Oct. 24, 1933. W. DARBYSON 1,931,753

AEROPLANE

Filed June 23, 1932 2 Sheets-Sheet 1

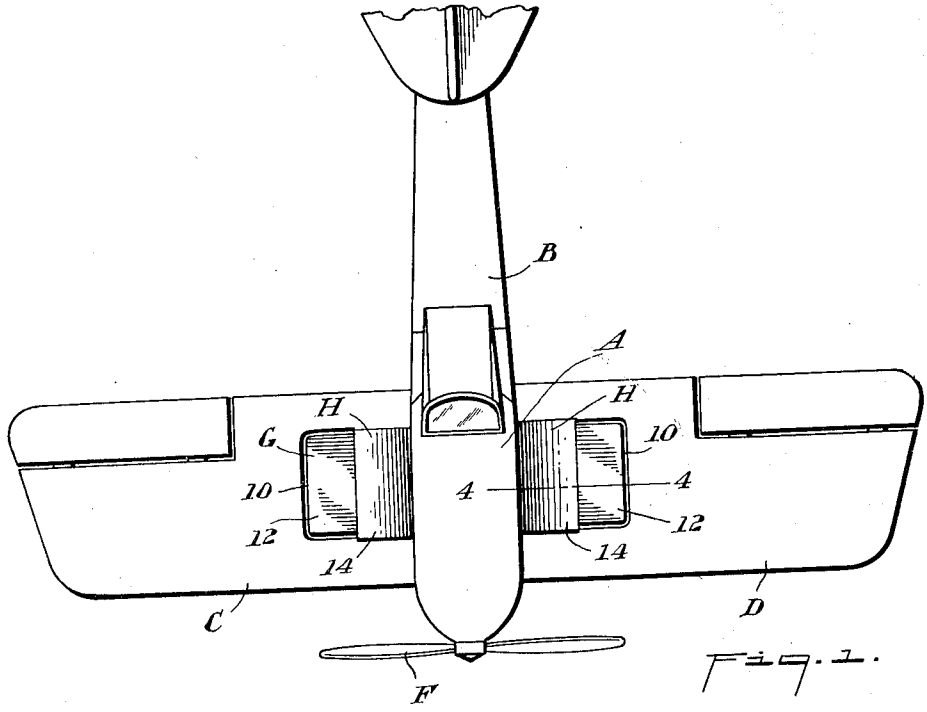


Fig. 1.

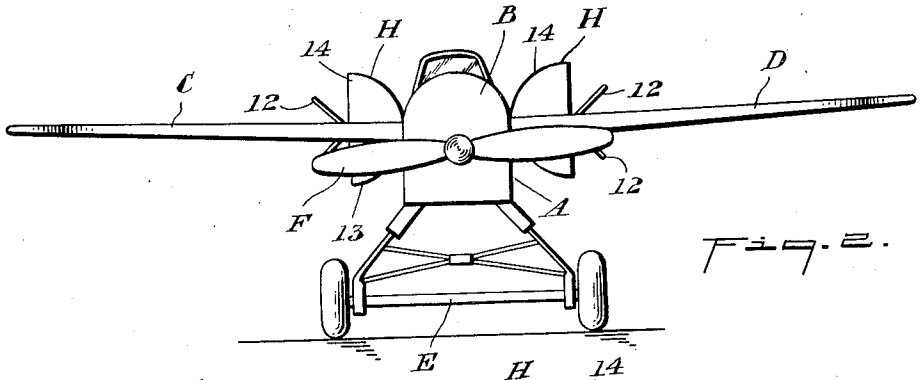


Fig. 2.

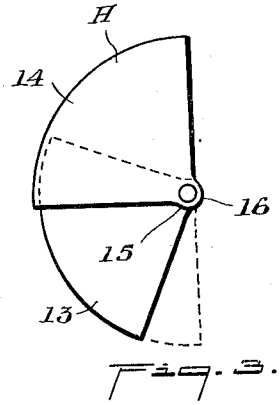


Fig. 3.

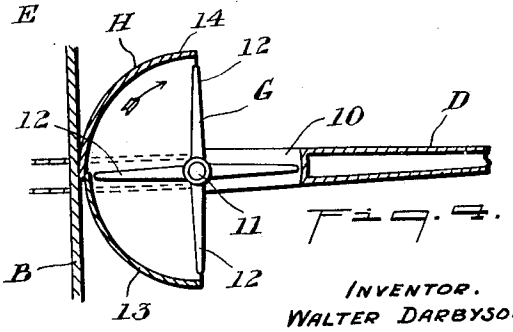


Fig. 4.

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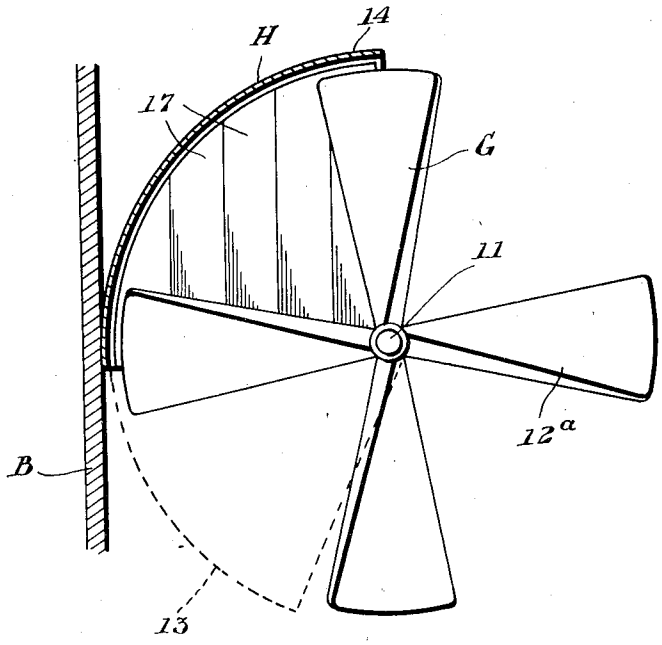


Fig. 5.

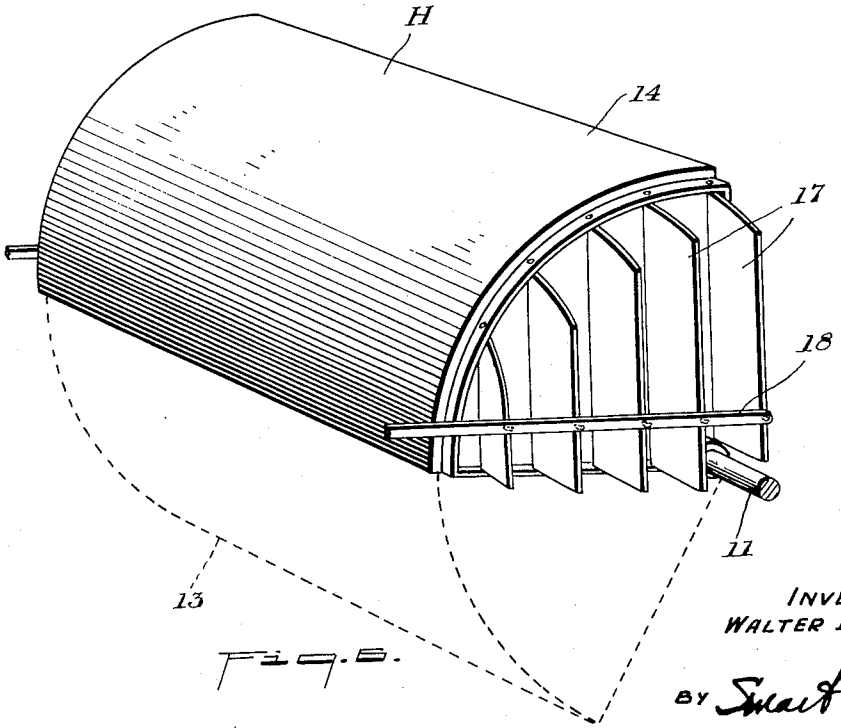


Fig. 6.

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Patented Oct. 24, 1933

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UNITED STATES PATENT OFFICE

1,931,753

AEROPLANE

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Application June 23, 1932. Serial No. 618,904

4 Claims. (Cl. 244—18)

This invention relates to improvements in aeroplanes, and the objects of the invention are to provide a novel form of vertical lift with increased stability and a provision for forward propulsion. Further objects of the invention are to combine the elevating or lifting means with the supporting plane to obtain an economy of space, reduced air resistance and greater stability. Further objects still are to provide for adjustment in the amount of vertical lift and to enable the lifting mechanism to be applied if desired to effect or augment the forward propulsion.

Further objects of the invention are generally to improve and simplify the construction of the device and better to adapt it to perform the functions required of it.

In its construction the invention includes a rotor having lifting blades thereon, an enclosing casing for the rotor adapted partially to screen the blades, the extent of such screening being adjustable, this casing extending on opposite sides of the supporting plane whereby the air propelled by the blades is drawn from one side of the plane and discharged on the other. The rotor blades may be set to provide, if desired, for forward propulsion, and regulating or controlling means may be provided to control the amount of air used for lifting or forward propulsion. The construction is fully set forth and described in the accompanying specification and drawings.

In the drawings Figure 1 is a plan view of an aeroplane having the invention embodied therein.

Figure 2 is a front elevation of the same.

Figure 3 is a detail in elevation showing the adjustable casing.

Figure 4 is a cross-sectional detail of the adjustable casing taken on a line 4—4 of Figure 1.

Figure 5 is a sectional elevation showing a modified form of rotor.

Figure 6 is a perspective detail showing controlling vanes for the casing.

In the drawings like characters of reference indicate corresponding parts in all the figures.

Referring to the drawings, A indicates an aeroplane of any approved design having the usual fuselage B, supporting wings C and D, under carriage E, and propeller F, the latter connected to a suitable engine not shown. The present invention may be adapted to any of the usual type of aeroplanes, and particularly to monoplanes the general construction of which does not form part of the present invention which relates particularly to the lifting means hereinafter described.

In accordance with the present invention lifting means are provided in association with each of the planes C and D, these lifting means including rotors G mounted in balanced relation in suitable openings 10 in the wings adjacent to the fuselage, the shafts 11 of the rotors being suitably journalled in the wings, being connected to and driven either from an independent motor or by gearing from the main motor and engine which drives the propeller F.

Each rotor carries a plurality of lifting blades 12, four being shown, which blades may be set parallel with the axes of the shafts 11 when it is desired to utilize them only for lifting, or may be spiralled or set at an angle as shown in Figure 5, when it is desired that the rotor should assist or provide for the forward propulsion of the aeroplane. The shafts 11 extend substantially horizontally parallel to each other and parallel to the axes of the main propeller.

In order to avoid the downward reaction as the blades 12 move upwardly, casings H are provided screening part of the rotors and blades. These casings may be conveniently semi-cylindrical in form, their inner periphery fitting close to but not in contact with the edges of the blades, the casings being so set that substantially half of each casing extends on the upper and half on the lower side of the supporting plane or wing, the casing thus having an opening on each side of the plane so that the blades in the casing will draw air in at one side and discharge it out on the other side of the wing.

In order to provide for adjustment of this screening action the casing H may conveniently be made in two adjustable segmented sections, as shown in Figure 4. These two sections 13 and 14 are adapted to collapse or telescope over each other, and each have the end open, and are supported by arms 15 from bearings 16 mounted on the shafts 11. The casings may be held in adjusted position with respect to each other by any convenient means. Conveniently the upper half 14 of the casing may be fixed in position while the lower half 13 is adjustable. Its position may be readily controlled from a distance by means of a suitable hand lever with connecting links or rods.

Forward propulsion of the aeroplane may generally be obtained by the main propeller F, but if desired auxiliary propellers may be mounted on the shafts 11, or the blades of the rotor G may be made in spiral form or set at an angle shown in 12*a* in Figure 5. When this form of construction is employed it will be found desirable to control the forward propulsion by means of

pivoted louvers 17 mounted at the end of the casing H, whose position is controlled by an adjusting rod 18 pivotally connected to each of the louvers, whose position may be adjusted and held in a desired adjusted position by any convenient mechanism.

It will be seen that as the lifting means are located in the wing itself they may be readily installed in an aeroplane of the low-wing type and will not add to the vertical height of the plane. I find it preferable to locate the shafts 11 substantially in the plane of the supporting wings, but if it is desired they may be located a short distance below provided that there are openings in the wings through which the lifting force may be exerted. It is obvious that if desired the shafts 11 might also carry propellers to assist in the forward movement.

During operation of the rotors G the downwardly moving blades 12 exert a lifting force and at the same time the air propelled by the blade on one side and drawn in at the other will effect a further lifting force, the amount of both such forces being controllable by adjusting the casing to vary the screening action thereof. The adjustment of this screening action also enables the plane to be stabilized by independently varying the lift on either side. By reason of the screening action of the casing on the rising blades of the propellers these blades are prevented from exerting an upward force with a downward reaction, and in consequence the action of the rotors is to produce a net upward reaction. In the forms shown in Figures 5 and 6 it is possible by adjusting the vanes 17 to regulate the division of power between the lifting force and forward propulsion.

Various modifications may be made in the invention without departing from the spirit thereof or the scope of the claims and, therefore, the exact forms shown are to be taken as illustrative only and not in a limiting sense, and I desire that only such limitations shall be placed thereon as are imposed by the prior art or are specifically set forth in the appended claims.

What I claim as my invention is:—

1. In an aeroplane a supporting plane, a rotor having lifting blades thereon, and an enclosing casing for the rotor formed in upper and lower telescoping sections adapted partially to screen the blades and extending on opposite sides of the plane whereby the air propelled by the blades is drawn from one side of the casing and discharged on the other and means for moving the lower section of the casing to increase or reduce the screening effect on the lower part of the rotor.

2. The device as claimed in claim 1 in which the lifting blades are set in an angle in order to give horizontal propulsion as well as a lifting force and means is provided for leaving the ends of the upper section of the casing open or shut including means for operating the latter mentioned means.

3. In an aeroplane a supporting wing having an opening therein, a rotor mounted in the opening and having lifting blades thereon, a semi-cylindrical enclosing casing formed in upper and lower telescoping sections adapted partially to screen the rotor and extending above and below the wing, whereby the air propelled by the blades is drawn in on one side of the plane and discharged on the other, the upper section of the casing being fixed to the aeroplane within said opening, the lower section of said casing being movably mounted and means for moving the lower section of the casing to increase or reduce the screening effect on the lower part of the rotor.

4. In an aeroplane, a supporting plane, a rotor having angularly set lifting blades thereon, an enclosing casing formed in upper and lower telescoping sections adapted partially to screen the blades and extending on opposite sides of the plane whereby the air propelled by the blades is drawn from one side of the plane and discharged on the other, the upper section of said casing being fixed to extend above the plane, the lower section being movably mounted, means for moving the lower section of the casing to increase or reduce the screening effect on the lower part of the rotor below the plane and means in connection with the upper section of said casing for opening the ends thereof whereby said rotor functions as a propelling medium.

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