

March 28, 1933.

G. F. MYERS

1,903,009

FLYING MACHINE

Original Filed Nov. 4, 1926

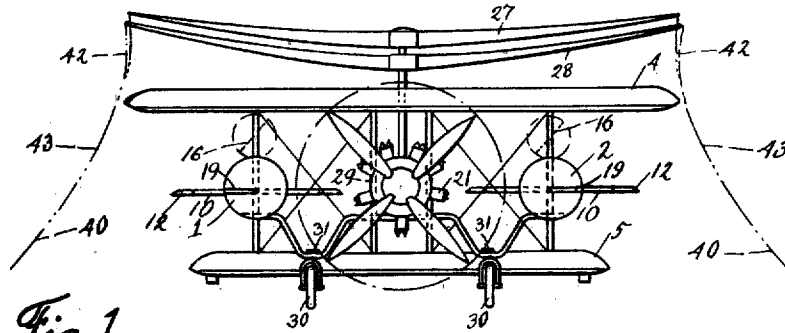


Fig. 1.

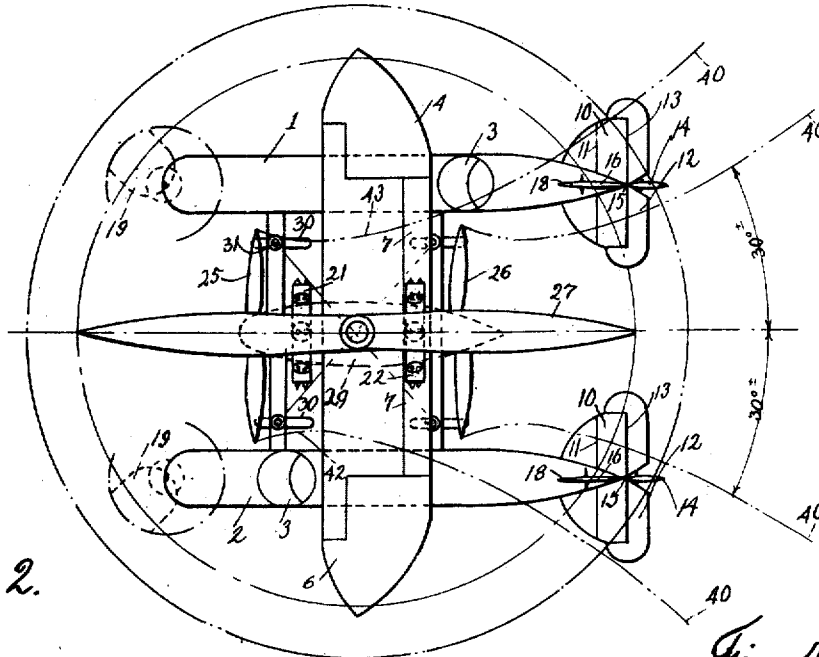


Fig. 2.

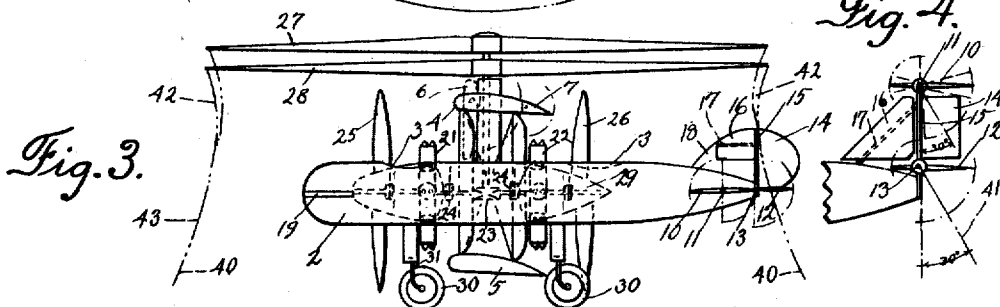


Fig. 3.

Fig. 4.

Inventor:
George Francis Myers

UNITED STATES PATENT OFFICE

GEORGE FRANCIS MYERS, OF NEW YORK, N. Y.

FLYING MACHINE

Original application filed November 4, 1926, Serial No. 146,092. Divided and this application filed January 22, 1931. Serial No. 510,373.

This invention relates to flying machines and particularly to that type known as helicopters.

It has for its object to provide a machine 5 that will rise vertically and fly horizontally, or a combination of these two movements.

It also has for its object to provide a hovering rudder for helicopters when the same have no forward motion by providing a vertical 10 plane surface either along the longitudinal center line of the machine, or two of the same on each side of the said line, on a horizontal longitudinal axis or on an axis oblique to the said line.

Another object is to provide a hinged 15 stabilizing plane and a hinged elevator mounted one above the other to shorten the length of the helicopter fore and aft, and placing these hinged surfaces on either side 20 of a double vertical rudder.

Still another object is to mount the three rudder controls in the slip stream of both the lifting propeller and the progression propeller.

Also to provide a double control mechanism one when rising vertically and one when progressing horizontally.

These and other objects and specific features and improvements and modifications 30 will now be described and then pointed out in the claims.

Referring now to the drawing that accompanies this specification, and in which similar 35 numerals of reference indicate similar parts:

Figure 1 represents a front elevation of a machine embodying the invention in its preferred form.

Fig. 2 represents a plan view thereof.

Fig. 3 represents a side elevation.

Fig. 4 is a modification of the tail unit.

The invention is constructed and operated substantially and preferably as follows:—

1, 2 are the cars or fuselages with cockpits 3, one of the cockpits being mounted forward 45 of the center of gravity of the machine and on the left hand or port side of the machine and the other cockpit to the rear of the said center in the starboard car. 4, 5 are the top and bottom planes or airfoils having ailerons 50 6 and 7; the former being at the extreme ends

of the top plane, and the latter trailing in the rear thereof.

Each tail unit is supplied with a hinged stabilizing plane 10 on pivot 11, elevator 12 on pivot 13, airplane rudder 14 on rudder post 15, and helicopter on hovering rudder 16, on axis 17, and fixed fin 18. 55

In Fig. 3 the said stabilizing plane and elevator are horizontally in line, while in Fig. 4 they are vertically in line with the rudder 14 between. When not operating as a rudder 16 is part of the fixed fin 18 as in Fig. 3, the axis thereof being horizontal, while in Fig. 4 the whole fin is the helicopter rudder when turned on its oblique shaft 17. In both 60 cases the hovering rudder is mounted on the rudder post 15, and in line with and adjacent to the airplane rudder 14. 65

The engines 21 and 22 drive horizontal shafts and bevel gearing 23 through clutches 24 so that all the propellers—the forwardly driving or progression propellers 25 and 26 and the lifting or helicopter propeller or propellers, 27 and 28—can all be operated simultaneously, or any one or more of the propellers may be operated separately or simultaneously. Both the said engines are in the engine housing 29 which is in line horizontally with the two fuselages 1 and 2. Wheels 30 are swivelled on castors as at 31. 70 75 80

I have found that if a plane surface such as 16 be turned from the vertical to the oblique and mounted on a shaft in the vertical plane so that it comes within the maximum slip stream of a lifting propeller, it will turn the machine on one of its principal axes whether the machine has forward motion or not. Therefore it will act when the machine is rising vertically, when hovering in midair, and when progressing horizontally. Whether the surface be hinged on a horizontal axis as in Fig. 3, or on an oblique axis as in Fig. 4 does not matter, nor whether one surface is mounted along the longitudinal axis of the machine or two surfaces mounted one on each 85 90 95 side of the said axis.

The hovering or helicopter rudder 16 when mounted to the rear of the center of gravity and in the vertical plane is a fin; when moved to one side or the other slightly and the ma- 100

chine is hovering, and the slip stream from the helicopter propeller is beating down on one of the surfaces thereof, it will turn the machine on its vertical axis; when the rudder is moved to a greater angle and the machine is travelling forward and the impinging air is striking its surface the machine will be turned to one side or the other whether or not the helicopter propeller is operating; and when the surface of the said rudder is turned flatwise to the slip stream of the helicopter propeller whether the machine is hovering or travelling forward, the rear of the machine will be depressed. Therefore the hovering rudder acts in a four-fold capacity.

Also I have found that the slip stream from the lifting propeller or propellers swings outward from the tips of the blades as shown at 40 in Figs. 1 and 3; that when the blades of the propellers were straight or horizontal as in Fig. 3, then all of the controls, or depressors 19 as I prefer to call them, if unhampered would automatically take the positions indicated by 41 in Fig. 4. Also streamers of cloth placed anywhere on the machine (or held by hand) near the maximum back wash or slip stream of the propeller or at its tips, would flutter at about the same angle during the whole time the propeller was revolving. This angle was found to be about 30 degrees. Of course, if the blades be dihedralized, whether on account of their flexibility or mechanically or permanently so, this angle of 30 degrees will be increased as the particles of air leave the blade normal to its surface.

The slip stream would therefore form a more or less hollow body for there would be practically no slip stream adjustment to the center of the revolving blades. These blades would form one of the bases of a frustum of a cone. It would have a more or less sharp re-entrant curve as at 42, near one of its bases, its sides or elements being incurvated or curved as at 43.

When the machine is moving vertically, the controls, 10, 6 and 16 turn the machine on its transverse, longitudinal and vertical axis respectively, and when travelling forward the controls 12, 7 and 14 turn the machine on the same axes respectively, that is there are two separate sets of controls, one for travelling as a helicopter and one when progressing as an ordinary airplane. Either 6 or 7 can be used for ailerons when the machine is operating as an airplane or as depressors when the machine is operating as a helicopter; and either 10 or 12 as the elevator or the stabilizing plane.

As my invention is in some of its aspects generic, I do not limit myself to the particular construction shown and described, but also contemplate the employment of such equivalents as fairly fall within the scope of the claims.

In this connection I may state that the hinged surfaces herein may be used equally well on other kinds of hovering machines besides helicopters proper, as for instance on ornithopters or autogyros and even airplanes in strong winds; or stratospheric or rocket motor driven machines.

Therefore it should be understood that various changes may be made in the form, proportion, size and detail of the several parts shown, the number and position of certain elements used, as well as the character of the motive power employed, without departing from the spirit of the invention.

This application is a division of my co-pending application filed November 4, 1926, Serial No. 146,092, which is a continuation in part of my application filed April 3, 1925, Serial No. 20,568, and another filed April 15, 1926, Serial No. 102,110.

I claim:

1. In combination with a flying machine, of a helicopter propeller, and a tail unit comprising an elevator, a stabilizing plane, a fixed fin, an airplane rudder, and a helicopter rudder mounted longitudinally in line with the said airplane rudder and contiguous thereto.
2. In combination with a flying machine, of a helicopter propeller, a vertical rudder post, an airplane rudder mounted on the said post, a fin mounted on the said post, and a helicopter rudder mounted contiguously on the said post, the two rudders and the said fin being in the slipstream of the said propeller.
3. The combination in a flying machine, of a vertical post, an airplane rudder mounted on the said post, and a fin part of which is hinged mounted and part of which is fixed to the said post.
4. The combination in a flying machine, of a car, a vertical rudder post, an oblique rod connecting the said post with the said car, and a hinged fin mounted on the said oblique rod.
5. In combination with a flying machine, of a helicopter propeller, a helicopter rudder mounted on an oblique axis, and a progression rudder in longitudinal alignment with the said helicopter rudder.
6. In combination with a flying machine, of a helicopter propeller, a hovering rudder mounted on an oblique axis, and a progression rudder mounted contiguous to the said hovering rudder.
7. In combination with a flying machine, of a helicopter propeller, a hovering rudder mounted on an oblique axis, and a progression rudder, the point of mounting of both of the same being at the rear end of the machine.
8. In combination with a flying machine, of a helicopter propeller, a hovering rudder on an oblique axis, and a progression rudder

in longitudinal alignment with the said hovering rudder being mounted contiguous to the other and adapted to turn the machine both to the right and to the left.

9. In combination with a flying machine, of a helicopter propeller, and a tail unit comprising an elevator, a stabilizing plane, a fixed fin, an airplane rudder on a vertical axis, and a helicopter rudder on an oblique axis, the said fin and both rudders being in longitudinal alignment.

10. In combination with a flying machine, of a fuselage, a helicopter propeller, a vertical rudder post, an airplane rudder mounted on the said post, an oblique shaft connecting the said post and the said fuselage, and a helicopter rudder mounted on the said shaft adjacent to the said post.

11. In combination with a flying machine, of a helicopter propeller, a fuselage, a vertical post, an oblique shaft mounted on said post in a vertical plane parallel to the longitudinal axis of the machine, a surface mounted on the said shaft in close proximity to the said fuselage, substantially under the maximum slipstream of the said propeller, and means for bringing the said surface from its normal pendant position to an angular position for turning the machine on one of its principal axes.

12. In combination with a flying machine, of a helicopter propeller, a hovering rudder mounted on a substantially horizontal shaft, and a progression rudder in longitudinal alignment with the said hovering rudder and contiguous thereto mounted on a substantially vertical shaft situated at the rear portion of the machine, the progression rudder being mounted on the rearmost side of the said vertical shaft and the hovering rudder being mounted on the foremost side thereof.

13. In combination with a flying machine, of a helicopter propeller, a tail unit comprising an elevator, a stabilizing plane, a fixed fin, an airplane rudder on a vertical axis, and a helicopter rudder on a horizontal axis directly in longitudinal alignment with the said airplane rudder.

14. In combination with a flying machine, of a helicopter propeller, a vertical rudder post, a progression rudder mounted on the said post, and a fin part of which is horizontally hinged to the said post.

15. The combination in a flying machine, of a car, a vertical rudder post, a vertical rudder hinged to the said post, a horizontal rear plane hinged adjacent to the said post, a horizontal elevator also hinged adjacent to the said post and perpendicularly in line with the said plane, and a hinged fin mounted also on the said post.

16. The combination in a flying machine, of a pair of parallel cars, a vertical rudder post mounted on each of the said cars, a vertical rudder mounted on each of the said

posts, a hinged stabilizing plane mounted on each of the said posts, and a hinged fin mounted adjacent to each of the said posts.

17. The combination in a flying machine, of a pair of parallel cars, a vertical rudder post mounted on each of the said cars, a vertical rudder mounted on each of the said posts, a hinged stabilizing plane mounted on each of the said posts, a hinged fin mounted adjacent to each of the said posts, and a fixed fin similarly mounted.

18. The combination in a flying machine, of a pair of parallel mounted cars, a pair of vertical rudder posts mounted one on each of the said cars, an oblique rod connecting each of the said posts and cars, and a hinged fin mounted on each of the said oblique rods.

19. The combination in a flying machine, of a pair of parallel cars, a vertical rudder post mounted on each of the said cars, a vertical rudder mounted on each of the said posts, a hinged stabilizing plane mounted between the said rudders, and a hinged elevator similarly mounted.

20. The combination in a helicopter airplane, of a system of control for turning the machine on its longitudinal, transverse, and vertical axes when rising substantially vertically, and an entirely separate means for operating the machine on its said axes when driving substantially horizontally.

21. The combination in a helicopter airplane, of a system of control for turning the machine on its longitudinal, transverse, and vertical axes when rising substantially vertically, and separate means for operating the machine on its said axes when traveling substantially horizontally, each system being substantially out of commission when the other system is in use.

22. The combination in a flying machine, of a fuselage, means for driving the machine forward, means for lifting the machine substantially vertically, a wing surface mounted adjacent to the fuselage, means for turning the machine on its vertical axis comprising a vertical rudder, means for turning the machine on its transverse axis comprising a horizontal elevator, and means for turning the machine on its longitudinal axis comprising a pair of reversely operable ailerons attached to the rear portions of the wing surface, the said last three mentioned means as well as the wing surface being in the slipstream of the said first two mentioned means which are substantially contiguous.

23. In combination with a flying machine, of a fuselage, an airfoil, motive power, two sets of revolving blades one set being mounted substantially vertically and one set mounted substantially horizontally, means mounted on a horizontal transverse axis at the rear end of the said fuselage for turning the machine on its transverse axis, means mounted

on horizontal transverse axes and trailing in the rear of the said airfoil for turning the machine on its longitudinal axis, and means mounted on a vertical axis and adjacent to the said first mentioned means for turning the machine on its vertical axis, the said three means being mounted back of and within a lateral surface of cylindrical shape one of whose bases is the plane of the revolving blades of the said first mentioned set and likewise below and within a similar lateral surface of cylindrical shape one of whose bases is the plane of the revolving blades of the said second mentioned set.

24. In combination with a flying machine, of a fuselage, an airfoil, motive power, two sets of revolving blades one set being mounted substantially vertically and one set mounted substantially horizontally, means mounted on a horizontal transverse axis at the rear end of the said fuselage for turning the machine on its transverse axis, means mounted on horizontal transverse axes and trailing in the rear of the said airfoil for turning the machine on its longitudinal axis, and means mounted on a vertical axis and adjacent to the said first mentioned means for turning the machine on its vertical axis, the said three means being mounted back of and within the lateral surface of a frustum of a cone one of whose bases is the plane of the revolving blades of the said first mentioned set, and likewise below and within a similar lateral surface of a frustum of a cone one of whose bases is the plane of the revolving blades of the said second mentioned set.

25. In combination with a flying machine, of a fuselage, an airfoil, motive power, two sets of revolving blades one set being mounted substantially vertically and one set mounted substantially horizontally, means mounted on a horizontal transverse axis at the rear end of the said fuselage for turning the machine on its transverse axis, means mounted on horizontal transverse axes and trailing in the rear of the said airfoil for turning the machine on its longitudinal axis, and means mounted on a vertical axis and adjacent to the said first mentioned means for turning the machine on its vertical axis, the said three means being mounted back of and within the lateral surface of a frustum of a cone with incurvated elements one of whose bases is the plane of the revolving blades of the said first mentioned set, and likewise below and within a similar lateral surface of a frustum of a cone with incurvated elements one of whose bases is the plane of the revolving blades of the said second mentioned set.

26. In combination with a flying machine, of a fuselage, an airfoil, motive power, two sets of revolving blades one set being mounted substantially vertically and one set mounted substantially horizontally, means mounted on a horizontal transverse axis at the rear end

of the said fuselage for turning the machine on its transverse axis, means mounted on horizontal transverse axes and trailing in the rear of the said airfoil for turning the machine on its longitudinal axis, and means mounted on a vertical axis and adjacent to the said first mentioned means for turning the machine on its vertical axis, the said three means being mounted back of and within the lateral surface of a frustum of a cone with a re-entrant angle near one of its bases one of whose bases is the plane of the revolving blades of the said first mentioned set, and likewise below and within a similar lateral surface of a frustum of a cone with a re-entrant angle near one of its bases, one of whose bases is the plane of the revolving blades of the said second mentioned set.

27. In combination with a flying machine, of a fuselage, an airfoil, motive power, two sets of revolving blades one set being mounted substantially vertically and one set mounted substantially horizontally with dihedral blades, means mounted on a horizontal transverse axis at the rear end of the said fuselage for turning the machine on its transverse axis, means mounted on horizontal transverse axes and trailing in the rear of the said airfoil for turning the machine on its longitudinal axis, and means mounted on a vertical axis and adjacent to the said first mentioned means for turning the machine on its vertical axis, the said three means being mounted back of and within a lateral surface of cylindrical shape one of whose bases is the plane of the revolving blades of the said first mentioned set and likewise below and within a similar lateral surface of cylindrical shape one of whose bases is the plane of the revolving blades of the said second mentioned set.

28. In combination with a flying machine, of a fuselage, an airfoil, motive power, two sets of revolving blades one set being mounted substantially vertically, and one set mounted substantially horizontally with curved dihedral blades, means mounted on a horizontal transverse axis at the rear end of the said fuselage for turning the machine on its transverse axis, means mounted on horizontal transverse axes and trailing in the rear of the said airfoil for turning the machine on its longitudinal axis, and means mounted on a vertical axis and adjacent to the said first mentioned means for turning the machine on its vertical axis, the said three means being mounted back of and within a lateral surface of cylindrical shape one of whose bases is the plane of the revolving blades of the said first mentioned set and likewise below and within a similar lateral surface of cylindrical shape one of whose bases is the plane of the revolving blades of the said second mentioned set.

29. In combination with a helicopter, of a fuselage, a propelling propeller, a helicopter propeller, a wing surface mounted adjacent

to the fuselage, means for turning the machine on its transverse axis comprising a horizontal elevator, means for turning the machine on its longitudinal axis comprising a pair of reversely operable ailerons attached to the rear portions of the said wing surface and means for turning the machine on its vertical axis comprising a vertical rudder, the said three means as well as the said wing surface being in line horizontally with the slipstream of the said first mentioned propeller and vertically in line with the slipstream of the said second mentioned propeller, the two propellers being substantially contiguous.

GEORGE FRANCIS MYERS.

20

DISCLAIMER

1,903,009.—*George Francis Myers*, New York, N. Y. FLYING MACHINE. Patent dated March 28, 1933. Disclaimer filed September 12, 1934, by the patentee, the licensee, *James E. Gallagher, jr.*, consenting.

Hereby enters the following disclaimer, to wit:

There is hereby disclaimed from claim 24 of said Letters Patent any flying machine except one in which the means for turning the machine on its transverse axis, the means for turning the machine on its longitudinal axis, and the means for turning the machine on its vertical axis, extend substantially within the slip stream of the vertically mounted revolving blades and extend substantially within the slip stream of the horizontally mounted revolving blades.

[*Official Gazette October 9, 1934.*]

40

45

50

55

60

65

to the fuselage, means for turning the machine on its transverse axis comprising a horizontal elevator, means for turning the machine on its longitudinal axis comprising a pair of reversely operable ailerons attached to the rear portions of the said wing surface and means for turning the machine on its vertical axis comprising a vertical rudder, the said three means as well as the said wing surface being in line horizontally with the slipstream of the said first mentioned propeller and vertically in line with the slipstream of the said second mentioned propeller, the two propellers being substantially contiguous.

GEORGE FRANCIS MYERS.

20

DISCLAIMER

1,903,009.—*George Francis Myers*, New York, N. Y. FLYING MACHINE. Patent dated March 28, 1933. Disclaimer filed September 12, 1934, by the patentee, the licensee, *James E. Gallagher, jr.*, consenting.

Hereby enters the following disclaimer, to wit:

There is hereby disclaimed from claim 24 of said Letters Patent any flying machine except one in which the means for turning the machine on its transverse axis, the means for turning the machine on its longitudinal axis, and the means for turning the machine on its vertical axis, extend substantially within the slip stream of the vertically mounted revolving blades and extend substantially within the slip stream of the horizontally mounted revolving blades.

[*Official Gazette October 9, 1934.*]

40

45

50

55

60

65