J. G. E. DANIELSON.

AIRSHIP.

APPLICATION FILED JUNE 21, 1911.

1,037,136.

Patented Aug. 27, 1912.

2 SHEETS—SHEET 1.

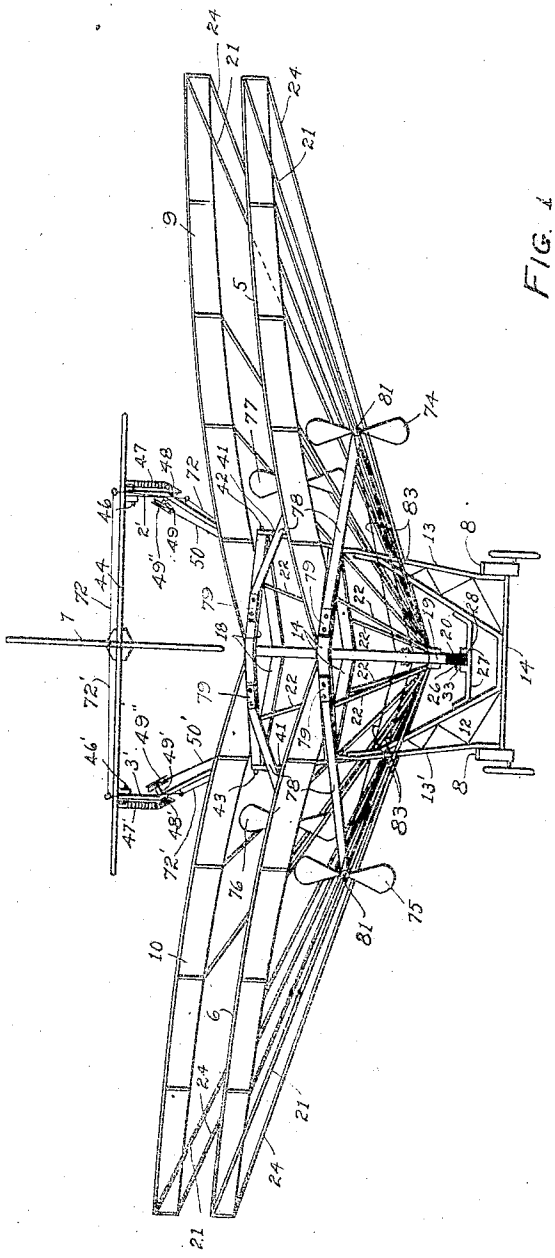

FIG. 1

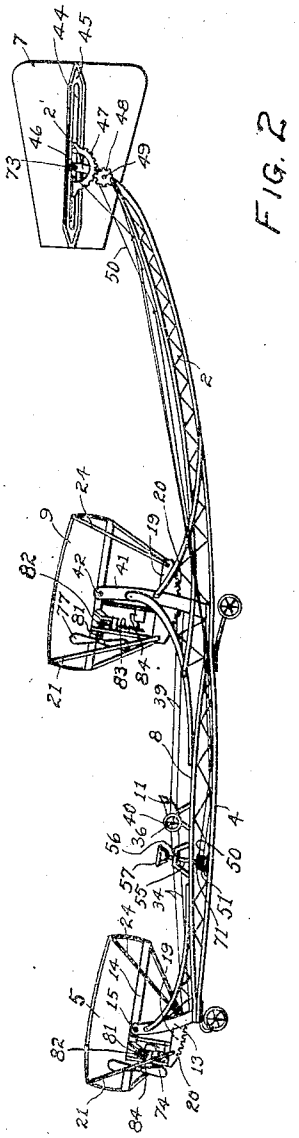

FIG. 2

WITNESSES:

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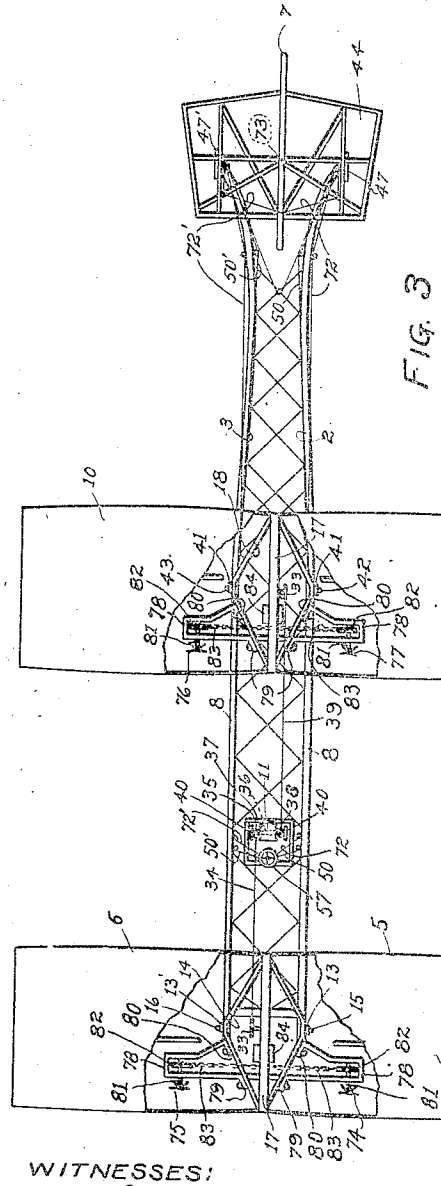

FIG. 3

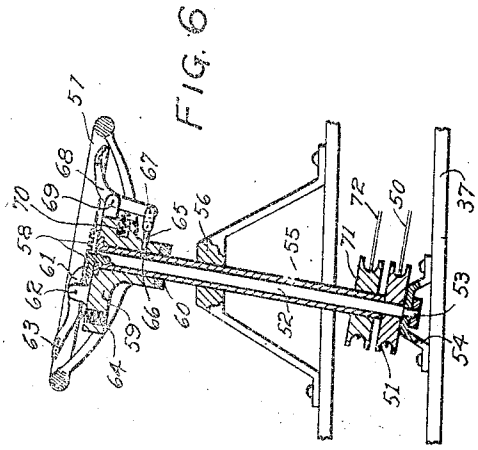

FIG. 6

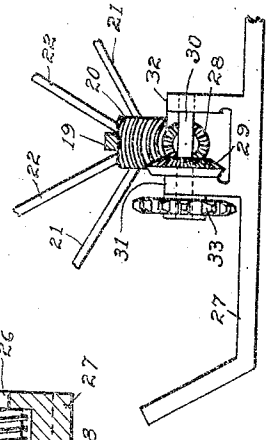

FIG. 5

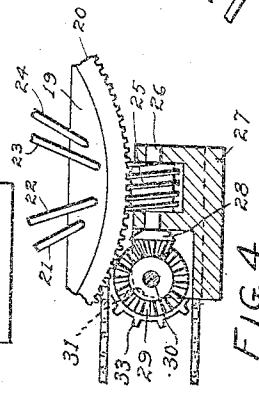

FIG. 4

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UNITED STATES PATENT OFFICE.

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AIRSHIP.

1,037,136. Specification of Letters Patent. Patented Aug. 27, 1912.

Application filed June 21, 1911. Serial No. 634,644.

To all whom it may concern:

Be it known that I, JOHN G. E. DANIELSON, a subject of the King of Sweden, residing in the city of Omaha, county of Douglas, and State of Nebraska, have invented certain new and useful Improvements in Airships, of which the following is a specification.

My invention relates to aerial navigation and has particular reference to the heavier-than-air type of air-ships.

The objects of the invention are to secure increased stability, security, strength of construction, and better control in the aeroplane type of air craft.

With these objects in view my invention consists in the novel construction, combination and arrangement of parts, all as hereinafter described in detail, illustrated in the accompanying drawings and particularly pointed out in the appended claims.

In the drawings—Figure 1 is an end elevation of an aeroplane embodying my invention. Fig. 2 is a side elevation thereof on a reduced scale. Fig. 3 is a plan view thereof. Figs. 4, 5 and 6 are enlarged detail views broken away.

In the construction herein shown two sets of planes or wings are shown, these wings being curved upwardly to slightly elevate their outer edges and improve the stability of the ship. The two sets of wings or planes and the rear steering mechanism are arranged at different elevations, increasing rearwardly, in order to give each set of planes a comparatively undisturbed stratum of air to move in, that is undisturbed so far as the movements of the other parts of the ship through the air are concerned. The forward planes will create certain vortexes or other disturbances of the normal condition of the body of the atmosphere, but as said forward planes are moving through a lower level of atmosphere than the rear carrying or sustaining planes these created air currents will largely take place below said rear planes leaving the latter a comparatively unagitated body of air to work in. The two sets of main or carrying, planes are movable simultaneously to elevate or lower the craft, which prevents the accidental endwise tipping of the craft and maintains its equilibrium while rising or falling. The rear horizontal steering plane is therefore employed chiefly for the mere adjustment of slight inequalities in height between the forward and rear end of the vessel and not for the purpose of elevating or lowering the craft as a whole which has heretofore been done by means of the rear steering plane at the risk of tipping the craft "off the bank" of air, which has heretofore been the cause of probably the majority of accidents. In the present invention each set of carrying planes is provided with its own propellers whose axes of rotation are changed or tilted with the planes themselves.

Referring in detail to the several views, 2 and 3 represent the sides of a vertically curved frame, each of these sides consisting of a truss-form of construction to secure strength and rigidity in the body of the ship. Each of these truss-sides 2 and 3 comprises a rod or rib 4, which may be a piece of tubing, which extends from the forward carrying plane or planes or wings, labeled 5 and 6, to the rear end or rudder 7. Above the rib 4 is a similar, but shorter, rib 8 which is arched or curved upwardly over the forward half of the frame or body of the vessel and is secured at its ends to the rib or rod 4. This provides a strong and comparatively rigid support at each side of the frame for the operator's seat 11 placed substantially midway between the forward and rear planes, the latter being indicated by the numerals 9 and 10. At their forward ends the sides 2 and 3 are secured to a vertically disposed truss-frame 12, the side portions of which are labeled, respectively, 13 and 13′. To the upper ends of the sides 13 and 13′ of this truss-frame are pivoted opposite corners of a rhomboid-shaped frame 14, 15 and 16 in Figs. 1 and 3 being the pivotal points. A brace-bar 17 spans the distance between the two other opposite corners of this frame 14. For the rear planes 9 and 10 a frame 18, corresponding in structure substantially to the frame 14, is provided. A full perspective view of the rear frame 18 is shown in Fig. 1 together with a portion of its counterpart 14. The inner or adjacent ends of the respective planes or wings 5, 6 and 9 and 10 are attached in any suitable manner to these rhomboid-shaped frames 14 and 18. Each of the latter is supported

on a web 19 of a segmental worm-gear rack 20 (which is shown on an enlarged scale in Fig. 4), by means of a series of radial rods 21, 22, 23 and 24, which extend from the web 19 of the gear segment to the rhomboid shaped frame 14 in the one instance and the similar frame 18 for the rear planes 9 and 10. A description of the supports for one of these frames will therefore suffice for both. From each side of the frame 14, or from each of the pair of sides of the frame 14 divided apart by the brace-bar 17, the series of rods 21 to 24 converge to the web 19, as shown substantially in Fig. 4, the rods from the opposite side of the web being arranged as duplicates of those seen on the near side in Fig. 4. In other words the elements 19 to 24 of Fig. 4 appear alike from both sides, each of the rods 21 to 24 being duplicated.

The gear-segment 20 is in mesh with a worm 25 on a shaft 26 mounted in suitable bearings on a cross-bar 27 which spans the space between the lower ends of the sides 13 and 13′ of the upright front truss-frame. On the shaft 26 is keyed a bevel pinion 28 which meshes with a larger bevel gear 29 keyed to a shaft 30. The latter is journaled in bearings 31 and 32 which rise from the cross-bar 27 adjacent to the bearings for the shaft 26. On the shaft 30 is keyed a sprocket-wheel 33 which is driven by a sprocket-chain 34 from a sprocket-wheel 35 which is substantially a duplicate of the wheel 33. The wheel 35 is keyed to one end of a shaft 36 mounted in a bearing-frame 37 on which the seat 11 is mounted between the sides 2 and 3 of the frame or body of the vessel in any suitable manner. Near the opposite end of the shaft 36 is placed a second sprocket wheel 38 from which leads a sprocket-chain 39 to a sprocket-wheel 33 of a similar sprocket-wheel and chain mechanism for the rear planes 9 and 10. The shaft 36 is rotated by the operator by means of a hand-wheel 40 keyed to said shaft. Through the sprocket-wheel and chain-connections between said shaft and the plane-tilting mechanism for each plane shown in Fig. 4, both forward and rear planes are tilted in the same directions when the hand-wheel 40 is rotated. The upright supporting-frame on which the wings 9 and 10 are pivoted by their rhomboid frame 18 is substantially identical with the frame 13 for the forward wings, and is distinguished from said frame 12 by being labeled 41.

42 and 43 are the pivotal bearings for the rear plane, planes or wings, and these correspond with the bearings 15 and 16 for the forward wings.

On the rear end of the structure or frame 2 and 3, which is designated as 2′ and 3′, is mounted a rudder 7 and a horizontal steering plane 44. The latter passes through a slot or opening 45 in the former. The steering-plane 44 is pivoted to the ends 2′ and 3′ at 46 and 46′, respectively 46 and 46′ being studs on gear-segments 47 and 47′. These segments are in mesh with bevel gears 48 and 48′ on shafts 49 and 49′ mounted in the ends 2′ and 3′. The latter shafts are rotated by means of pulleys or sprocket-wheels 49″ and the latter are rotated from the operator's seat by cords, cables or sprocket-chains 50 and 50′ which are led in any suitable manner over pulleys to a pulley 51 on the lower end of an upright shaft 52 (Fig. 6) placed in front of the driver's seat 11 (Figs. 2 and 3).

50 and 50′ in Figs. 1, 2 and 3 represent separate runs or legs of the flexible connection 50 shown on the pulley 51 in Fig. 6. The details of arrangement in running this connection from the pulley 51 to the pulleys 49″ and back to the pulley 51 may be varied in any desired manner and form no part of the present invention.

The shaft 52 has on its lower end a reduced journal portion 53 journaled in a bearing 54 on the frame-work 37 mounted between the frame-sides 2 and 3 as indicated in Fig. 3. The shaft 52 is telescoped by a hollow shaft 55, which, together with the shaft 52, is supported laterally by a bearing 56. These two shafts are rotated by a hand-wheel 57 which is rotatively mounted with relation to both the shafts and has normally released or releasable connections whereby said hand wheel may be keyed to either or both shafts to adjust either the steering plane 44 or the rudder 7 or both. Thus, referring, say, to Fig. 2 the operator controls the rear steering mechanism through the hand-wheel 57 in front of his seat while he adjusts the planes 5, 6 and 9, 10 by the wheel 40 at the side of his seat. The manner in which the hand-wheel 57 is connected with the shafts 52 and 55 is shown in Fig. 6, and is as follows: To the upper end of the inner shaft 52 is secured a ring or segmental form ratchet, toothed member, or quadrant 58. Beneath the latter on the upper end of the hollow shaft 55 is loosely or rotatably mounted a hub 59 on the hand-wheel 57. The wheel and its said hub are supported vertically on the hollow shaft by means of a collar 60 secured to the shaft 55. The hub 59 is keyed to or connected with the shaft 52 by means of a pawl 61 on a lever 63 fulcrumed at 62 on a lug rising from the hub 59. The power-end of this lever is provided with a thumb-piece arranged in proximity to the rim of the wheel so that when the latter is grasped for the purpose of rotating it the thumb of one hand may simultaneously operate or depress the lever 63. The pawl-end of the lever 63 is held normally in engagement with the notches or teeth 58 by a spring 64 seated in

a recess in the top of the hub as shown in Fig. 6, the outer end of this spring being arranged to bear against the lever to force its pawl into engagement with the toothed portion on top of the shaft 52. The outer or hollow shaft 55 is connected with the hub 59 by means of a pin 65 mounted in a bore in the side of the hub extending to the hollow shaft. The latter is provided with one or more bores 66 adapted to register with the end of the pin which is longitudinally movable in the hub.

At 67 the pin 65 is pivoted to the lower end of a lever 68 fulcrumed at 69 on the hub and having its power end arranged with respect to the rim in substantially the same manner as the lever 63. Hence the thumb of one hand may depress the lever 63 while the thumb of the other hand may depress the lever 68 while the wheel is grasped to be rotated by both hands. The lever is spring-pressed to hold the pin 65 normally out of engagement with the shaft 55 by a spring 70 seated in a recess in the side of the hub, as shown.

On the lower end of the hollow shaft 55 is keyed a pulley 71 which is connected through a cord 72 with the rudder 7. From the pulley 71 the cord 72 (or this may be a sprocket wheel and sprocket chain, if preferred) extends rearwardly over any desired pulley arrangement, one leg or run 72 running preferably along one side of the frame 2, 3 while another leg of same labeled 72′ runs along the opposite side. The details of leading the cord and its runs from the wheel 71 to the rudder are not amplified, these specific details being immaterial for the purpose of this invention and may be varied in any desired manner. At the rear end the runs 72 and 72′ are shown leading from the sides of the frame to opposite sides of the rudder 7.

The rear horizontal or steering plane 44 is represented only by its frame-work, the usual canvas covering being omitted in the plan view in order to disclose the parts underneath.

In the positions in which the parts of the controlling mechanism for the rear steering devices are shown in Fig. 6 the hand-wheel 57 is connected with the shaft 52 and disconnected from the shaft 55. Hence without touching the small levers connected with this wheel its rotation will operate the horizontal steering plane 44. The rocking of the latter will also rock the rudder 7, but the latter's movement will be merely edgewise and the shifting of its position in this manner will not materially affect its function or steering horizontally. When the rudder is to be operated or moved from side to side the operator will release the pawl of the lever 63 and press down the opposite lever to engage the pin 65 with the hollow shaft. The axis of movement or pivot for the rudder is indicated at 73 in Fig. 2 this pivotal connection being shown as mounted on top of the plane 44.

In Figs. 1 and 3 the manner of mounting the propellers is most clearly shown. Each of the pair of wings or planes 5, 6 and 9, 10 is shown provided with a pair of propellers, one under each wing, there being four propellers 74, 75, 76, and 77. Referring to Fig. 3, each propeller is mounted on a bearing-bracket 78 which is a laterally extending arm formed by bending a bar of metal upon itself to form a loop and two spaced-apart bearings for the propeller shaft. The ends of this bent bar are bent into lugs or feet 79 and 80 adjusted to the sides of the frame and bolted or riveted thereto. Near the return or outer end the propeller shaft 81 is provided with suitable bearings in said arm or bracket. Within the loop formed a sprocket-wheel 82 is keyed to the shaft in each instance and from these sprocket wheels lead sprocket-chains 83 to the engine-shaft (not shown) of an engine 84 under each set of carrying-planes.

Any suitable means, electrical or mechanical, may be provided for controlling the engines from the operator's seat 11.

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

1. In an air-ship, a series of forward and rear planes and steering mechanisms, each thereof pivoted for angular adjustments and in different horizontal planes with respect to the normal position of said ship and a separate engine and propeller mechanism for each said planes.

2. In an air-ship, the combination with separate sets of planes and a horizontal and vertical steering mechanism of a main body frame, a separate framing for each of said planes and for said steering mechanism, said framings having independent pivotal supports upon said main frame and each arranged in a horizontal and a transverse vertical plane different from the horizontal and transverse vertical planes in which the other framings are arranged, a separate engine and propeller mechanism mounted on each of the framings for said planes to swing in arcs with said framings, and controlling means for said framings, engines, propellers and steering mechanism.

3. The combination with an enlongated frame or body, of a plane-support pivotally mounted on the forward end of said body, a similar plane-support pivoted in a higher horizontal plane to an intermediate portion of said frame or body, an independent engine and propelling mechanism on each of said plane-supports, means for tilting said plane-supports simultaneously on their separate axes, a steering plane support piv-

oted on the rear end of said body in a horizontal plane above the pivotal planes of said first-mentioned supports, a driver's seat or station arranged between the forward and intermediate plane-supports, and means for operating said planes and steering mechanism.

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

JOHN G. E. DANIELSON.

Witnesses:

CHARLES NELSON,

ADOLF ROSEN.