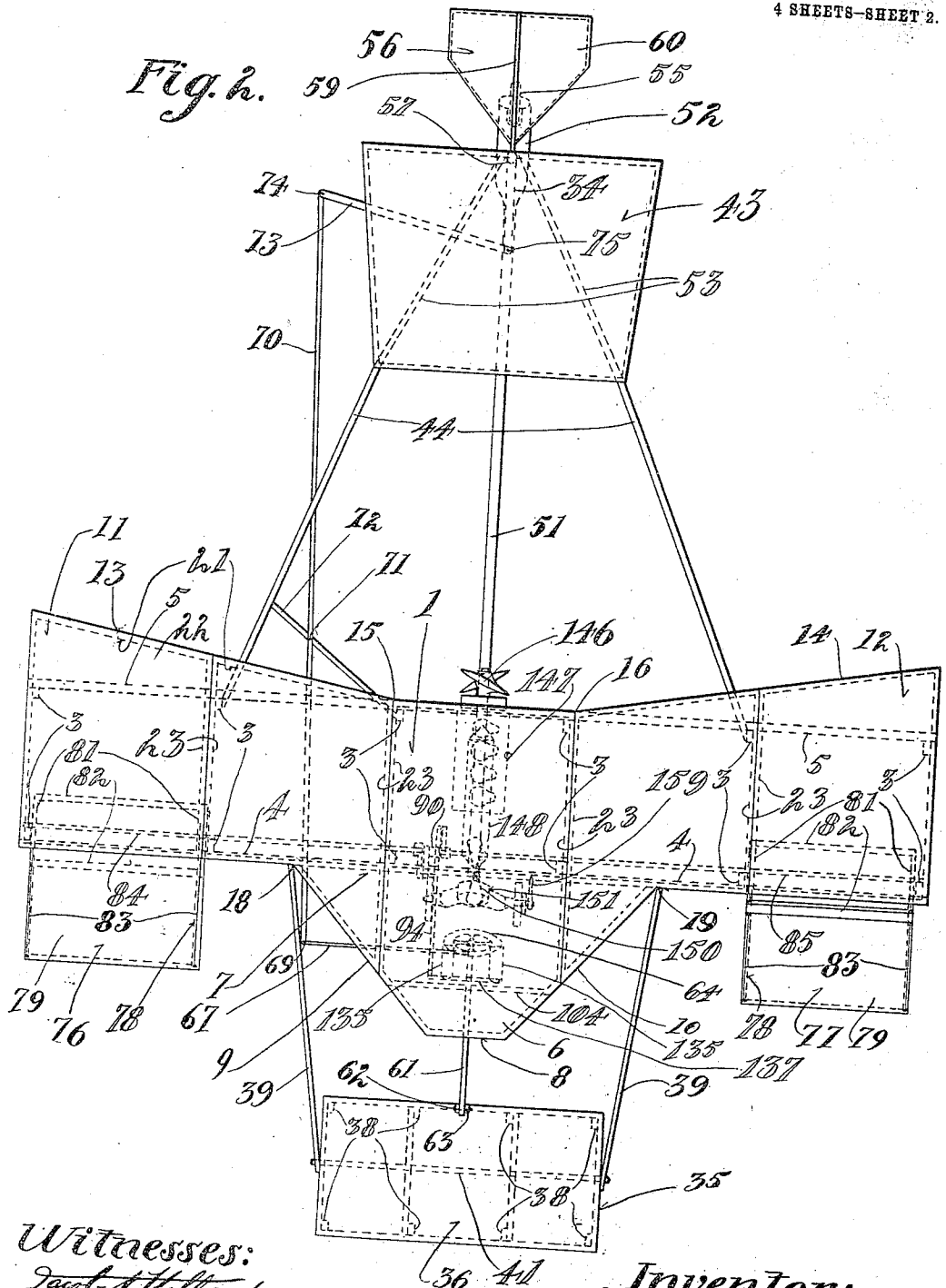
4 SHEETS—SHEET 2.

Fig. 2.



Witnesses:

Jacob S. Hollander

Lillian Burnett

Inventor:

John A. Jung

by A. F. Kirkpatrick

His Attorney

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4 SHEETS—SHEET 3.

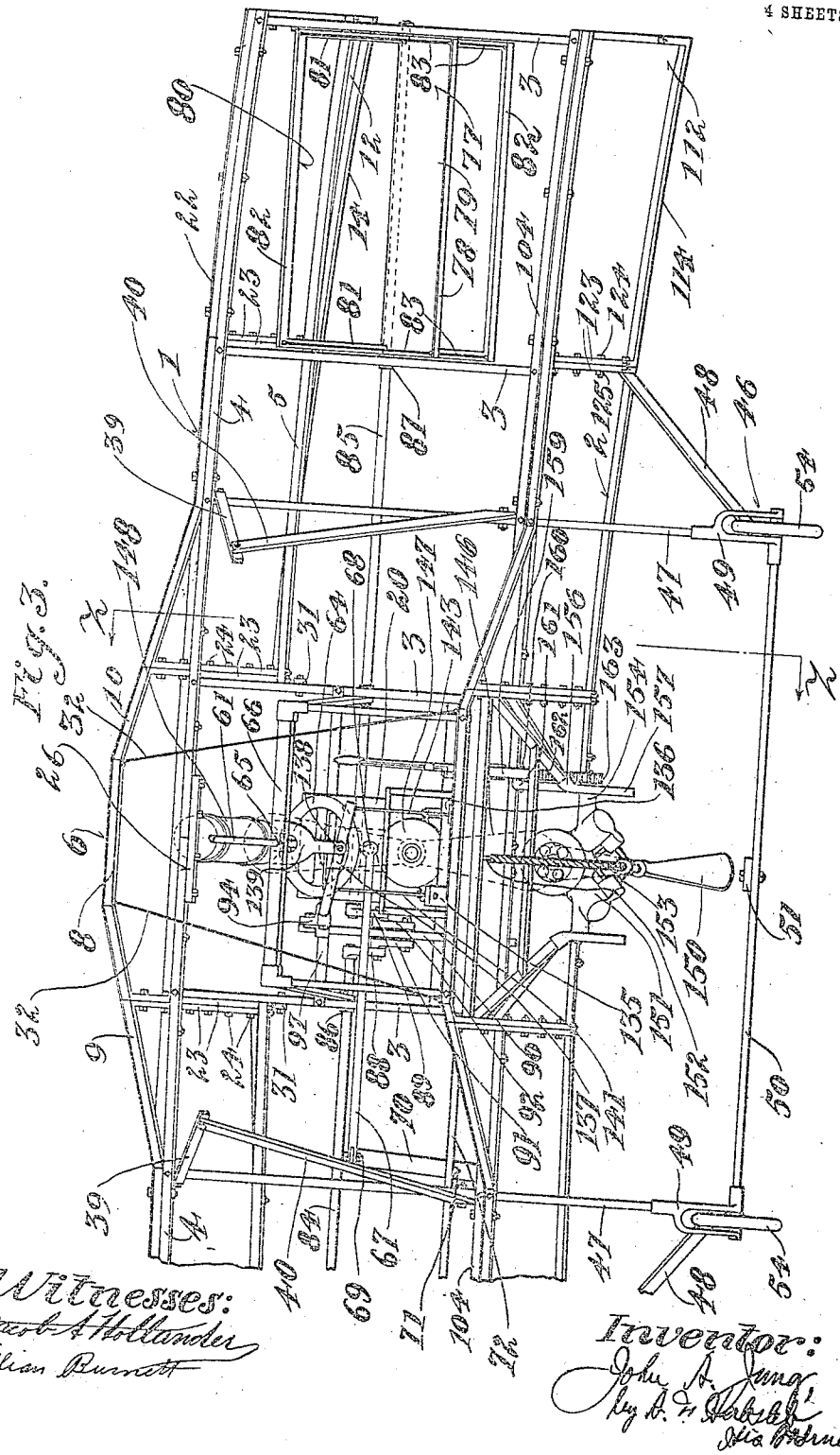

Fig. 3.

Witnesses:
Jacob A. Hollander
Lilian Burnett

Inventor:
John A. Jung
by A. H. Hollander
his Attorney.

J. A. JUNG.

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4 SHEETS—SHEET 4.

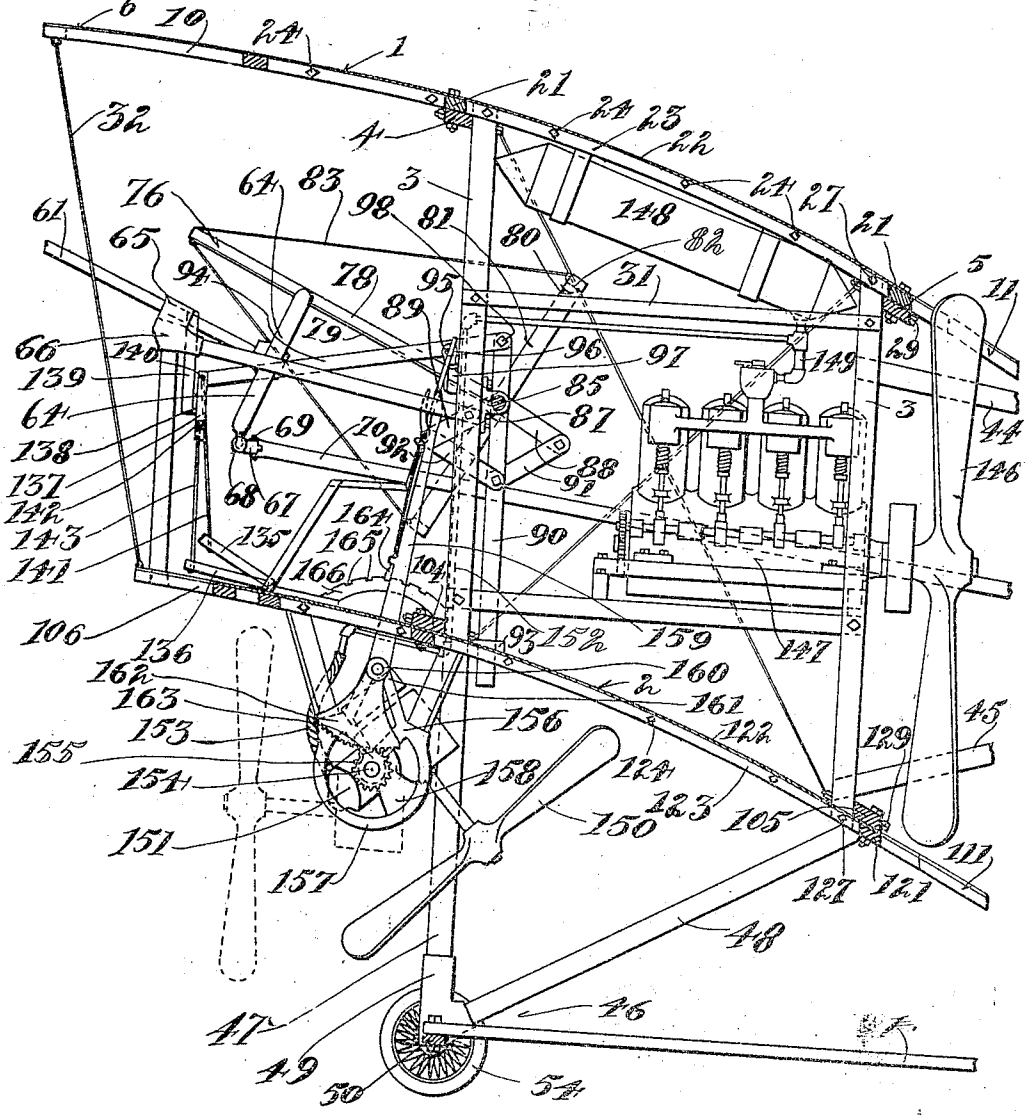

Fig. 4.

Witnesses:

Jacob A. Hollander

Lillian Burnett

Inventor:

John A. Jung,

by D. F. Herkley

His Attorney.

UNITED STATES PATENT OFFICE.

JOHN A. JUNG, OF CINCINNATI, OHIO.

FLYING-MACHINE.

1,023,937. Specification of Letters Patent. Patented Apr. 23, 1912.

Application filed May 25, 1910. Serial No. 563,314.

To all whom it may concern:

Be it known that I, JOHN A. JUNG, a subject of the King of Hungary, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification.

My invention relates to flying machines of the character of those employing an aeroplane or buoyancy surface which is adapted to provide buoyancy for the machine by the propulsion of the aeroplane edgewise through the air, the propulsion being effected by suitable mechanical or other means, or by the weight of the flying machine in gliding through the air.

My invention consists in providing a flying machine with an aeroplane having a forward extension at its median portion and rear extensions of novel form at its lateral ends; further in providing a flying machine embodying an aeroplane of the character mentioned and a rear horizontal buoyancy plane-member; further in providing such structure with a forward elevation-plane for controlling the angle of elevation in the flight of the machine; further in providing a flying machine of the character mentioned with an aeroplane, a forward normally horizontal rudder and a rear normally vertical rudder and adjusting means between the two for connecting the same for combined movement; further in providing a flying machine of the aeroplane type with lateral equilibrium-wings connected for combined but reversely acting movement and treadle mechanism for operating the same; further in providing a flying machine with an aeroplane and a plurality of propellers arranged for acting in different horizontal planes in the normal line or direction of flight, and further, in providing means for adjusting the relative positions between said propellers.

The invention will be further readily understood from the following description and claims, and from the drawings, in which latter:

Figure 1 is a side elevation of my improved device. Fig. 2 is a plan view of the same. Fig. 3 is a front elevation of the same, partly broken away. Fig. 4 is a vertical section of the same taken on the line *z*—*z* of Fig. 3, with the forward and rear portions broken away. Fig. 5 is a vertical section on the line *y*—*y* of Fig. 1; and, Fig. 6 is a detail in plan view and partly broken away showing the releasable connection for the aeroplane-sections.

In the specification and claims I refer to the main buoyancy members as the aeroplanes. It is obvious that these aeroplanes may be true plane surfaces or have a slight curvature imparted thereto without departing from the spirit of my invention. I also refer to the horizontal and vertical planes of the parts, it being understood that these are approximate planes, while the machine is at rest upon the ground.

I prefer to employ a pair of main aeroplanes 1 and 2, the aeroplane 1 being shown as the upper aeroplane and the aeroplane 2 being shown as the lower aeroplane, these aeroplanes being connected by separating bars 3. These aeroplanes are in practice of substantially greater width than length, the terms width and length being employed as in relation to the line of flight of the machine, the length being parallel with said line of flight.

Describing the upper aeroplane, the main portion of the aeroplane is bounded by the forward stringer 4, the rear stringer 5, and the lateral ends of the aeroplane. The aeroplane is provided with a forward extension 6 at its median portion, the base 7 of which is preferably of substantially greater width than the nose 8 thereof, the side edges 9 10 of said forward extension slanting toward each other forwardly. The rear lateral ends of the aeroplane are provided with rearward extensions 11 12, the rear edges 13 14 of the same respectively slanting inwardly and forwardly to points 15 16, preferably separated from each other and located respectively at distances from the normal median line of the machine which are less than the distances at which the meeting points 18 19 between the base 7 and the main portion of the aeroplane are located from said median line. That is to say, the inner ends of the rearward extensions are separated a less distance than the rear ends of the forward extension. These rear extensions droop laterally and rearwardly with a gradual slope toward their outer rear corners for presenting surfaces toward the atmosphere, whose angles of inclination to the horizontal become gradually greater as said

outer rear corners are approached. Constructed in this way, the rear lateral corners of the aeroplane present surfaces to the atmosphere which gradually decrease in area but increase in resistance to the atmosphere and increase stability of flight.

The aeroplane is constructed in lateral sections which are separable for convenience in packing or shipping. Each section comprises frame-members 21 over which the covering 22, such as canvas or prepared silk, is stretched and secured. The frame-members 21 comprise side-pieces 23, the adjacent side-pieces being connected and secured together by bolts 24 receiving nuts 25 over their threaded ends for securely clamping the adjacent side-pieces together side by side. The stringers 4, 5 extend laterally from end to end of the collective aeroplane-sections for lapping across the meeting joints between sections, although these stringers may be separable at the median line as indicated by the joint 26.

Preferably the middle aeroplane-section has the middle portion of the forward extension integral therewith, and the aeroplane-sections adjacent thereto respectively have the side portions of said forward extension integral therewith, while the end aeroplane-sections have the respective rear extensions integral therewith.

The lower aeroplane is formed substantially similar to the upper aeroplane, the parts thereof being identified by the same reference numerals increased by the numeral 100, and preferably the forward extension 106 of the lower aeroplane extends forwardly a less distance than the forward end of the upper aeroplane, for the purpose of providing greater freedom of view for the operator whose position is indicated by the seat 20.

The upper and lower aeroplanes are releasably connected by the separating bars 3, as by means of bolts 27, passing through said separating bars and the side pieces of the aeroplane-sections and nuts 28 received over the ends of said bolts, and by bolts 29 passing through the stringers and said separating bars, and nuts 30 received over the ends of said bolts. Braces 31 releasably connect the front and rear separating bars. The noses of the forward extensions are connected by tension-wires 32.

35 is a forward elevating-member and in the form shown consists of a pair of planes 36 37 connected by separating bars 38. This elevating-member is pivoted on arms 39 projecting forwardly from the main aeroplane structure and braced by braces 40 therefrom. The pivoting may be accomplished by a pivot-rod 41 received in bearings in braces 42 of the forward elevating-member and bearings in the forward ends of the arms 39.

43 is a tail balancing plane which is normally horizontally disposed and preferably rigidly connected with the main aeroplanes, and for accomplishing this I prefer to provide rearwardly extending arms 44 braced by braces 45 from the separating bars between the main aeroplanes. This tail balancing plane may also have support from the carriage of my improved device. This carriage is shown at 46 and preferably comprises forward uprights 47 depending from the lower aeroplane and braced therefrom by braces 48, the lower ends of the uprights and braces being received in sockets in casters 49 connected by a cross-piece 50. 51 is a pole which has connection with said cross-piece and extends rearwardly under said tail balancing-plane, where it has a support 52, the lower ends of stanchions 53 being suitably releasably connected to said support and diverging upwardly toward the respective corners of said tail balancing-plane where they are also releasably secured. Supporting wheels 54 are mounted in the casters 49, and a supporting wheel 55 is mounted in the support 52.

56 is a tail-rudder swinging on a normally vertical axis and is shown pivotally supported on a pivot 57 between the rear end of the tail balancing-plane and a cross-piece 58 between the rear stanchions 53. This rudder preferably has a normally vertical wing 59 and a normally horizontal wing 60. The forward elevation-member 35 and the tail-rudder 56 are preferably connected for combined movement. I have shown this accomplished by providing an endwise shiftable rod 61 which has an articulation at 62 with an arm 63 extending from said front elevation-member and provided with a hand-wheel 64 for shifting the same endwise. The rod slides endwise in a bearing 65 located on a railing 66, and the hand-wheel is mounted to rotate on the rod, but is suitably positioned endwise thereon. To this hand-wheel a link 67 is jointed at 68, the link having articulation at 69 with a lever 70 extending rearwardly and pivoted at 71 on a brace 72, the rear end of the lever having connection with a link 73 by an articulation 74, the last-named link being articulated at 75 to an arm 34 extending forwardly from the rear rudder. The turning of the hand-wheel will swing the rear rudder on its pivotal axis. The joints 68 and 69 are preferably loose joints so that the arc in which the inner end of the link 67 moves when shifted by the hand-wheel will not act with a binding strain upon the lever 70. By the means stated the forward elevation-member and rear rudder are capable of operation by means of the same hand-wheel so that both may be under instant control of the operator.

The planes of the elevation-member are preferably located in front of and distanced

from the forward extensions of the main aeroplanes and are separated a less distance than said main aeroplanes and located between the planes when extended of said main aeroplanes.

76 77 are equilibrium-wings which are located at the respective ends of the main aeroplanes. They preferably extend in front of the end portions of the main aeroplanes at the sides of the forward extensions of said main aeroplanes.

The equilibrium-wings preferably embrace a plane-frame 78 over which the covering 79 is stretched, the plane-frame being mounted on a supporting frame 80 comprising an arm 81 at each end of the plane-frame rigidly connected to said plane-frame, the arms being connected by cross-pieces 82, tension-wires 83 connecting the four corners of the supporting frame with the outer ends of the plane-frame.

The equilibrium-planes are arranged to be deflected up and down, preferably simultaneously in reverse directions, and for accomplishing this conveniently I mount the respective wings on shafts 84 85 journaled in bearings 86 87 secured to the separating bars 3 between the main aeroplanes. The shafts 84 85 respectively have cranks 88 89 extended therefrom connected to a bar 90 by links 91 92. The lower end of the bar has movement in a bearing 93 in the lower aeroplane. The links 91 92 are respectively articulated to the bar and to said cranks for moving the cranks in reverse directions.

94 is a lever, pivoted at 95 in a bearing 96 secured to a cross-piece 97 releasably secured between the innermost separating bars 3, the lever being articulated with the bar 90 at 98.

The respective arms, braces, rods and pole of my improved device are provided with releasable connections for assembling the same and permitting their separation, these connections being shown consisting of bolts or screws.

Treadles 135 136 connect with the lever 94 for operating the same in reverse directions. Thus a lever 137 is pivoted at 138 to a hanger 139 depending from the railing 66. The treadle 135 is connected with the lever 137 at one side of its pivot as at 140 by means of a link 141, and the treadle 136 is connected with said lever at the other side of its pivot, as at 142, by means of a link 143.

When the treadle 135 is depressed, the right hand wing (looking toward aeroplanes from the front) will be raised and the left hand wing lowered, and when the treadle 136 is depressed, the left wing will be raised and the right wing will be lowered, the depressing of one treadle also raising the other treadle. It will be noted therefore, that in my improved device the front elevation-member, and the rear rudder may be simultaneously or independently moved from a single manipulated element namely, the hand-wheel, which can be readily operated by one hand while the lateral equilibrium wings are operated by the feet, thereby putting the controlling means for the flying machine under instant and ready control of the operator.

I have shown propulsion means for the machine, and have also shown a plurality of propulsion means so correlated that the propulsion means may serve or aid in controlling the elevation of the flying machine. Thus 146 is a propeller operated by a suitable motor. I have shown a hydro-carbon internal-combustion motor 147 fed from a tank 148 through a pipe 149. The propeller 146 preferably has its axis of rotation between the main aeroplanes and is located in lateral plane between the rearward extensions of said main aeroplanes, and is arranged for driving the flying machine in a normally forward direction.

150 is a propeller preferably swingingly mounted in such manner as to augment the force applied by the propeller 146 or to qualify said force. I have shown this accomplished by a change in the angle at which the rotary axis of said propeller 150 extends with relation to the line of the rotary axis of the propeller 146. The propeller 150 is suitably driven and I have shown the same driven by an auxiliary motor fed from the tank 148 by a pipe 152 and a flexible tube 153. The motor 151 is mounted on trunnions 154 journaled in bearings 155 of hangers 156 depending from the lower aeroplane. Each of these hangers has an arc guideway 157 thereon in which an arc-piece 158 of the engine-frame has bearing.

159 is a lever pivoted at 160 to a lug 161 on one of the hangers. The lever has on it a segment-gear 162 which meshes with a pinion 163 on one of the trunnion-shafts for swinging the motor 151 about its pivot for changing the direction in which the rotary axis of the propeller 150 extends. The lever may be positioned by a latch 164 arranged to engage notches 165 in a segment-piece 166. The propeller 150 may be swung to rear of its motor position, as shown in full lines, when it will augment the action of the propeller 146, the forward elevation planes being adjusted to a suitable extent to control the combined action of said propellers. If it is desired to cause rapid ascent of the flying machine, the position of the propeller 150 may be changed for causing the same to act with a direct upward thrust upon the flying machine, in which relation the rotary axis of the propeller 150 will be substantially at right angles to the main aeroplanes, or the propeller 150 may be adjusted to forward position as indicated in dotted lines in Fig. 3 for directly counter-

acting the action of the main propeller and causing decrease in speed of the flying machine.

The rotary axes of the propellers are preferably located in coincident vertical planes which are coincident with the median lines of the aeroplanes, and the propeller 150 is adjustable so as to change the angle of its rotary axis with relation to the rotary axis of the propeller 146.

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

1. In a flying machine, an aeroplane of substantially greater width than length and having a forward extension at its median portion and a rearward extension at each of its lateral portions, the said rearward extensions being spaced apart and drooping laterally and rearwardly toward their outer rear corners for presenting surfaces toward the atmosphere whose angles of inclination to the horizontal become gradually greater as said outer rear corners are approached, substantially as described.

2. In a flying machine, the combination of vertically separated aeroplanes each of which is of substantially greater width than length and is provided with a forward extension at its median portion and with a rearward extension at each of its side portions, the said forward extension of the lower one of said aeroplanes being of less length than the forward extension of the upper one of said aeroplanes, substantially as described.

3. In a flying machine, the combination of an aeroplane, an elevating-member in forward position with relation to said aeroplane and comprising a pair of separated plane members, means for pivoting said elevating-member on a transverse axis, a normally vertically disposed rudder in rear of said aeroplane, means for pivoting said rudder on a normally upright axis, and a common controlling member for said elevating-member and rudder, said controlling member comprising a longitudinally movable forwardly extending rod having connection with said elevating-member for swinging the same on its transverse axis, a hand-wheel on said rod, and laterally extending connecting members between said hand-wheel and rudder, and constructed and arranged for controlling said elevating-member by axial movement of said hand-wheel and for controlling said rudder by the turning of said hand-wheel upon its axis, for the purpose described.

4. In a flying machine, the combination of vertically separated aeroplanes, an elevating-member comprising a plurality of separated planes located forwardly of said aeroplanes when extended, said elevating member arranged for swinging on a horizontal axis, a rear horizontal balancing plane located to rear of said aeroplanes, a rudder extending rearwardly of said rear horizontal balancing plane and having a normally vertically disposed blade and arranged for swinging on a normally upright axis, a longitudinally movable forwardly-extending rod having connection with said elevation-member, a hand-wheel thereon, laterally disposed connecting means between said hand-wheel and rudder, and constructed and arranged for swinging said elevating-member upon its axis by axial movement of said hand-wheel and for swinging said rudder by the turning of said hand-wheel about its axis, substantially as described.

5. In a flying machine, the combination of an aeroplane of substantially greater width than length and provided with a forward extension having a wider base than forward end, the said aeroplane being composed of separable plane-sections laterally disposed and means for rigidly connecting said plane-sections, the median plane-section comprising a portion of said forward extension and the plane sections adjacent thereto comprising other portions of said forward extension, substantially as described.

6. In a flying machine, the combination of a plurality of aeroplanes, separating means between the same, each of said aeroplanes being of substantially greater width than length and having a forwardly projecting extension at the median portion thereof, whose rear portion is spaced sidewardly from the forward lateral ends of said aeroplane, an elevating-member located forwardly of said aeroplanes, and equilibrium wings pivotally disposed between said aeroplanes and in lateral positions sidewardly of said forward extensions, substantially as described.

7. In a flying machine, the combination of a plurality of aeroplanes, separating means between the same, each of said aeroplanes being of substantially greater width than length and having forwardly projecting extensions at the median portions thereof, an elevating member located forwardly of said aeroplanes, and equilibrium-wings pivotally disposed between said aeroplanes and in lateral positions sidewardly of said forward extensions and between the ends of the said aeroplanes, a normally horizontal rear balancing-plane in rear of said aeroplanes, and a vertically disposed rudder adjacent to the latter, substantially as described.

8. In a flying machine, the combination of a pair of aeroplanes, means for separating the same, each of said aeroplanes being of substantially greater width than length and having a forward extension at the median portion thereof, equilibrium-wings

located between said aeroplanes and in lateral disposition at the sides of said forward extensions, rock-shafts for said equilibrium-wings at the respective sides of said forward extensions, and treadle and lever mechanism having connection with said rock-shafts for moving the equilibrium-wings at the respective sides of said forward extensions in reverse directions, said treadles being located between said forward extensions, substantially as described.

9. In a flying machine, the combination of a pair of aeroplanes of substantially greater width than length, each of said aeroplanes having a forward extension at its median portion which has a wider base than forward end, a propeller, driving means therefor between said aeroplanes, an auxiliary propeller, and driving means therefor under the lower one of said aeroplanes, substantially for the purpose described.

10. In a flying machine, the combination of a pair of aeroplanes of substantially greater width than length, each of said aeroplanes having a forward extension at its median portion which has a wider base than forward end, a propeller, driving means therefor between said aeroplanes, an auxiliary propeller, driving means therefor under the lower one of said aeroplanes, and means for adjusting the direction in which the rotary axis of said auxiliary propeller extends operable from a position between said aeroplanes, substantially as described.

11. In a flying machine, the combination of a pair of aeroplanes of substantially greater width than length, each of said aeroplanes provided with a forward extension having a wider base than front edge and with rearward extensions at the lateral portions of said aeroplane, a main propeller operable in a path located between the said rear extensions and having a rotary axis which when extended is located between said aeroplanes, an auxiliary propeller, and means for adjusting the direction in which the rotary axis of said auxiliary propeller extends, and constructed and arranged for causing said auxiliary propeller to qualify the action of said main propeller, substantially for the purpose described.

12. In a flying machine, the combination of a pair of aeroplanes of substantially greater width than length, each of which is provided with a forward extension at its median portion and with rearward extensions at its lateral portions, a propeller whose rotary axis when extended is located between said aeroplanes, and a second propeller which is hinged below the lower aeroplane for causing said last-named propeller to be located below the said forward extension of said lower aeroplane or below the main portion of said aeroplane, or at angles between said two positions, substantially as described.

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

JOHN A. JUNG.

Witnesses:
EDWARD SOUTHWORTH,
JACOB A. HOLLANDER.