

July 30, 1968

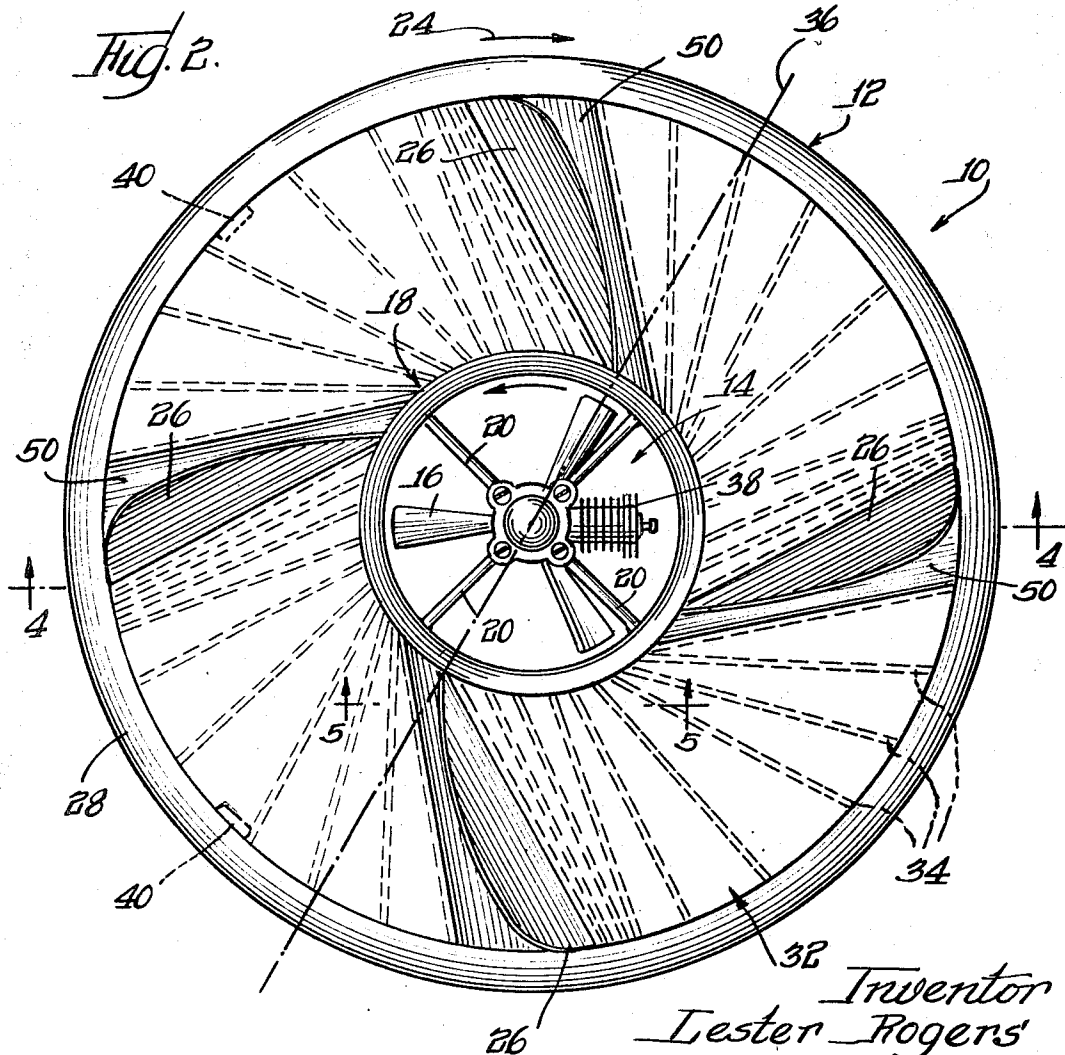
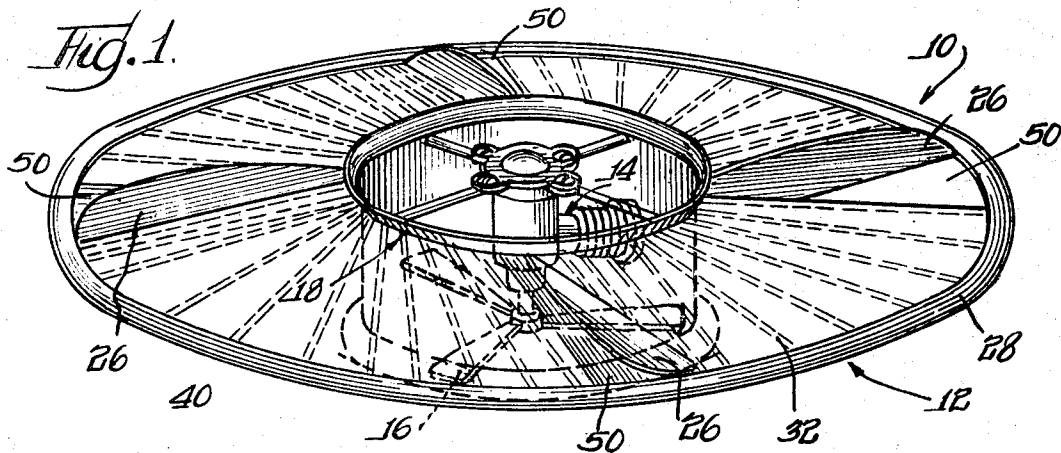
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3,394,906

FLYING SAUCER STRUCTURE

Filed May 24, 1966

2 Sheets-Sheet 1



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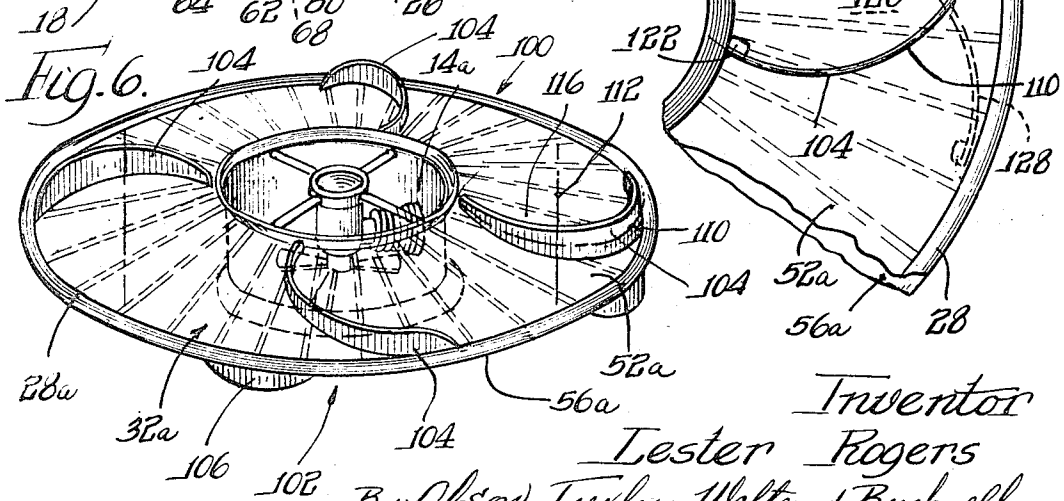
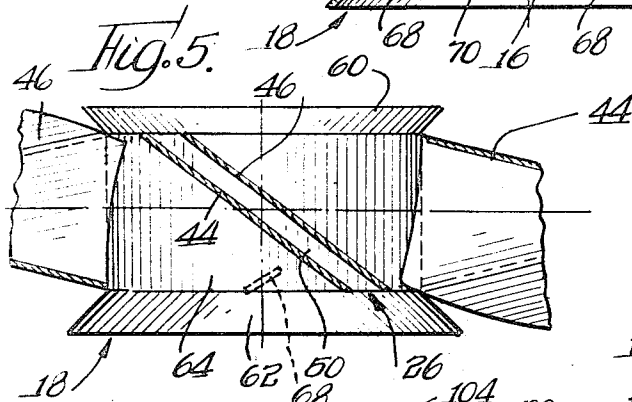
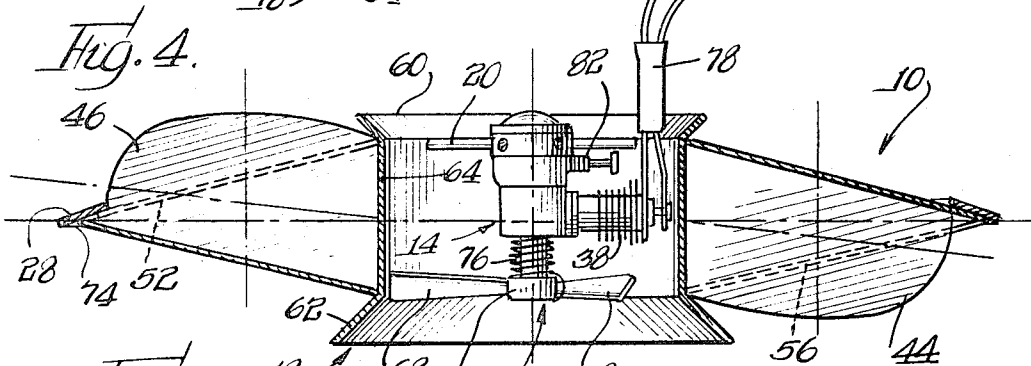
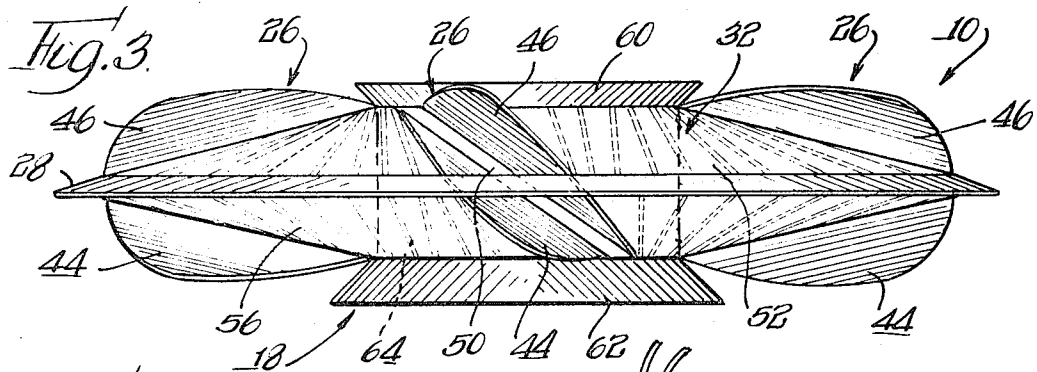
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## FLYING SAUCER STRUCTURE

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2 Sheets-Sheet 2



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## FLYING SAUCER STRUCTURE

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### ABSTRACT OF THE DISCLOSURE

An aircraft including a circular-shaped body portion having a central duct extending therethrough. A motor-driven propeller is included within the central duct to power the craft, and a plurality of air foil means are provided to furnish lift and stability. In a preferred embodiment, the air foil means includes pairs of arcuately spaced fin members extending through the body portion of the craft, each pair of fin members forming an air flow channel extending through, from the upper to the lower surface of, the body portion of the craft. The channels are at an acute angle with respect to the longitudinal axis of the central duct, and at an opposite angle from the pitch of the propeller blades. Another embodiment of the craft includes arcuately shaped fins, one set thereof being mounted on the upper surface of the craft and one set thereof being mounted directly below and on the lower surface of the craft. The rim or outside perimeter of the craft is weighted on one side thereof to counteract the off-center weight distribution of the motor.

This invention relates generally to an aerodynamic structure and more particularly to a toy flying saucer.

Conventional aircraft normally have a fuselage to which a pair of outwardly extending wings are attached. The aircraft is commonly propelled through the air by means of engines mounted on the wings. However, various unidentified moving objects have recently been seen in the air. These unidentified flying objects are usually alleged to have a disk or saucer shape and exhibit excellent maneuverability and acceleration characteristics.

The structure through which these flying objects or saucers obtain alleged superior performance is, at the present time, unknown. However, the performance and unique shape of the flying saucers has aroused the interest of many people. Scientists and engineers are interested in the mechanical structure which maintains the flying saucers airborne; model builders and young people, on the other hand, are fascinated by the shape of the flying saucers.

Therefore, one of the objects of this invention is to provide a model of a flying saucer which will illustrate the characteristics of flight of a disk shaped body.

Another object of this invention is to provide a disk shaped structure which will maintain free flight under its own power.

These and other objects and features of the invention will become more apparent upon a reading of the following description when taken in connection with the accompanying drawings, wherein:

FIG. 1 is a perspective view of a structure illustrating a preferred embodiment of my invention;

FIG. 2 is a plan view of the structure of FIG. 1 illustrating the relationship of various components of the structure;

FIG. 3 is an elevational view of the structure of FIGS. 1 and 2 and illustrates the vertical relationship of the components of the structure;

FIG. 4 is a sectional view, taken along the line 4-4 of FIG. 2, illustrating the relationship of a motor and air foils utilized in the preferred embodiment of my invention;

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FIG. 5 is a sectional view, taken along the line 5-5 of FIG. 2, illustrating the structure of fins used in the air foil structure;

FIG. 6 is a perspective view, on a reduced scale, of a second embodiment of my invention; and

FIG. 7 is an enlarged view of the relationship between fin members utilized in an air foil in the structure of FIG. 6.

Referring now to the drawings in greater detail, there is shown in FIGS. 1 and 2 an aircraft or flying saucer 10 which forms a preferred embodiment of my invention. The aircraft 10 has a circular or disk shaped body 12 which is powered by a glow plug type diesel engine or other suitable motor 14. The motor 14 drives a propeller 16 in a counterclockwise direction, as indicated by the arrow in FIG. 2. Rotation of the propeller 16 draws air downwardly through a central duct or tunnel 18 in which the motor is mounted on support struts or bars 20. This action by the propeller lifts the aircraft 10 vertically relative to the ground due to the simultaneous creation of a partial vacuum above the aircraft and a high pressure air column below the aircraft.

The counterclockwise rotation of the propeller 16 results in a counter-rotation of the disk shaped body 12 in a clockwise direction, as indicated by the arrow 24 in FIG. 2. This clockwise rotation of the body 12 provides gyroscopic stability to the aircraft when it is in powered flight. In addition, air foils 26 are provided to utilize the rotation of the body 12 for creating a secondary source of lift for the aircraft 10, in a manner to be explained in greater detail subsequently. The air foils 26 are secured to the duct 18 at a radially inner end and are secured to an annular rim member 28 at a radially outer end. The air foils, duct and rim are all interconnected by a tough sheet or membrane assembly 32 which is reinforced by radially outwardly extending struts 34. The sheet assembly 32 is advantageously made of a tough polymeric material, as is the rest of the body 12 of the aircraft.

The body 12 and motor 14 are both mounted with their longitudinal axes at the geometric center of the aircraft 10. However, the motor 14 includes a radially outwardly extending cylinder portion 38 (see FIG. 2) which results in the center of gravity of the motor being displaced radially relative to the center of gravity of the body of the aircraft. This displacement of the center of gravity of the motor relative to the body of the aircraft would, if uncorrected, result in an unstable flying condition for the aircraft 10. Therefore, counterweights 40 are mounted on the rim 28 to offset the unbalance created by the motor 14 so that the center of gravity of the aircraft 10 is at the geometric center of the aircraft. This coincidence of the center of gravity and geometric center of the aircraft results, as will be apparent to those skilled in the art, in a relatively stable, wobble-free, flight for the aircraft 10.

Referring now to FIGS. 3 through 5, in which the structure of the aircraft 10 is illustrated in greater detail, the air foils 26 each include a pair of spaced apart fins or vanes 44 and 46. The fins 44 and 46 are formed of a flat, resilient polymeric material and are connected to the duct 18. Also, the fins flare radially outwardly in a counterclockwise direction from the duct 18 toward the rim 28, as is perhaps best seen in FIGS. 2 and 3, to define a slot or passage 50. An arcuate uppermost edge portion of the fin 46 extends above an upper sheet or membrane 52 of the sheet assembly 32. The fin 46, as shown in FIG. 5, is mounted with its transverse axis at an upward angle relative to the longitudinal axis of the duct 18 and aircraft 10. The fin 46 is slanted upwardly so that when the aircraft 10 is rotated in a clockwise direction air pressure on a forward surface 54 of the fin lifts the aircraft upwardly. The fin 46 also diverts air downwardly through

the slot 50 to create a partial vacuum behind the fin. The slot 50 has an outwardly diverging structure to permit a greater volume of air to be conducted through the slot at the radially outer end of the slot where the fin 46 has its largest angular velocity. The greater angular velocity of the outer end of the fin tends to force a larger volume of air into the slot 50 at the radially outer end than at the radially inner end.

The lower fin 44 projects axially outwardly beneath a lower sheet or membrane 56 of the sheet assembly 32. The lower fin 44 is also angled relative to the longitudinal axis of the aircraft 10. The transverse axes of the fins 44 and 46 are generally parallel to each other. However, the longitudinal axes of the fins will not be parallel to each other, since the fins diverge radially outwardly.

The arcuate downwardly projecting edge portion of the fin 44 is slanted to provide vertical lift when the body 12 of the aircraft is rotated in a clockwise direction. This vertical lift is increased by the air flowing through the slot 50 of a preceding air foil. Therefore, the fins 44 and 46 both provide an upward lifting force, when the body 12 of the aircraft is rotated. The fin 46 also diverts air downwardly to the slot 50 to create a lift on the lower surface of the fin and a partial vacuum adjacent an upper surface of the fin.

The duct 18 includes an upper radially outwardly sloping motor mount flare or skirt 60 which reduces turbulence and channels air into the duct 18. A radially outwardly sloping pedestal flare or skirt 62 is provided at the bottom of the duct 18 to expand a high pressure air column from the propeller 16 over a large area to increase both lift and stability. The motor mount flare 60 and pedestal flare 62 are interconnected by a cylindrical side wall portion 64 to provide a rigid central structure for the aircraft 10. The pedestal flare 62, as its name implies, may be used as a resting base for the aircraft 10 to sit upon when the aircraft is not in flight.

The propeller 16, as is best seen in FIG. 4, includes a plurality of outwardly extending blades 68 which are connected to a hub portion 70 of the propeller and mounted adjacent to the lower end portion of the duct 18. The blades are angled, relative to the longitudinal axis of the aircraft, in a direction generally opposite from that of the fins 44 and 46 (see FIG. 5). The propeller is, as previously explained, rotated by the motor in a counterclockwise direction to life the aircraft 10 upwardly while rotating the body section 12 at a relatively slow speed in a clockwise direction. As the propeller blades 68 are rotated, a column of relatively high pressure air is formed under the aircraft 10. This column of air is spread outwardly by the pedestal flare 62. The column of air is retained under the aircraft, to some extent, by the radially outwardly and downwardly sloping rim 28 which tends to entrap the air beneath its lower surface 74.

The motor 14 is, in the preferred embodiment of the aircraft, of a well known glow plug type which is commonly used in model aircraft. The motor is started through the assistance of a starter spring 76 which is mounted on the propeller shaft. A battery clip 78 is provided to connect the heating element or plug within the motor 14 to a battery. Suitable fuel is supplied to the engine through an aperture in the motor into which a fuel flow rate regulating valve 82 is mounted. As will be apparent to those skilled in the art, the motor is started by connecting the clip 78 to the motor and, by means of the spring 76, rotating the propeller 16.

In order to enhance the understanding of the invention, a modified form is shown in FIGS. 6 and 7. In this modified form of the invention, like numerals have been used to designate like parts with a suffix "a" being employed to distinguish the elements associated with FIGS. 6 and 7 from those of FIGS. 1 through 5. The aircraft 100, as is best seen in FIG. 6, includes a central duct 18a in which a motor 14a is mounted. An annular rim 28a is connected to the duct 18a by a sheet or membrane assembly 32a.

The sheet or membrane assembly 32a includes an upper surface 52a and a lower surface 56a.

The embodiment of the invention shown in FIGS. 6 and 7 differs primarily from the embodiment of FIGS. 1 through 5 in the construction of the air foils 102 which extend radially outwardly from the duct 18a to the rim 28a. The air foils include two separate fin members 104 and 106. The fin members 104 are mounted on the upper sheet 52a and are angled radially outwardly in a counterclockwise direction. The fin members 104 have an arcuate longitudinal axis 110 and a generally vertical transverse axis 112. The fins 104 are angled in a counterclockwise direction relative to the transverse axis of the aircraft. Since the aircraft 100 rotates in a clockwise direction when the motor 14a is powering the craft in flight, the fin members 104 will deflect air upwardly away from the surface 52a to provide a partial vacuum in a cup-shaped recess 116 formed behind the fins 104.

In a similar manner, the fin 106 is mounted on the lower surface 56a of the aircraft 100. However, as will be apparent from an inspection of FIG. 7, the fins 106 extend radially outwardly from the duct 18a with a clockwise slope. Therefore, when the aircraft 100 is rotated in a clockwise direction, the fin 106 will tend to trap air in a cup-shaped recess 120 formed by the forward surface of the fin to provide lift, against the lower surface 56a of the aircraft.

As is perhaps best seen in FIG. 7, the fins 104 and 106 have inner end portions 122 and 124 which are circumferentially displaced relative to each other adjacent to the central duct 18a. Similarly, the fins 104 and 106 have radially outermost portions 126 and 128 which are displaced circumferentially relative to each other adjacent to the rim 28a of the aircraft 100. This relative displacement of the fins 104 and 106 results in an even application of lifting forces to the aircraft. Thus, the aircraft 100 is driven in powered flight by the motor 14a and is retained in an airborne condition by an air column from a propeller fastened to the motor and the aerodynamic action of the fins 104 and 106.

For purposes of affording a more complete understanding of the invention, it is advantageous now to provide a functional description of the mode in which the component parts thus far identified cooperate. The aircraft 10 is prepared for flight by first filling the fuel reservoir in the motor 14. A one and one-half volt battery is then connected to the clip 78 to heat the resistance element in the glow plug engine 14. The propeller 16 is then rotated with the starter spring 76. After the motor catches, the speed of the engine is adjusted by turning the fuel control valve 82. The aircraft is launched by holding it in a substantially horizontal position and rotating it in a clockwise direction. The propeller 16 forces a column of air downwardly through the duct 18. This downwardly flowing column of air will be diffused outwardly by the pedestal flare or skirt 62 to lift the aircraft 10 vertically.

Simultaneously with this vertical movement of the aircraft, the body 12 will be rotated in a clockwise direction by the counter torque resulting from the counterclockwise rotation of the propeller 16. This counterclockwise rotation of the body 10 will cause the upwardly extending arcuate fins 46 to engage air on their lower downwardly sloping inner surface to lift the aircraft. A partial vacuum will tend to be formed adjacent to the upper surface of the fin 46 to further increase the lift imparted to the aircraft by the fins 46. Air pressing against the lower inner surface of the fin 46 will be directed downwardly through the radially outwardly diverging slot 50. The air will then flow out of the slot and engage the lower outer surface of the adjacent fin 44 to provide further lift for the aircraft. The clockwise rotation of the body 12 and the aerodynamic action of the fins 44 and 46 will impart a translational movement to the rotating aircraft.

When the motor 14 is out of fuel the aircraft will tumble toward the ground due to lack of lifting power.

Since the entire craft is made of a tough resilient plastic and tends to glide to the ground with this tumbling movement, the aircraft is not damaged by impact with the ground. Also this impact is decreased by ground effects between the aircraft and the earth.

While the illustrated embodiments are intended for use as toys, it will be apparent to those skilled in the art that the structure has many uses when built to a larger scale. It is contemplated that the full size aircraft will be controlled by shifting the center of gravity or altering the lift imparted to the craft by the air foils. In addition, the direction of flight can be controlled by tilting the duct 18 relative to the body 12. With the full size craft, and certain delicate models, it is contemplated that a parachute will be utilized to reduce the impact upon landing. The specific examples herein shown and described are, therefore, to be considered as being primarily illustrative.

What is claimed is:

1. An aircraft comprising: a circular-shaped body portion including upper and lower surfaces joined at the outer perimeter thereof; a cylindrically-shaped central duct extending through said body portion, said duct having an intake opening through said upper surface of said body portion and an outlet opening through said lower surface of said body portion; air foil means including a plurality of pairs of spaced-apart fin members, said pairs being arcuately spaced about said circular body portion, each pair of fin members being secured to and extending radially outwardly from said central duct with transverse axes thereof at an acute angle relative to the longitudinal axis of said duct, each of said pairs of spaced-apart fin members defining therebetween an airflow channel, said airflow channels extending through said body portion between said upper and lower surfaces thereof and opening outwardly therethrough at respective ends of said channels; motor means mounted in said duct; and propeller

means including a plurality of blades mounted within said duct on said motor means, said blades being angled in a direction opposite from said radially extending fin member pairs, whereby upon the rotation of said propeller means by said motor means in one direction at a first rate of rotational speed, air is drawn into said intake and expelled through said outlet of said duct, said motor means duct and body portion including said air foil means rotating in a second direction at a second relatively slower rotational speed, thereby to power said aircraft in flight.

2. An aircraft as claimed in claim 1 wherein: first ones of said pairs of fin members include arcuate wing-shaped uppermost edge portions extending outwardly from said upper surface of said body portion and second ones of said pairs of fin members include arc-shaped lowermost edge portions extending outwardly from said lower surface of said body portion, whereby upon the rotation of said aircraft in said second direction, said uppermost and lowermost edge portions of said first and second ones of said pairs of fin members, respectively, serve to direct air into and out of said channels, respectively, thereby to provide added vertical lift to said aircraft.

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