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AIRCRAFT AND SCREW PROPELLER THEREFOR

Original Filed April 6, 1926

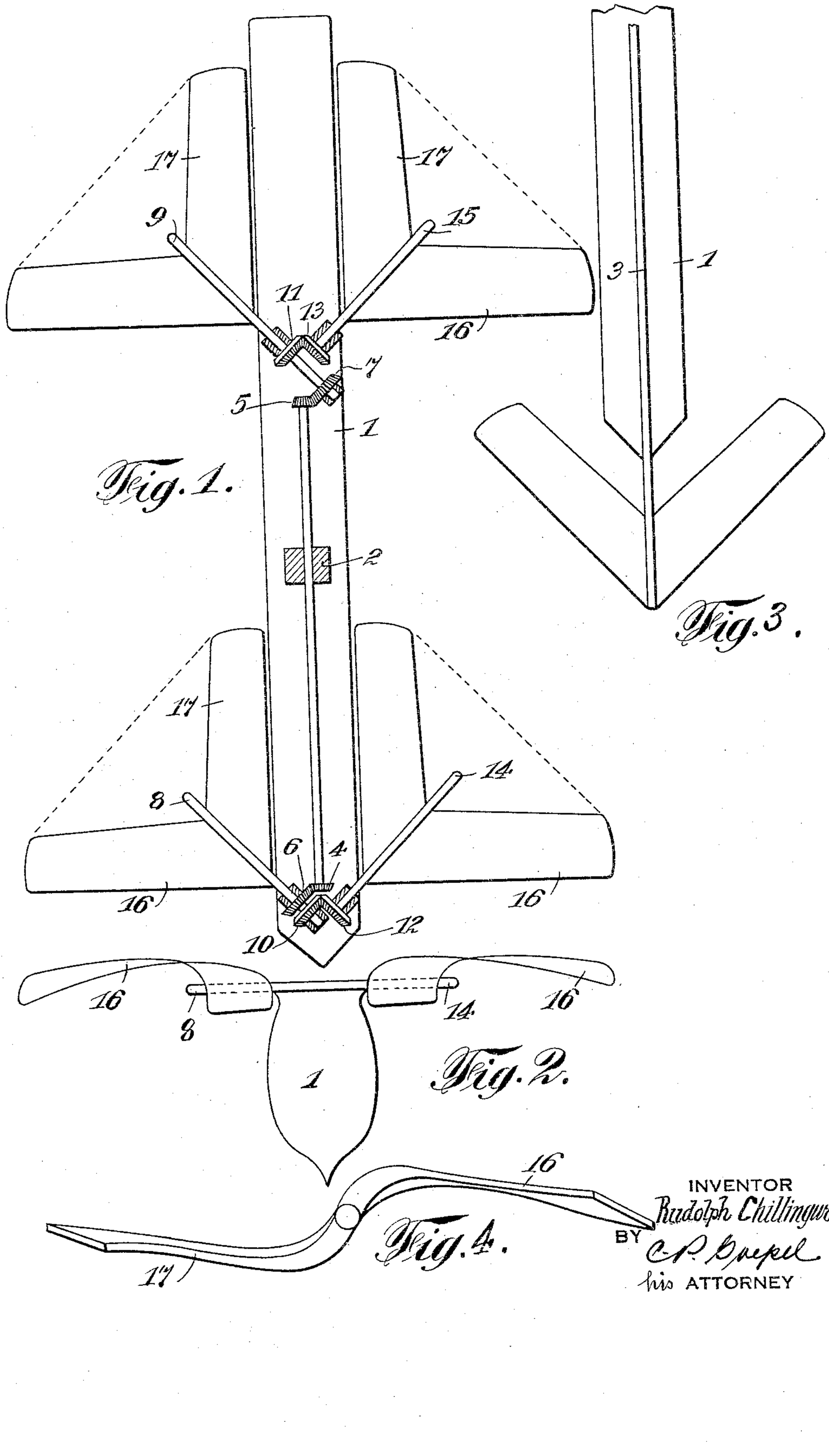

Fig. 1.

Fig. 3.

Fig. 2.

Fig. 4.

INVENTOR
Rudolph Chillingworth
BY C. P. Goepel
his ATTORNEY

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RUDOLPH CHILLINGWORTH, OF BROOKLYN, NEW YORK

AIRCRAFT AND SCREW PROPELLER THEREFOR

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This invention relates to improvements in aircraft and propellers therefor, which latter are of the type in which the blades describe the surface of a cone of substantially 90° angle in their rotation.

A propeller for ships is known in which the blades describe a conical surface, a pair of such propellers being arranged on shafts inclined at 45° to the longitudinal axis of the ship.

In the propeller of the present invention a pair of blades lie substantially in the plane of the driving shaft, and they have their bounding edges, when viewed in plan, and their inner bounding edges when viewed in plan substantially at right angles to one another, and at 45° to the said driving shaft.

The present application is a division of my application for Letters Patent of the United States, filed April 6, 1926, Serial No. 100,100, for aircraft and screw propellers therefor.

The invention is shown diagrammatically in one of its forms of construction in the drawing which shows respectively:—

Figure 1—an aeroplane, with two pairs of propellers fixed one behind the other, in plan view.

Figure 2—an end elevation of the aeroplane shown in Fig. 1.

Figure 3—an aeroplane with a front propeller.

Figure 4—the view of a propeller in the plane of the blades.

The aeroplane fuselage 1 is constructed in any suitable form and manner, and contains a longitudinal shaft 3, rotated directly by the driving motor 2, which shaft carries bevel wheels 4 and 5 one each on the forward and rear end. Each of the bevel wheels 4 and 5 acts respectively on shafts 8 and 9 in a horizontal plane with respect to the longitudinal axis of the aeroplane and arranged at 45° to the rear and mounted in the body of the aeroplane. Each of these shafts 8, 9 bears a second bevel wheel, 10 and 11 respectively, which engages with a bevel wheel, 12 and 13 on a second shaft 14 and 15 extending rearwards from the other side of the fuselage at the same angle and in the same plane.

The fuselage is thus fitted with four shafts 8, 9 and 14 15, driven from the same source of power, extending to the rear at an angle of 45° in the horizontal plane relative to the longitudinal axis of the fuselage. On each of these shafts a propeller is fitted, which consists of two blades 16 and 17 at right angles to one another and which are so fitted with respect to the driving shaft that this bisects the right angle between the two blades.

The propeller blades are thus at an angle of 45° to the driving shaft. In the selected form of construction, the shafts are driven and the blades are fixed on the shaft. The blades can however also be arranged to be rotatable on their shafts or axes and in this case the blades are driven and the axis is stationary. The axis of rotation of the propeller can also be inclined at an angle of about 45° to the longitudinal axis of the craft and bear the blades on this inclined end.

Each propeller can be provided with a single blade, which is also at an angle of 45° to its axis of rotation, instead of two blades.

The propellers may be arranged singly or in pairs on each side of the fuselage, and their number is unlimited. It is also possible to arrange a plurality of propeller blades, of the kind described, one behind the other on a single shaft.

It is possible to arrange the propellers not only in the front as shown in Fig. 3 for example, or at the rear of the aeroplane, but they can also be fitted at the side of the fuselage and in very close proximity thereto.

If the propellers on one side of the fuselage are given a greater or smaller rotational velocity than those on the other side, a steering to one side is effected, while if the forward propellers are given a greater or less rotational velocity than the rear ones an elevation is produced. The different velocities of rotation of the separate propellers are easily obtained by means of a differential gearing or other device. The propellers can also be completely put out of use on one or the other side of the fuselage or at the front or rear end, in order to obtain a powerful and quick acting steering effect.

The axes of rotation of the propellers need not be inclined relative to the fuselage, but

can each assume any suitable position with respect thereto. The blades can be made resilient or yielding at their ends by means of slits or other devices, so as to attain a greater efficiency.

The new type of propeller can be used for aeroplanes, airships, and the like, of various kinds. A plurality of supporting bodies with suitably arranged propellers can be connected in one system, or these propellers could be fitted on horizontal or vertical rotatable supporting bodies or axles.

The construction of the blades thus unites the action of the supporting planes with the previous usual propellers and renders possible simultaneous vertical and horizontal steering.

From an examination of the drawing it will be seen that each blade of the improved propeller is curved upwards from the boss out of its median plane, and then downwards at the tip towards the median plane.

Further each blade is slightly twisted about its own axis from boss to tip.

While the invention has been illustrated and described with some degree of particularity, it is realized that in practice various changes and alterations may be made therein, and further that the invention is capable of embodiment in many different types of air craft. It has been sought herein to illustrate only such embodiments as will suffice to exhibit the character of the invention. Reservation is, therefore, made to the right and privilege of changing the form of the details of construction or otherwise altering the arrangement of parts without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. An airship having a plurality of propellers with their axes of rotation diagonal to the longitudinal axis of the airship; said axes intersecting said longitudinal axis from opposite directions, the blades of each propeller being diagonal to the axis of rotation thereof, the blades of each propeller at times being parallel with said longitudinal axis and at times perpendicular thereto; the propeller on one side of the longitudinal axis thereof upon rotation being adapted to actuate the opposite propeller.

2. In air airship, a fuselage, a drive shaft coincident with the longitudinal axis of said fuselage, means for actuating said shaft, a pair of propellers with their axes of rotation inclined to said shaft, and a support for said propellers, one of said propellers being driven by said shaft and having means thereon for actuating the other propeller whenever the first propeller is driven, said propeller comprising blades having their longitudinal axes at 45° to the axis of rotation of the blades, with the apices of said angles directed towards the longitudinal axis of the fuselage, and having the bounding edges of the blades substantially parallel and the edges of one blade forming right angles with the edges of the other blade, the blades upon the rotation of the propeller shaft being movable alternately to a position parallel with the longitudinal axis of the fuselage and to a position at substantially 90° to the longitudinal axis of the fuselage.

3. An aircraft including a fuselage, a pair of propellers lying substantially in the plane of the driving shaft and on each side of its longitudinal axis thereof, and each having its outer bounding edges when viewed in plan and its inner bounding edges when viewed in plan substantially at right angles to one another and at 45° to said driving shaft, a driving shaft for the propellers on one side of the shaft, and means on said propellers for actuating the other propellers on the other side of the shaft when driving the first pair.

4. In an airship, the combination with a fuselage having a drive shaft coincident with the longitudinal axis of the fuselage thereof, of a propeller whose axis of rotation is inclined at substantially 45° with respect to said drive shaft, said propeller being driven by said shaft, and another propeller also inclined with its axis of rotation at 45°, said latter propeller being actuated by the movement of the first propeller, said propeller comprising blades having their longitudinal axes at 45° to the axis of rotation of the blades, with the apices of said angles directed towards the longitudinal axis of the fuselage, and having the bounding edges of the blades substantially parallel and the edges of one blade forming right angles with the edges of the other blade, the blades upon the rotation of the propeller shaft being movable alternately to a position parallel with the longitudinal axis of the fuselage and to a position at substantially 90° to the longitudinal axis of the fuselage.

5. In an airship, a drive shaft, a pair of propellers at the front and a pair of propellers at the back thereof, each pair of said propellers having their axes of rotation diagonal with respect to the longitudinal axis of the shaft, the edge of one of the blades of said propellers being alternately parallel, while the edge of the other blade is perpendicular to the longitudinal axis of the driving shaft being driven by said shaft, and in turn adapted to drive the propellers on the other side of said shaft.

6. An aircraft, including a fuselage, a driving shaft coincident with the longitudinal axis of said fuselage, means for driving said shaft, and a pair of oppositely disposed propellers on each side of the said shaft and having their axes of rotation inclined to that of the shaft at an angle of 45°, the blades of said propellers having their longitudinal axis disposed successively at right angles and per-

pendicular to the longitudinal axis of the drive shaft when they are in motion.

7. An airship having a longitudinal axis, propellers at opposite sides thereof, having shafts at substantially 45° to the longitudinal axis, the blades of the propellers having longitudinal axes at substantially 45° to the propeller shafts, and means connecting the propeller shafts to cause the rotation of one propeller by the other.

8. In an aircraft, a blade supporting shaft at an angle of substantially 45° to the longitudinal axis of the aircraft, blades on said shaft having each of their longitudinal axes at an angle of substantially 45° to said blade supporting shaft and said axes being themselves at right angles to each other, the blades having opposite bounding edges substantially parallel with each of their longitudinal axis, said blades being movable alternately to a position parallel with the longitudinal axis of the aircraft and to a position at substantially 90° to the longitudinal axis upon the rotation of the blade supporting shaft, the acute angles formed by the longitudinal axes of the blades with the blade supporting shaft having their apices directed to the longitudinal axis of the aircraft on the line of the blade supporting shaft.

In testimony that I claim the foregoing as my invention, I have signed my name hereto.

RUDOLPH CHILLINGWORTH.