

H. O. EIANE.
AEROPLANE.

APPLICATION FILED SEPT. 26, 1911.

Patented May 27, 1913.

3 SHEETS—SHEET 1.

1,062,772.

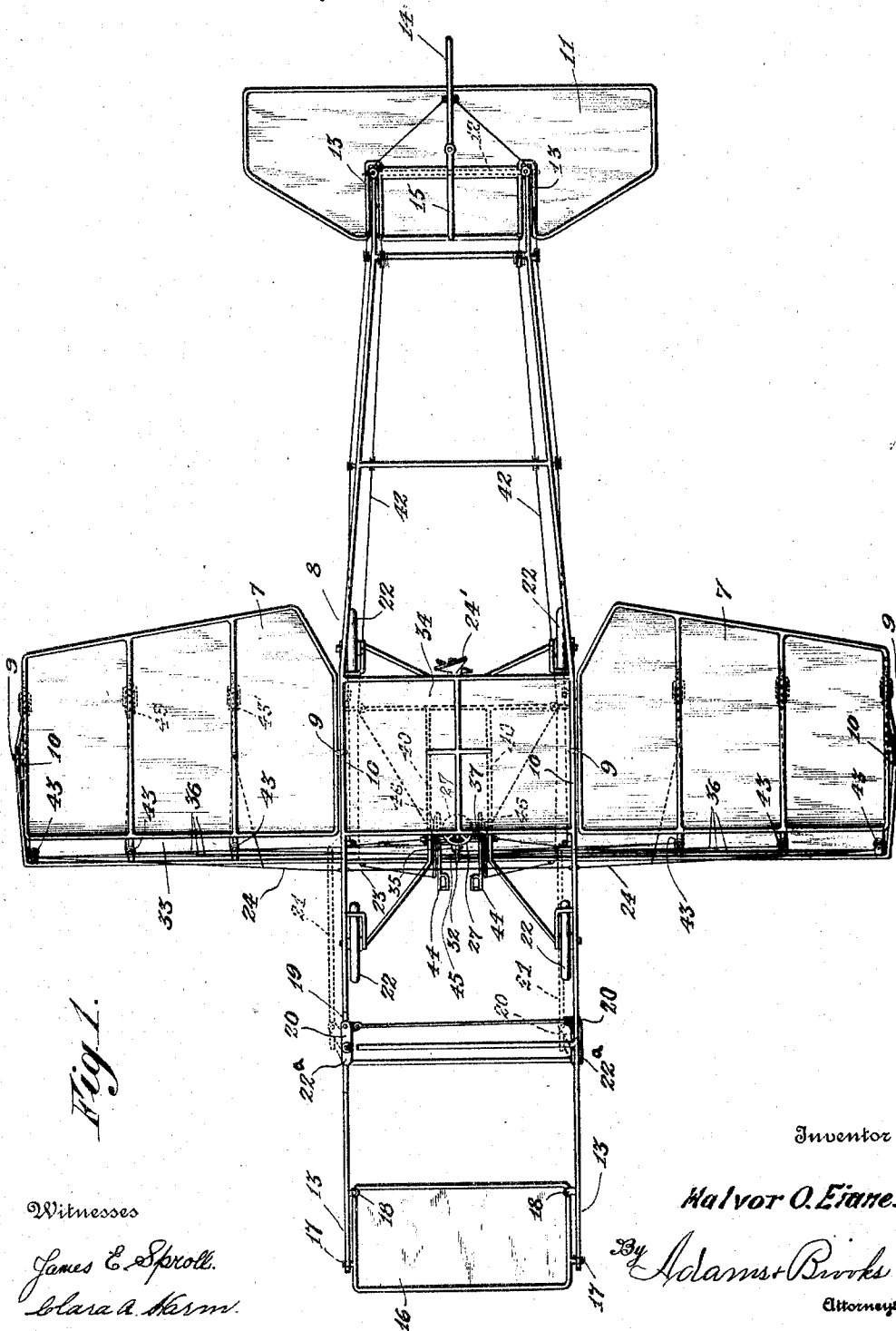


Fig. 1.

Witnesses

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3 SHEETS—SHEET 2.

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Fig. 2.

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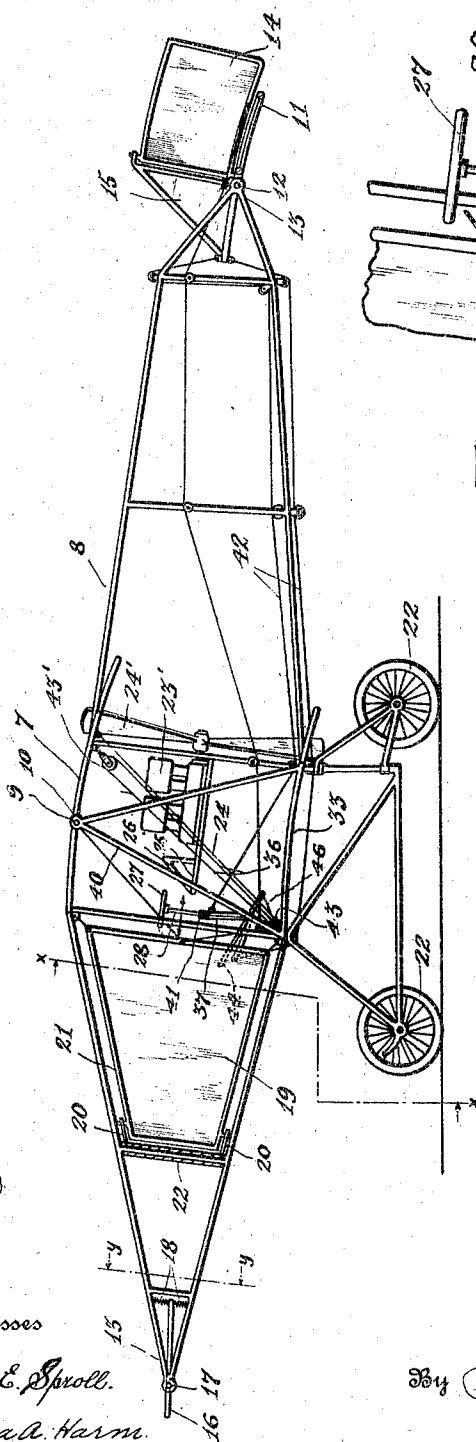


Fig. 3.

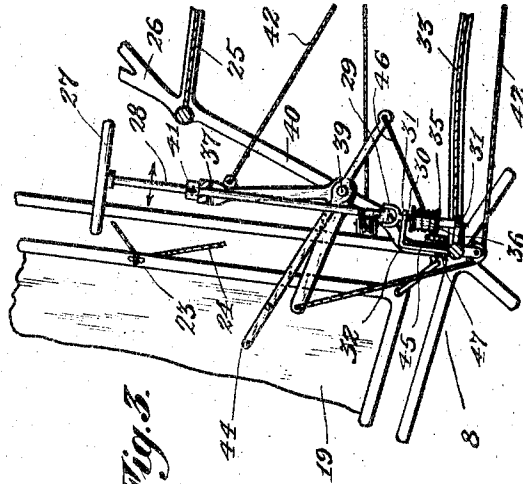
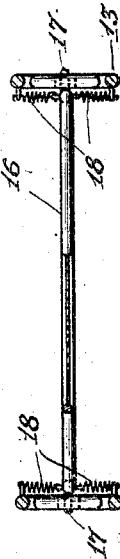


Fig. 1.



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Fig. 5.

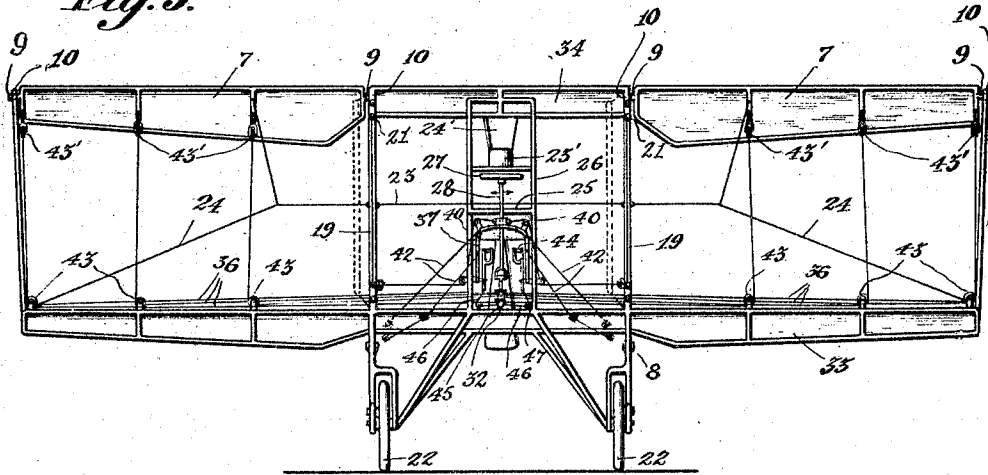
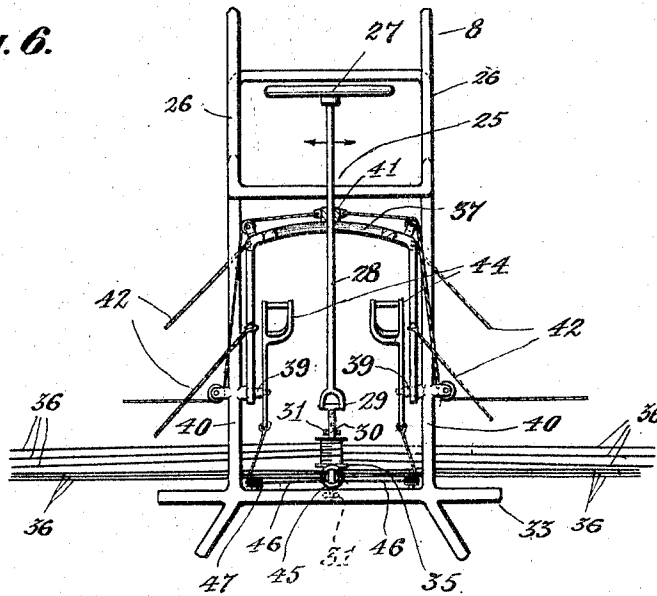


Fig. 6.



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UNITED STATES PATENT OFFICE.

HALVOR OLSEN EIANE, OF SAN DIEGO, CALIFORNIA.

AEROPLANE.

1,062,772.

Specification of Letters Patent.

Patented May 27, 1913.

Application filed September 26, 1911. Serial No. 651,473.

To all whom it may concern:

Be it known that I, HALVOR OLSEN EIANE, a citizen of the United States of America, and a resident of the city of San Diego, in the county of San Diego and State of California, have invented certain new and useful Improvements in Aeroplanes, of which the following is a specification.

My invention relates to improvements in aeroplanes and like the construction shown in my Patent 1,021,040, it has more particular reference to improvements in devices for steering, controlling the motions and automatically maintaining the equilibrium of aeroplanes during their operation of flying, and the objects of my improvements are to provide means which shall be simple in construction and operation, reliable and efficient in action and easily controlled by the operator. I attain these objects by devices illustrated in the accompanying drawings in which—

Figure 1 is a plan view of my invention. Fig. 2 is a view of same in side elevation. Fig. 3 is an enlarged view in side elevation of some details of my invention which are merely indicated in Fig. 2. Fig. 4 is a view in cross-section looking toward the forward end of the machine from broken line $y-y$. Fig. 5 is a view in front elevation partly in cross-section on broken line $x-x$ of Fig. 2 and Fig. 6 is an enlarged view in front elevation of some of the working parts of my invention which parts are indistinctly indicated in Fig. 5.

Similar reference numbers indicate like parts throughout the drawings.

Referring to Fig. 1, two sail planes 7 are disposed one on each side and near the top of the metal frame 8 where they are mounted on pivots 9 (which are supported by four bearings 10 disposed on said frame 8) to adapt them to assume different angles with respect to a horizontal line in response to manipulations of the steering apparatus as hereinafter described. 11 is a horizontal rudder adapted to change the angle of its plane by being mounted on a shaft 12 which is journaled in bearings 13 at the extreme rear end of frame 8. 14 is a vertical rudder adapted to be changed with respect to the angle of its plane by being hinged on bearings supported by a tri-angular support 15 projecting upwardly from the said shaft 12 upon which it is rigidly mounted. A pilot plane 16 is disposed in a normally hori-

zontal position at the extreme front end of frame 8 where it is mounted on pivots 17 whose bearings are fixed on frame 8 whereby it is adapted to be free to change the angle of its plane to an extent limited by the degree of compressibility of spiral springs 18 which are disposed to extend from the sides of the rear end of the pilot-plane 16 to the sides of the frame work of frame 8 as more clearly illustrated in Figs. 2 and 4.

In Fig. 2, 19 is one of two like planes both of which are disposed vertically and parallel to each other, one on each side of frame 8 where it is supported by a hinged arm 20 to the end of which arm 20 its upper rim 21 is articulated at a point near its front end, as more clearly shown in Fig. 1 where said upper rim 21 is shown in dotted lines. Each of said hinged arms 20 is hinged upon the end of a tube or sleeve 22* which is mounted freely upon a stay rod which passes through it from one side of the top of frame 8 to the respective lower side thereof. The hinged arms 20 are connected together by a rod each end of which is pivoted at a suitable distance from the hinge of said arms 20, whereby said arms 20 are maintained in a parallel relation to each other irrespective of their sidewise swinging movement and whereby both planes 19 are permitted to move sidewise in either direction, but always in parallel relation to each other and both always in a vertical position with respect to the frame 8. Each of the planes 19 at its upper rear corner and at its lower rear corner is connected with frame 8 by an elastic tie to permit sidewise movement of said planes 19 in response to sidewise air currents. A rope tie 23 of suitable length extends between the rear ends of planes 19 at a point near the center of the rims of said planes 19 whereby they are maintained parallel to each other and from the rim of the rear end of each plane 19 (at the point where the rope tie 23 is fastened) a rope 24 leads through suitable guiding pulleys to a suitable point on the outer end edge of sail plane 7 on its respective side whereby when said planes 19 are forced to move sidewise in response to crosswise air currents the rope 24 serves to pull the end of said sail plane 7 downward to present a surface to said air current whereby the tipping effect of such air current is neutralized. Such cooperation of said planes 19 and the tip ends of sail planes 7 is possible,

however, only when sail planes 7 are set in a horizontal position since rope 24 may be taut only when sail planes are in such horizontal position. 33 is a fixed sail plane disposed to extend across and from each side of frame 8 at the underside thereof and by which it is supported at a suitably slight fixed angle with respect to a horizontal line, and 34 is also fixed sail plane disposed on and secured to the top of frame 8 between the two sail planes 7 where it is set at a suitably slight angle with respect to a horizontal line, permanently. The frame 8 is supported by wheels 22 in a manner well known as shown in Fig. 2.

The driving power, comprising the engine 23' and propeller 24' indicated in Fig. 2, may be of any well known type. The steering and controlling mechanism is located in front of a suitable operator's seat 25 which is attached to and supported by side brace rods 26 of the frame 8 as shown in Figs. 2, 3, and 6. Such mechanism comprises the steering wheel 27 which is mounted on the upper end of a shaft 28 whose lower end is connected by a universal joint 29 with a shorter shaft 30 whose journals are adapted to rotate in suitable bearings 31 which are supported by bracket 32 which is fixed to frame 8. The short shaft 30 is provided with a drum 35 around which may be wound ropes 36 which extend to and connect with the sail planes 7, as shown in Fig. 1, whereby the angle of said sail planes 7 may be changed synchronously by turning wheel 27. Said shaft 28 extends upwardly from universal joint 29 through an elongated slot in the top of a yoke 37 whose downwardly projecting portions are hinged at their lower ends on studs 39 which are fixed to frame rods 40, as shown in Fig. 6, whereby said shaft 28 (on the top end of which is a hand wheel 27) may be moved forward and backward or it may be moved sidewise toward either the right hand or left hand of the operator. On shaft 28 adjacent to the top of the bowed top of yoke 37 is a loose collar 41 provided with rings on each side to each of which rings is fastened a rope which leads to vertical rudder 14 being guided in its path by suitable pulleys, whereby a sidewise movement of said shaft 28 may cause a sidewise swinging movement of said rudder 14 in an obvious manner.

The horizontal rudder 11 may be operated by suitably guided ropes 42 extending between the centers of the vertical portions of yoke 37 and said rudder 11 whereby a forward or backward movement of shaft 28 will cause said rudder to alter the angle of its plane with respect to horizontal line in a well known way.

The two sail planes 7 may be moved synchronously to any desired angle with respect to a horizontal line by rotating the

drum 35 by motion communicated by hand wheel 27 through shaft 28, universal joint 29 and the short shaft 30 around which drum 35 ropes 36 are made to encircle, which ropes 36 extend from said drum 35 and take over respective direction pulleys 43 spaced lengthwise on the forward edge portion of plane 33 and thence upward over respective pulleys 43', provided on the rear edge portions of sail planes 7, and finally back over the said pulleys 43 to a ring 45 to which ring 45 the ends of all ropes 36 from each sail plane 7 are connected whereby when wheel 27 is rotated the sail planes 7 are moved synchronously to a desired angle.

Means are provided for moving sail planes 7 to positions wherein the angle of one shall be different from the angle of the other. Such means comprise pedals 44 fulcrumed one on an extension of each of studs 39, from the swinging end of which pedal 44 leads a connecting cord or rope 46 over a suitably disposed pulley 47 to connect with the ring 45 whereby a movement of one of said pedals 44 downward may cause ring 45 to move sidewise in one direction, while the other of said pedals 44 would at the same time rise, and vice-versa a movement of the other of said pedals downward would cause the ring 45 to move in an opposite direction while the one pedal 44 would rise and thus ropes 36 would convey contrary movements to sail planes 7 when either of pedals 44 is depressed. In brief, the rotation of wheel 27 serves to move sail planes 7 synchronously in the same direction about their pivotal points while a depression of either of pedals 44 serves to move such sail planes 7 each in a direction opposite to that of the other, whereby the operator may more readily control the movements of the machine in variable air currents.

To operate my invention the operator sits in seat 25 in which position he may control the machine as to its course toward the right or the left hand of the operator by moving shaft 28 sidewise in the desired direction while the course of the machine upward or downward may be controlled by moving said shaft 28 forward or backward as required. If required by air conditions to alter the relative angles of the two planes 7 the operator may press one or the other of pedals 44 to realize the desired effect.

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

1. In an aeroplane construction, a frame, a substantially horizontal adjustable plane mounted on said frame, a mechanism for adjusting said plane comprising spaced vertical planes mounted on said frame for bodily movement in a lateral direction by the air, and an operative connection between

said vertical planes and said horizontal plane.

2. In an aeroplane construction, a frame, a substantially horizontal adjustable plane
5 on said frame, means for adjusting said plane comprising a pair of vertical planes spaced laterally of said frame and mounted thereon for bodily movement in parallel relation laterally thereof, and an operative
10 connection between said vertical planes and said horizontal plane.

3. An aeroplane comprising a frame, a horizontal plane pivotally supported on said frame, means for effecting rotary adjust-
15 ment of said plane, means for warping said plane comprising a vertical plane supported on said frame for movement in a lateral direction by the air, and an operative connection between said vertical plane and said
20 horizontal plane.

4. An aeroplane comprising a frame, supporting planes pivotally mounted on said frame laterally of one another, means for

effecting rotary adjustment of said planes, means for warping said planes comprising a 25 vertical plane supported on said frame for movement laterally thereof by the air, and operative connections between said vertical plane and said horizontal planes.

5. An aeroplane comprising a frame, sup- 30 porting planes pivotally mounted on said frame laterally of one another, means for effecting rotary adjustment of said planes, means for warping said planes comprising vertical planes supported on said frame for 35 simultaneous movement laterally thereof by the air, and an operative connection between said vertical planes and said horizontal planes.

Signed at Seattle, Washington, this 7th 40 day of Sept. 1911.

HALVOR OLSEN EIANE.

Witnesses:

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ARLITA ADAMS.