Nov. 25, 1930. R. H. O'MASSEY 1,782,878

AEROPLANE

Filed Aug. 15, 1929 3 Sheets-Sheet 1

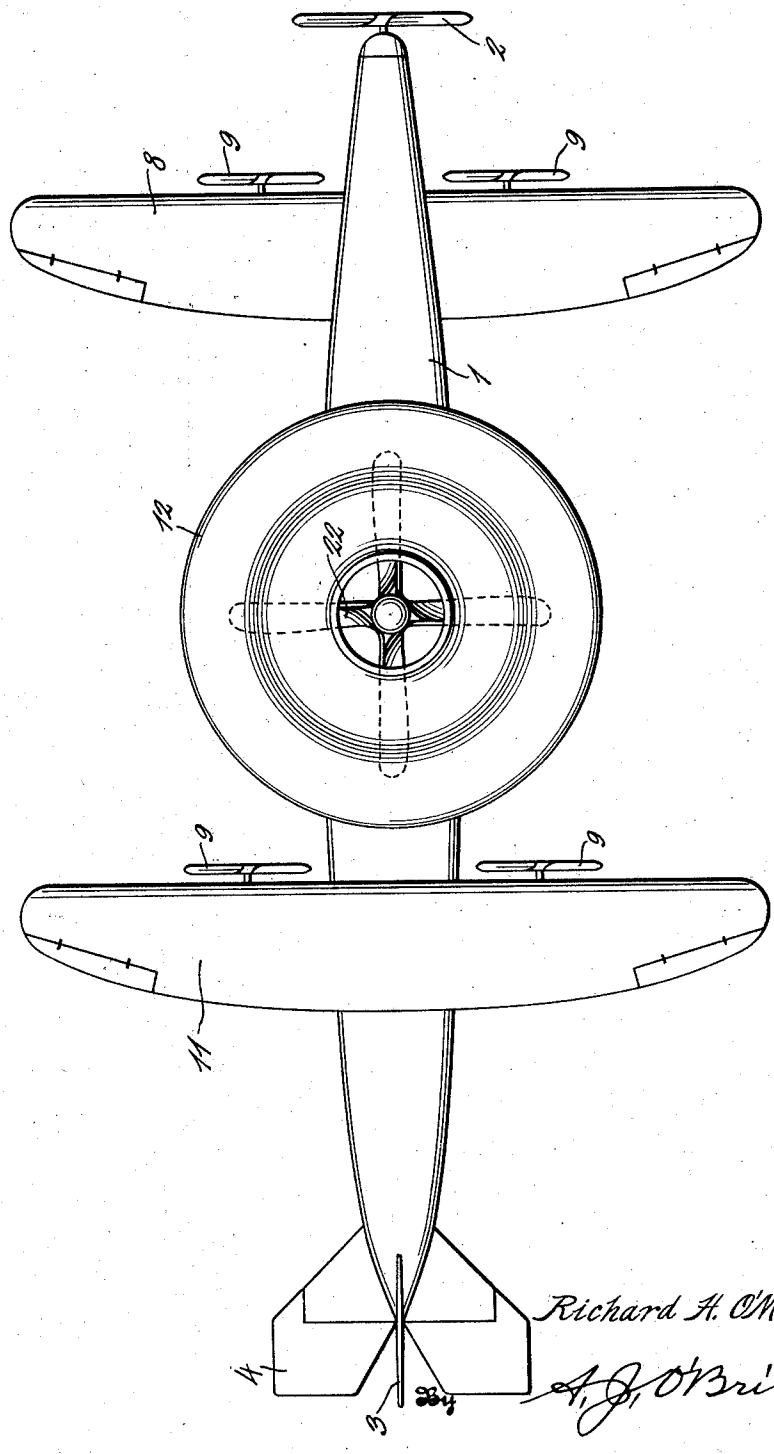


Fig. 1.

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AEROPLANE

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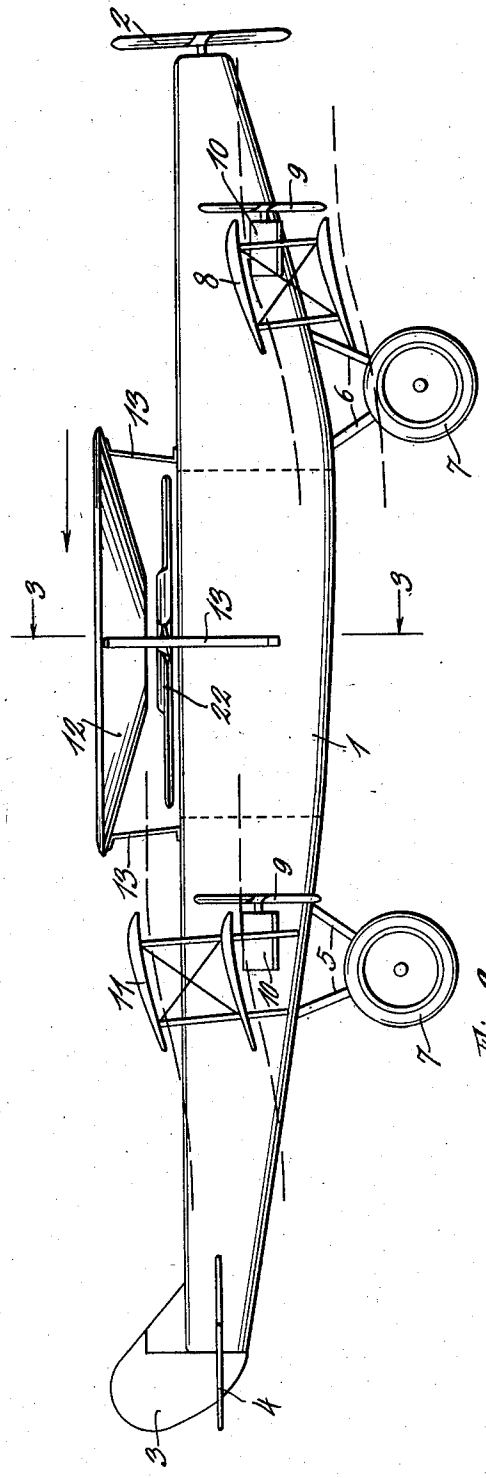


Fig. 2.

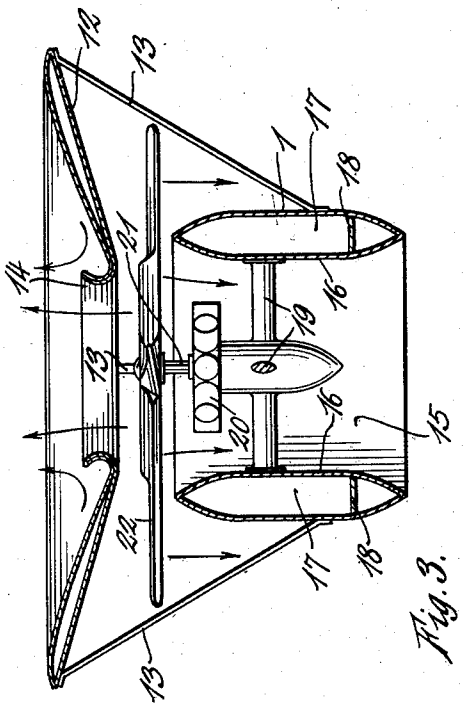


Fig. 3.

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AEROPLANE

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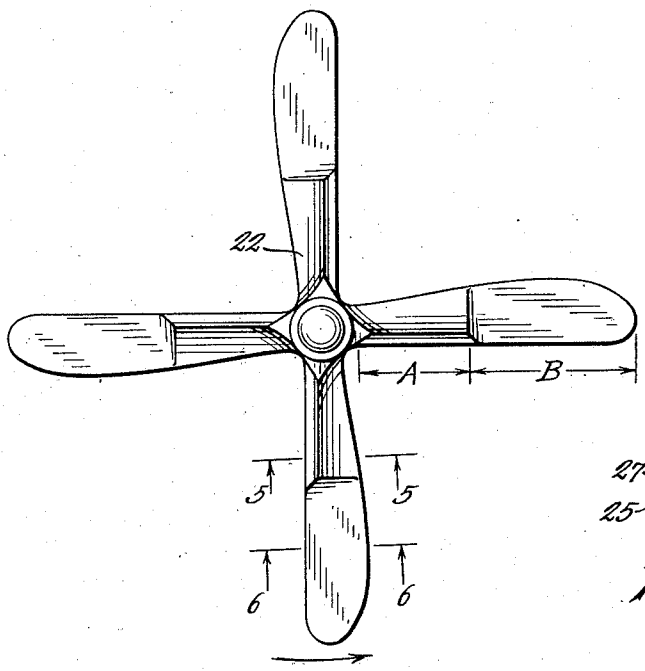


Fig.4.

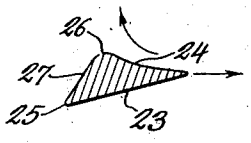


Fig.5.

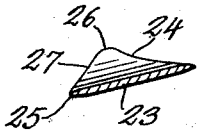


Fig.6.

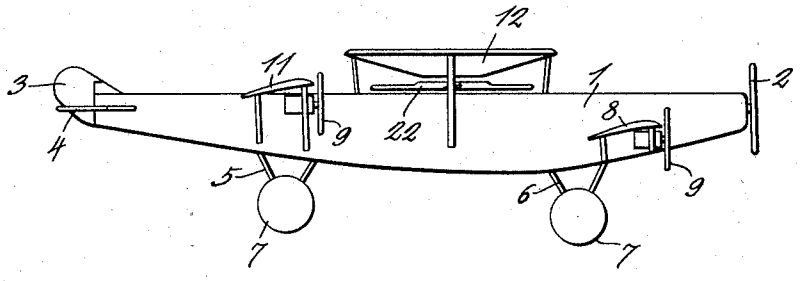


Fig.7.

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UNITED STATES PATENT OFFICE

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AEROPLANE

Application filed August 15, 1929. Serial No. 386,014.

This invention relates to improvements in aeroplanes and has reference more particularly to an aeroplane of the tandem type.

It has been found that tandem aeroplanes have been more or less inefficient, due to the fact that the rear wings, which have usually been located on the same level as the front wings, had to work in the downwash from the front wings and therefore their lifting effect was a great deal less than the lifting effect of the front wings or planes.

It is an object of this invention to produce a tandem aeroplane having a plurality of planes extending from the opposite sides of the fuselage body and spaced longitudinally thereof, and in which the separate sets of planes shall be so located vertically with respect to each other that the rear planes will be located above the downwash from the planes in front and therefore the different sets of planes will be equally effective for lifting.

It is another object of this invention to produce an aeroplane which shall be so constructed that it will rise very rapidly from the ground and which can be slowed down in landing so that it is possible to start and land from a much smaller field than that usually required by aeroplanes of ordinary construction.

It is a still further object of this invention to produce an aeroplane that shall be provided with a combined elevating and stabilizing device which will greatly retard the tendency of the plane to go into a tailspin and into nosedives and therefore make the plane much safer in operation.

The above and other objects that may become apparent as the description proceeds are attained by means of a construction and an arrangement of parts that will now be described in detail, reference for this purpose being had to the accompanying drawings, in which the preferred embodiment of the invention has been illustrated, and in which:

Fig. 1 is a top plan view of a tandem aeroplane constructed in accordance with this invention;

Fig. 2 is a side elevation of my improved aeroplane;

Fig. 3 is a transverse section taken on line 3—3, Fig. 2;

Fig. 4 is a plan view of the dual pitch propeller which is used for producing a direct lift;

Fig. 5 is a section taken on line 5—5, Fig. 4;

Fig. 6 is a section taken on line 6—6, Fig. 4;

Fig. 7 is a side view similar to that shown in Fig. 2, but shows my invention applied to a tandem plane of the monoplane type.

In the drawing reference numeral 1 represents the fuselage which is of ordinary construction and which is provided at its nose with a tractor propeller 2. The rear end of the fuselage is provided with a rudder 3 and rudders 4 which control the up and down movement of the plane. Secured to the bottom of the fuselage are two frames represented by reference numerals 5 and 6 and to the lower ends of which the landing wheels 7 are fastened. In the embodiment shown in Figs. 1 and 2 the aeroplane is of the tandem biplane type, and has secured to each side near the front end, two pairs of biplanes which have been designated by reference numeral 8. A propeller 9 is secured to the planes on each side of the fuselage and are connected with motors 10 by which they are rotated. Secured to the rear of the fuselage is another assembly of biplanes, in which the lower plane extends outwardly at a point which is slightly above the top of the upper plane in the front assembly and the upper plane of the rear plane assembly, which has been designated by reference numeral 11 extends entirely across the fuselage in the manner shown in Fig. 1.

In addition to the vertically spaced arrangement of the plane assembly, my improved aeroplane is provided with an elevator which has been indicated by reference numeral 12 and which is located above the fuselage at a point substantially midway between the two sets of planes, or perhaps, more definitely speaking, it is located above the center of mass of the entire plane. This elevator is secured to the fuselage by means of supports or braces 13 which have been more or less diagrammatically indicated in the drawing. This elevator is preferably circu-

lar and has its upper surface inwardly and downwardly inclined so as to form a concave surface at the top. The under surface is convex. The elevator is provided with a central opening bounded by an upturned central flange 14. The elevator is formed in the usual approved manner of aeroplane construction and is quite rigid but the specific details of its construction have not been shown. Directly below the opening in the elevator, the fuselage is provided with a central opening, which has been indicated by reference numeral 15. The side walls 16 of this opening are spaced a short distance from the inside of the outer walls of the fuselage so as to provide passages 17 through which passengers may go from the front opening to the rear thereof. The floors 18 being located a short distance above the lower ends of the passages. The upper and lower ends of the double walls surrounding opening 15 are pointed so as to give a stream line effect. Secured to the walls 16 are brackets 19 on which a whirlwind motor 20 is supported. The driveshaft 21 carries a dual pitch propeller 22. This propeller has been shown in detail in Figs. 4, 5 and 6, from which it will be seen that it consists of four blades making an angle of ninety degrees with each other, and each blade is formed of two sections or parts, the inner of which has been designated by letter "A" and the outer by "B". Section "A" has been shown in transverse section in Fig. 5 from which it will be seen that the lower surface 23 is downwardly and rearwardly inclined, while the upper surface is upwardly and rearwardly inclined. The upper surface, which has been indicated by 24 is dish-shaped, or concave so that when the propeller is rotating it will impart to the air an upward direction in the manner indicated by the arrow in Fig. 5. Each propeller blade has a rear edge 25 that is connected with the upper point 26 by means of an inclined surface 27, so as to give a stream line effect and thereby prevent the formation of a vacuum at the rear of the blade. It will be seen from Figs. 4, 5 and 6, that when the propeller is rotated, in a counterclockwise direction, as indicated by the arrows, that the inclined curved surface 24, will cause the air to be directed upwardly, and as this part of the propeller is located directly beneath the opening in the elevator, it will produce a flow of air upwardly in the direction of the arrow in Fig. 3, and at the same time, the under surface of the propeller will produce a downward flow of air, part of this downwardly flowing air will pass through opening 15, and part will pass downwardly along the outside of the fuselage, in the manner indicated in Fig. 3. When the aeroplane is in motion, there is a strong current of air flowing rearwardly above the elevator 12, and, therefore, the stream of air that flows upwardly through the opening in the elevator, will be turned rearwardly when it joins with the air currents above the impeller and the action of these two streams of air will form a low air pressure above the elevator and at the same time the air that strikes the under surface of the elevator will produce an increased air pressure on the lower side and the effect of this unbalanced air pressure on the upper and lower sides of the elevator, produces the lifting effect that is very effective in assisting the aeroplane to rise from the ground, and also makes it possible to greatly slow down the speed in landing and therefore, the effect of this elevator, is to make it feasible to rise from and land on much smaller fields than would be possible without this additional feature.

The elevator besides being of great use in starting and landing, has also a great stabilizing effect, as it produces an action similar to that which would be produced by a balloon or other body lighter than air, and therefore it has a tendency to prevent nose-dives and tailspins, and this makes it much safer for travel than if it did not have this additional feature.

In Figs. 1 and 2 I have shown my aeroplane as having two or more sets if biplanes, but it is equally well adapted to tandem planes of the monoplane type, such as shown in Fig. 7.

Although the invention has been shown and described in connection with a tandem aeroplane, it is equally well adapted for use with the ordinary plane construction as the elevator can then be located nearer the front of the fuselage, as the center of gravity naturally would be nearer the front on a shorter fuselage and I therefore do not want to limit myself to the use of the elevator and direct lift propeller in connection with a tandem aeroplane but consider that my invention covers the use of this additional feature in combination with aeroplanes of any specific type.

I want to call particular attention to the dual pitch propeller which, I believe, is entirely new, and which when employed in the combination shown, produces new and useful results, and which imparts to the aeroplane a stability which is of great practical importance.

Having described the invention what I claim as new is:

1. A tandem plane having an elongated fuselage, oppositely extending planes secured to the fuselage and spaced longitudinally thereof, the fuselage having a vertical opening located between the first two sets of planes, an elevating propeller located above the opening and rotatable about a vertical axis, and an elevating surface located above the elevating propeller, said surface having an opening concentric with the propeller.

2. An aeroplane having an elongated fuselage provided with a vertical opening, planes extending from opposite sides of the fuselage, a substantially circular elevator located above the opening in the fuselage, said elevator being concave on its upper side and convex on its under side and provided with a central opening, a propeller located between the fuselage and the under surface of the elevator, and means for rotating the propeller.

3. An aeroplane having an elongated fuselage provided with a vertical opening extending from the top to the bottom thereof, a dual pitch propeller located above the upper end of the opening and rotatable about an axis substantially coincident with the axis of the opening, means for rotating the propeller, an elevator located above the propeller, said elevator being concave on its upper side and convex on its lower side, means for securing the elevator to the fuselage, the elevator having a central opening concentric with the propeller, the opening having a wall that extends upwardly and forms a cylindrical flange, and a tractor propeller secured to the nose of the fuselage.

4. In an aeroplane having an elongated fuselage provided at its front end with a tractor propeller, at its rear end with horizontal and vertical rudders and on its sides with tandem planes located at different vertical levels, a direct lift propeller located above the fuselage and between the first two sets of planes, the fuselage having an opening directly beneath the propeller, an elevator located above the direct lift propeller, said elevator having its under surface convex and its upper surface concave and means for rotating the propeller.

5. In an aeroplane having a fuselage provided at its front end with a tractor propeller and having planes extending outwardly from its sides, an elevator surface located above the fuselage at a point substantially over the center of mass of the aeroplane, said elevator having a central opening, the upper surface of the elevator being concave and provided about the opening with an upwardly extending flange, the lower surface of the elevator being convex, a propeller located between the fuselage and the elevator, said propeller being mounted for rotation about a vertical axis, the fuselage having an opening directly below the propeller, and means for rotating the propeller, the blades of the propeller having two different pitches, that part adjacent the center being curved to blow air upwardly through the opening in the elevator surface and the outer ends being curved to blow air downwardly.

6. In an aeroplane having an elongated fuselage provided with laterally extending wings and with a vertical opening, a circular elevator located above the opening and secured to the fuselage, the upper surface of the elevator being concave and the lower surface convex, the elevator having a central opening which is bounded by a flange that projects above the upper surface of the elevator, a dual pitch propeller located between the fuselage and the elevator, said propeller being rotatable about a vertical axis, the outer ends of the propeller blades directing the air downwardly and the central portions directing the air upwardly.

In testimony whereof I affix my signature.

RICHARD H. O'MASSEY.