Oct. 12, 1937. C. DORNIER 2,095,734

ROTOR FLYING MACHINE

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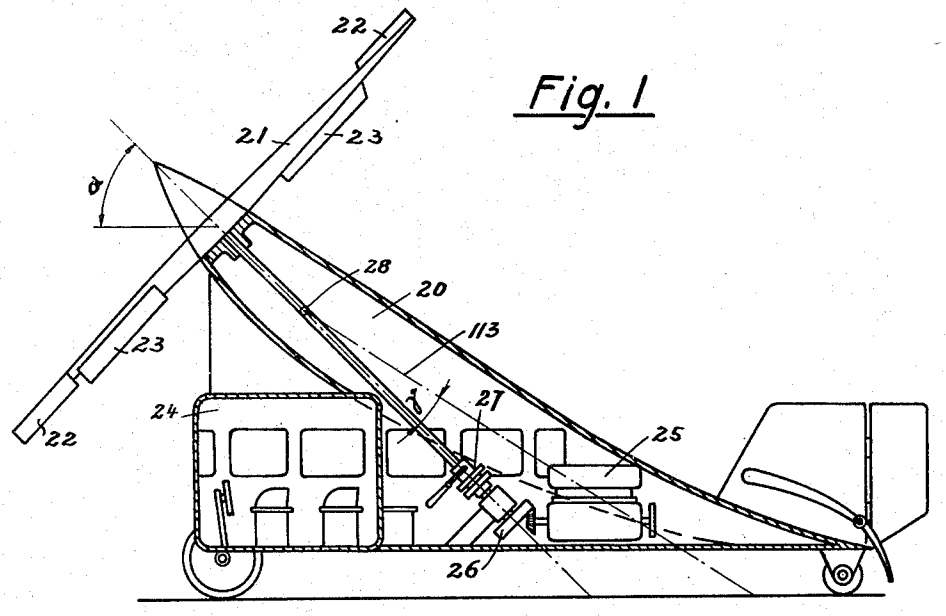


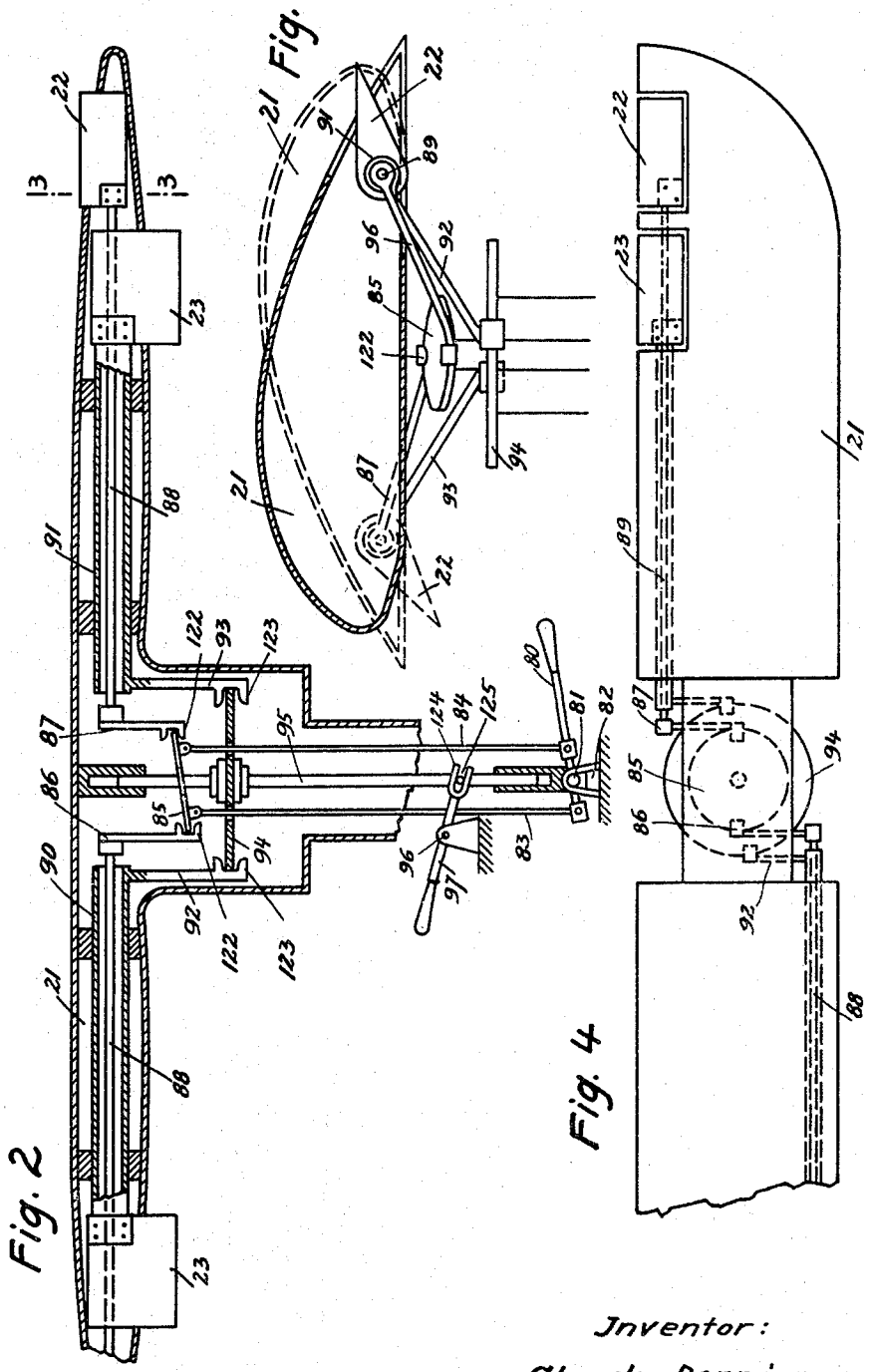
Fig. 1

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ROTOR FLYING MACHINE

Claude Dornier, Friedrichshafen-on-the-Bodensee, Germany

Application November 11, 1935, Serial No. 49,301
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6 Claims. (Cl. 244—17)

This invention relates to a flying machine, more particularly to a flying machine having, instead of stationary wings mounted to a fuselage, a system of rotating wings, hereinafter shortly called "rotor", adapted to move the machine horizontally, vertically, or on an inclined course. Instead of one rotor, I can employ a plurality of rotors having parallel axes, for example, in connection with large flying machines. The rotors are power driven but can be disconnected from the source of power, for example, when the machine descends.

An object of the present invention resides in the provision of a flying machine having only one power driven means for actively propelling the machine in a horizontal as well as in a vertical direction.

A further object of this invention resides in the provision of a flying machine having only one power driven means for actively propelling the machine in a horizontal as well as in a vertical direction, said power driven means having an axis of rotation which is inclined when the machine is in normal position on the ground and in the air.

Another object of the present invention is to provide a lifting and propelling rotor system for flying machines assuring utmost ease in operation and air-cushioned vibrationless motion.

A further object of this invention is the provision of a flying machine having propelling means, the axis of rotation of which is inclined when the machine is in normal position on the ground and in the air, and having novel adjustable means for assuring best equilibrium and balancing conditions.

According to the present invention, I provide flaps on the rear edges of the wings or auxiliary wings at the end of the main rotating wings, the position of said flaps and/or wings being automatically controlled so that the work of each rotating wing periodically changes during each revolution; the extent of this change can be adjusted as will be described later. Rotary systems of this type greatly assist the tail unit at the rear end of the fuselage with respect to maintaining the flying machine in properly balanced condition.

Further and other objects of the present invention will be hereinafter set forth in the accompanying specification and claims and shown in the drawings which, by way of illustration, show what I now consider to be a preferred embodiment of my invention.

In the drawings:

Fig. 1 is a part sectional longitudinal view of a flying machine according to my invention.

Fig. 2 is a longitudinal part cross sectional view of a wing system according to my invention showing the mechanism for adjusting the wing control surfaces in particular.

Fig. 3 is a transverse part cross sectional view substantially along line 3—3 of Fig. 2.

Fig. 4 is a top view of a rotating wing system according to my invention.

Referring more particularly to Fig. 1 of the drawings: 25 represents the main driving motor which is arranged in the rear of the room for the passengers and freight and stands on a plane common with the floor plane of said room. The body 20 carries the rotor 21 at its front end. The longitudinal axis 113 of body 20 does not coincide with the rotating shaft 28 of the rotor. In order to obtain the greatest distance possible between the tail unit and the rotor and in order to reduce the height of the flying machine, the longitudinal axis of body 20 forms an angle α with the revolving axis of the rotor, and the rear end of body 20 is slightly curved upwards resulting in a saddle-like configuration of the back of body 20.

The wings of rotor 21 are provided at their ends with flaps 22 which are movable and adjustable so that they may be projected from different sides of the plane of rotation of the rotor. They are adapted to periodically change their position in known manner during each revolution and to thereby periodically increase or decrease the lifting force of the individual wing. Other flaps 23 are provided and located closer to the hub of the rotor; these flaps 23 both project from one side of the plane of rotation, and the degree of projection can be adjusted. This adjustment causes a change of the lifting power of the whole propeller. These flaps permit the adjustment of the work done by the rotor as required by a change of the angle α, i. e., the angle formed by the axis of the rotor and the horizon. Below body 20 is an extension 24 adapted to receive passengers or freight. The rotor is driven by motor 25 by means of gear 26 located adjacent to the motor, the disconnectable coupling 27 and shaft 28. Motor, coupling and gear are in one chamber which is on the same plane as the room for the passengers. The flying machine as illustrated is built as a land plane and is provided with landing wheels.

Figs. 2, 3, and 4 illustrate in detail the mechanism for operating flaps 22 and 23 in the manner stated in the foregoing paragraph. I wish it to

be understood that the mechanism shown is only one of the possible ways to materialize the object of providing the wings of a rotor with a system of flaps adjustable while the rotor is in operation and adapted to affect the lift power of the rotor and to act as balancing means, whereby the balancing effect can also be adjusted while the rotor is in operation. The system substantially consists of a pair of flaps 22 and 23 in each wing 21. Flaps 22 can be turned to project above main wing 21 or below it, as is obvious from Fig. 3. Flaps 22 are connected to shafts 88 which are provided with cranks 86 and 87, respectively. The end of these cranks has the formation of claws 122 adapted to slidably engage disc 85 which does not take part in the rotation of the rotor. As long as this disc is in a position parallel to shafts 88, the position of flaps 22 with respect to wings 21 will be maintained. The angle of the flaps with respect to the wings can be changed by moving disc 85 up or down. If, however, the disc is held in an inclined position, the angle of flaps 22 with respect to wings 21 will continually change during each revolution of the rotor. This can be carried so far that the flaps periodically project underneath and above wings 21. The lift power of the wing will thus continually change during each revolution of the rotor, being largest at a certain position of the rotor and smallest at the diametrically opposite position. The degree of the inclination of disc 85 can be adjusted while the whole system is in operation by manipulating lever 80. This rotates around fulcrum 81 carried by support 82 which is located in the fuselage of the flying machine. At equal distance from and at both sides of fulcrum 81, rods 83 and 84 are linked to lever 80; the other end of these rods is linked to disc 85. All this can readily be seen from Fig. 2 and also how disc 85 is adjusted by moving the handle of lever 80 up or down.

Flaps 23, which need not change their position during each revolution of the rotor, are mounted to the hollow shafts 90 and 91 which have cranks 92 and 93, respectively. Each crank has a claw 123 slidably cooperating with disc 94. This disc is rigidly connected to shaft 95 and can be moved up and down by operating lever 97 swinging around fulcrum 96 and having on one end a fork 124; this fork cooperates with projection 125 of shaft 95. For instance, by depressing the left end of lever 97, the fork end pushes shaft 95 and, with it, disc 94 and cranks 92 and 93 upwards; thereby shaft 91 is turned clockwise and shaft 90 counterclockwise, when observing this operation on Fig. 3, and both flaps 23 are moved in such a way as to further project from the bottom side of wings 21 and to increase their lift power. Fig. 4, which is a top view of a rotor provided with adjustable flaps, further assists to illustrate the foregoing. Like numerals on this figure and Figs. 2 and 3 indicate like parts and render Fig. 4 self-explanatory.

While I believe the above described embodiments of my invention to be preferred embodiments, I wish it to be understood that I do not desire to be limited to the exact details of design and construction shown and described, for obvious modifications will occur to a person skilled in the art.

What I claim is:

1. In a flying machine having a rotating system of wings connected to a common rotor and producing lift and propelling power for said flying machine, the combination of a group of oscillating flaps movably connected with and protruding from said wings, automatically acting means connected with said wings and flaps and being adapted to automatically periodically change the angle of incidence of said flaps with respect to the wing to which it is connected, with another group of flaps which are also movably connected with and protrude from said wings, and adjusting means connected with said last mentioned flaps and said wings and being adapted to change the angle of incidence of said last mentioned flaps with respect to said wings.

2. In a flying machine having a rotating system of wings connected to a common rotor and producing lift and propelling power for said flying machine, the combination of a group of oscillating flaps movably connected with and protruding from said wings, automatic adjusting means connected with said wings and flaps and being adapted to automatically change the protrusion of said flaps from one side of said wings to a protrusion from the other side of said wings during one half revolution of said wing system, with another group of flaps which are also movably connected with and protrude from said wings, and adjusting means connected with said first mentioned flaps and being adapted to change the degree of periodic protrusion of said first mentioned flaps.

3. In a flying machine having a rotating system of wings connected to a common rotor and producing lift and propelling power for said flying machine, the combination of a group of oscillating flaps movably connected with and protruding from said wings, automatic adjusting means connected with said wings and flaps and being adapted to automatically periodically change the protrusion of said flaps from one side of said wings to a protrusion from the other side of said wings in accordance with the speed of said rotor, with another group of flaps which are also movably connected with and protrude from said wings, adjusting means connected with said second mentioned flaps and said wings and being adapted to change the degree of protrusion of said second mentioned flaps, and adjusting means connected with said automatic means adapted to adjust the extent of protrusion of said oscillating first mentioned flaps.

4. A flying machine having a rotating system of wings connected to a common rotor and producing lift and propelling power for said flying machine, said wings being provided with oscillating flaps having automatic adjusting means for periodically and automatically changing the angle of incidence of said flaps with respect to said wings synchronously with the speed at which said rotor revolves, and adjusting means connected with said automatic adjusting means adapted to adjust the size of the angle of incidence of said oscillating flaps with respect to said wings.

5. In a flying machine having a rotating system of wings connected to a common rotor and producing lift and propelling power for said flying machine, the combination of a group of oscillating flaps movably connected with and protruding from said wings, automatically acting means connected with said wings and flaps and being adapted to automatically and periodically change the angle of incidence of said flaps with respect to the wings to which they are connected, with another group of flaps which are also movably connected with and protrude from said wings, and adjusting means connected with said last mentioned flaps and said wings and being adapt-

ed to change the angle of incidence of said last mentioned flaps with respect to said wings, both groups of flaps being situated adjacent to one another.

6. In a flying machine having a rotating system of wings connected to a common rotor and producing lift and propelling power for said flying machine, the combination of a group of oscillating flaps movably connected with and protruding from said wings, automatically acting means connected with said wings and flaps and being adapted to automatically and periodically change the angle of incidence of said flaps with respect to the wing to which the are connected, with another group of flaps which are also movably connected with and protrude from said wings, and adjusting means connected with said last mentioned flaps and said wings and being adapted to change the angle of incidence of said last mentioned flaps with respect to said wings, both groups of flaps being situated adjacent to one another and to the outer end of said wings.

CLAUDE DORNIER.