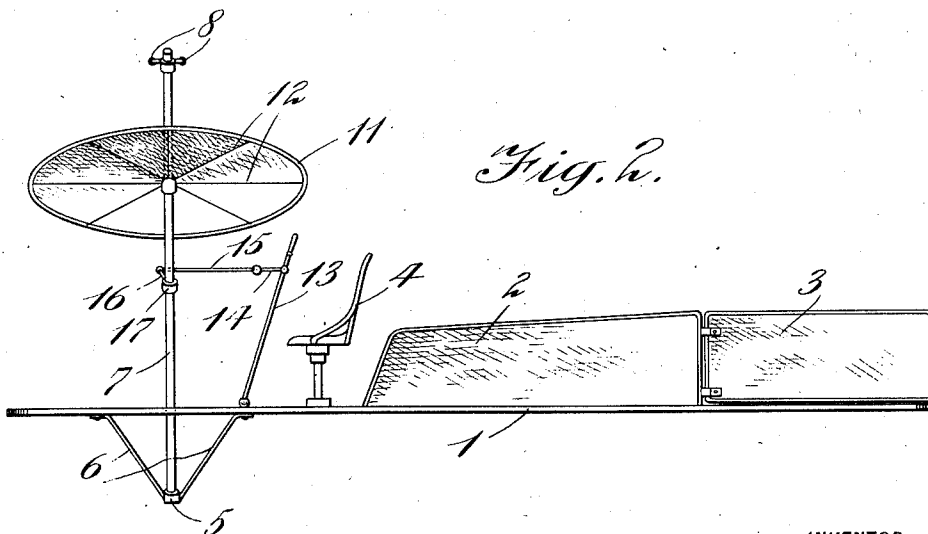
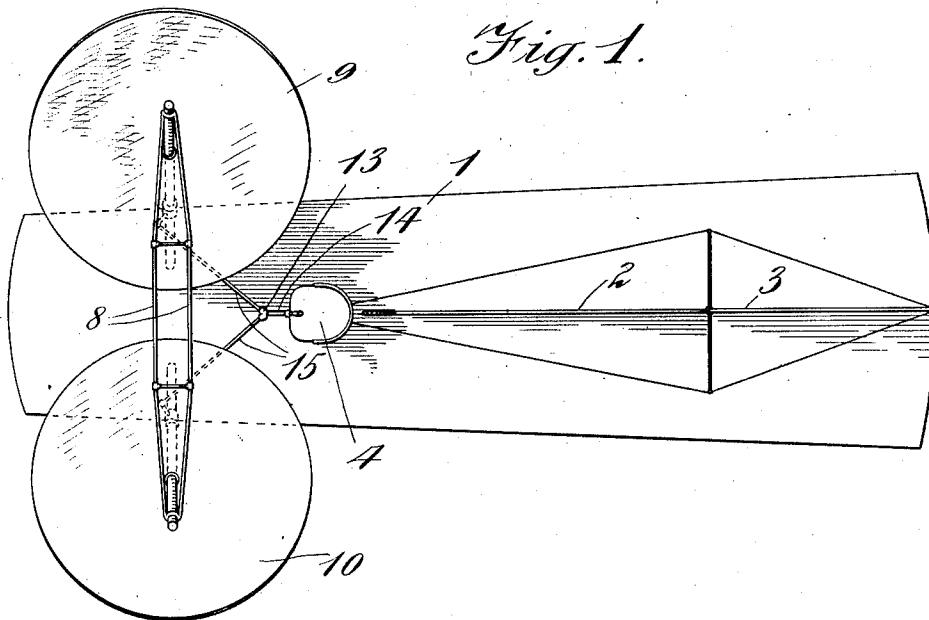


T. WINDEL.
BALANCING AND STEERING PLANES.
APPLICATION FILED AUG. 19, 1909.

964,828.

Patented July 19, 1910.

2 SHEETS—SHEET 1.



WITNESSES:

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Theodore Windel

BY *Gifford & Bull*
his ATTORNEYS

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2 SHEETS—SHEET 2.

Fig. 3.

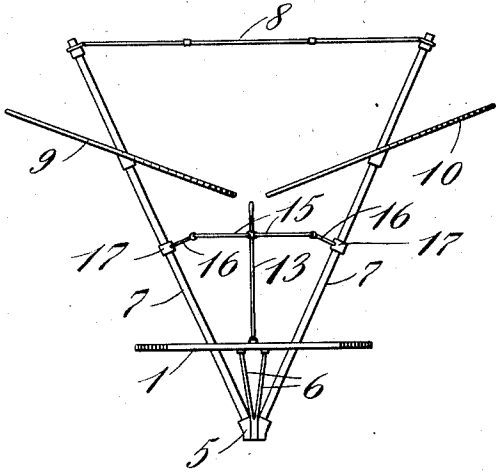


Fig. 4.

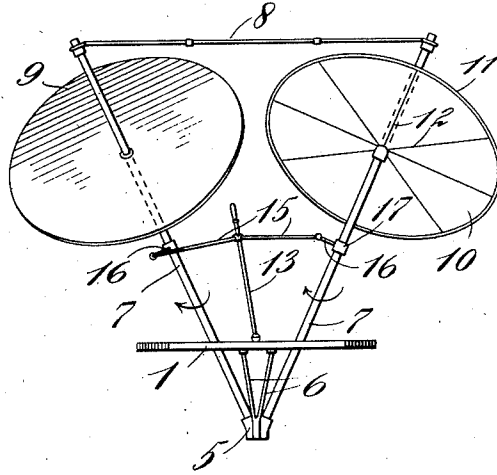


Fig. 5.

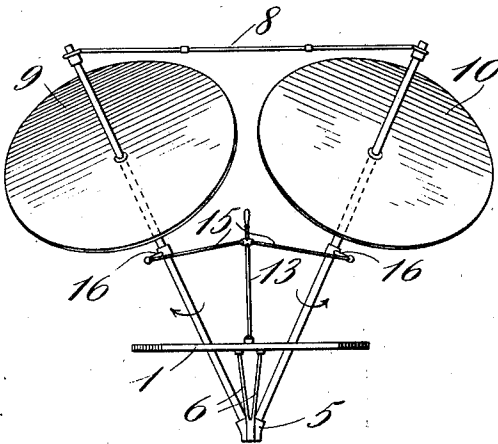
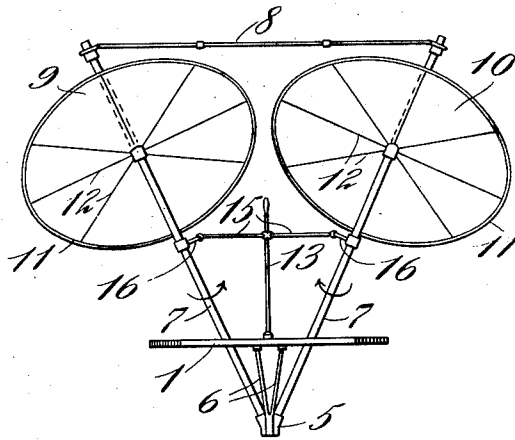


Fig. 6.



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UNITED STATES PATENT OFFICE.

THEODORE WINDEL, OF NEW YORK, N. Y.

BALANCING AND STEERING PLANES.

964,828.

Specification of Letters Patent. Patented July 19, 1910.

Application filed August 19, 1909. Serial No. 513,566.

To all whom it may concern:

Be it known that I, THEODORE WINDEL, a citizen of the United States, and a resident of New York city, borough of Brooklyn, county of Kings, and State of New York, have invented a new and useful Form of Balancing and Steering Planes for Air Conveyances, of which the following is a specification.

10 The object of my invention is to provide balancing and steering means for air conveyances of simple design, construction and operation and capable of operation by the movement of a single lever; the necessity of a number of levers being thereby avoided and the consequent difficulty in the management of the machine being greatly simplified, and the danger of faulty operation and accident being overcome.

20 An air conveyance embodying my invention is provided with planes mounted in a novel manner and fixed with relation to their supports, the supports themselves operating in fixed bearings and being merely 25 rotatable therein.

For the purpose of illustrating my invention, I have shown it in drawings herewith and will hereafter describe the same as embodied in a glider or an air conveyance adapted to be launched from an elevation and provided with no propelling means such as an engine.

My invention is capable, however, of being used in connection with an air conveyance of any desired type without departing from the spirit of my invention which consists in the design, arrangement and operation of parts as set forth in and falling within the scope of the claims hereto appended.

40 In the drawings, like characters of reference denote like parts in all the figures thereof.

Figure 1 represents a plan view of a glider embodying my invention. Fig. 2 represents a side view in elevation of a glider embodying my invention. Fig. 3 represents a front view of a glider embodying my invention; the balancing and steering planes being shown in normal position. 50 Fig. 4 represents a front view, the balancing and steering planes being shown in a position to either direct the course of the glider to the right or to elevate the left hand side of the glider. Fig. 5 represents a front view showing the balancing and steering planes in a position adapted to direct the

course of the glider downward. Fig. 6 represents a front view showing the balancing and steering planes in a position adapted to direct the course of the glider upward. 60

Turning to a detailed description of my invention as embodied in the glider shown in the drawings, 1 denotes the sustaining plane of the glider which is provided in its rear portion with a vertical fin 2 and a vertical rudder 3 attached thereto; the fin and rudder being positioned centrally on top of the sustaining plane extending lengthwise thereof. A seat 4 is provided for the operator. Adjacent the forward end of the glider and beneath the same, a bearing member 5 is suspended from the bracket 6 and rods 7 resting in bearings in said member 5 extend upward through the sustaining plane diverging at equal angles and being connected at their tops by a braced cross piece 8; the rods being capable of revolving in the bearings at their upper and lower ends and in the bearings through which they pass in the sustaining plane. 80

Mounted upon the rods 7 are the balancing and steering planes 9 and 10; said planes being preferably circular and mounted at an angle inclining downward toward the center of the machine. These planes are fast upon the supporting rods and therefore revolve with the rods when the latter are turned. The planes 9 and 10 are preferably formed from a circular steel tube 11 covered with canvas or other suitable material and strengthened with radial wire spokes 12. In front of and adjacent the seat for the operator, a lever 13 is pivoted on the sustaining plane being capable of universal movement at its pivot point. Said lever 13 is connected to the supporting rods 7 by means of a link 14 to which are pivoted rods 15, said rods being connected by pivoted links 16 with collars 17 secured to the rods 7. 100

The operation of my new steering and balancing plane is as follows: The plane 9 being the right-hand plane and the plane 10 being the left-hand plane as viewed from a position in the operator's seat. The normal positions of the planes 9 and 10 is as shown in Fig. 3, both planes inclining inward at equal angles and being flat presenting no resistance as the glider moves forward. The glider moving forward on a level course or inclined upward, should it be desired to depress the front end of the 110

glider to direct its course downward, the lever 13 is pushed forward, the supporting rods 7 being rotated in opposite directions (as denoted by the arrows in Fig. 5) and the planes 9 and 10, moving with rods 7 being brought to a position wherein their front edges are lowered and rear edges elevated, the resistance thus offered to the air serving to direct the course of the glider downward. Such a position of the planes 9 and 10 is shown in Fig. 5, the rods 7 having been rotated a quarter turn; the degree of rotation may, however, be as desired in accordance with the degree of resistance, tending to direct the glider downward, which it is desired to secure.

The glider moving forward on a level course or being directed downward, should it be desired to direct the course of the glider upward, the lever 13 is moved to the rear, the rods 7 and planes 9 and 10 carried thereby being rotated in opposite directions (as denoted by the arrows in Fig. 6) and the planes being brought to a position with front edges elevated and rear edges depressed, as shown in Fig. 6. The resistance offered to the air will then effect an upward movement of the glider, the degree of resistance being as desired and regulated by the degree to which the supporting rods and planes are rotated.

Should (1) the left hand side of the glider be depressed from any cause whatsoever, or should (2) the glider be moving in a curved course to the left, or should (3) the glider be moving forward on a level course, and it be desired (1) to bring the glider to its normal horizontal position or (2) to direct its course straight forward or (3) to direct its course in a curve to the right, the lever 13 is moved forward to the right and then to the rear in a curved path (substantially that denoted by broken line x, x , in Fig. 1) to bring the planes 9 and 10 to the respective positions shown in Fig. 4. Such movement of the lever 13 rotates the rods 7 in the same direction (as shown by the arrows in Fig. 4) the left hand plane 10 being brought to a position with front edge elevated and rear edge depressed; the right hand plane 9 being oppositely operated and the resistance offered by the planes either bringing the glider to a horizontal position, directing its course straight forward, or directing its course in a curve to the right as the case may be. The desired degree of balancing or steering effect is secured and regulated by the degree to which the rods 7 and the planes are rotated; the tendency of the planes to direct the glider in a curved course to the right being offset by a movement of the vertical rudder to direct the

course to the left when it is desired merely to bring the glider to its normal horizontal position while continuing a straight ahead level course.

When (1) the right hand side of the glider is depressed, (2) the glider is moving in a curved course to the right, or (3) the glider is moving forward on a level course, and it is desired (1) to bring the glider to a horizontal position (2) to direct its course straight forward, or (3) to direct its course in a curve to the left, the operation of the lever 13 and movement of rods 7 and planes 9 and 10 will be the opposite of that above described in connection with Fig. 4.

From the foregoing description, it will readily be seen that I have provided a new form and arrangement of balancing and steering planes for air conveyances operable in a novel manner with ease and simplicity and highly effective to gain desired results. The apparatus which I have provided comprises a minimum number of parts the planes being in fixed positions on their supporting rods, the rods being mounted in fixed bearings, and the effective operation of the apparatus being secured simply by the rotation of the rods and planes. It will furthermore be seen that the balancing and steering planes act as sustaining planes, being of especial aid for such purpose when my novel apparatus is used in connection with a glider, aeroplane, or other "heavier than air" conveyances.

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

1. A steering and balancing device of the class described, comprising two rods oppositely inclined at equal angles each rotatable in a fixed position and a plane mounted on each of said rods in a tilted position.

2. A steering and balancing device of the class described, comprising two rods each rotatable in a fixed position and a plane mounted on each of said rods in a tilted position, said planes being tilted at equal opposite angles.

3. A steering and balancing device of the class described comprising two rods oppositely inclined at equal angles each rotatable in a fixed position, and a plane mounted on each of said rods in a tilted position, said planes being tilted at equal opposite angles.

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

THEODORE WINDEL.

Witnesses:

FRANK E. RAFFMAN,
W. A. PAULING.