July 30, 1968 L. ROGERS 3,394,906

FLYING SAUCER STRUCTURE

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Fig. 1.

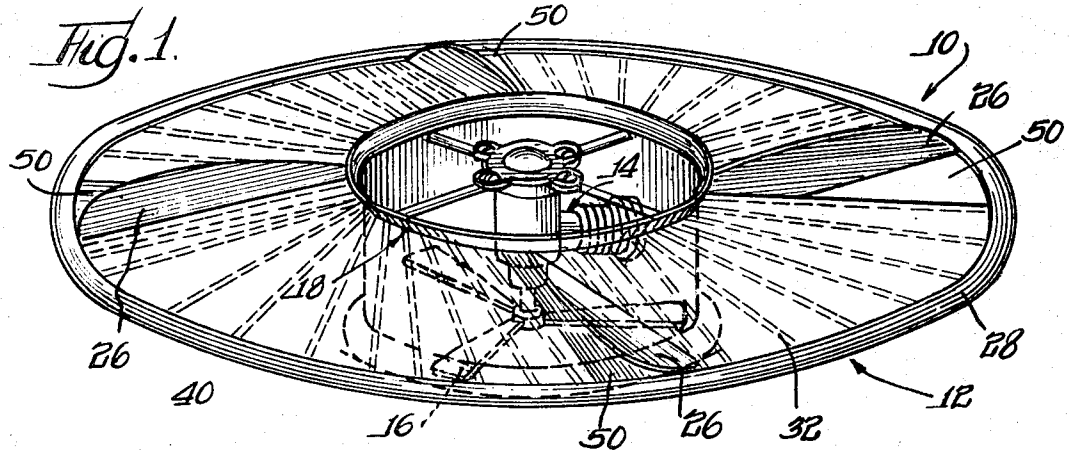
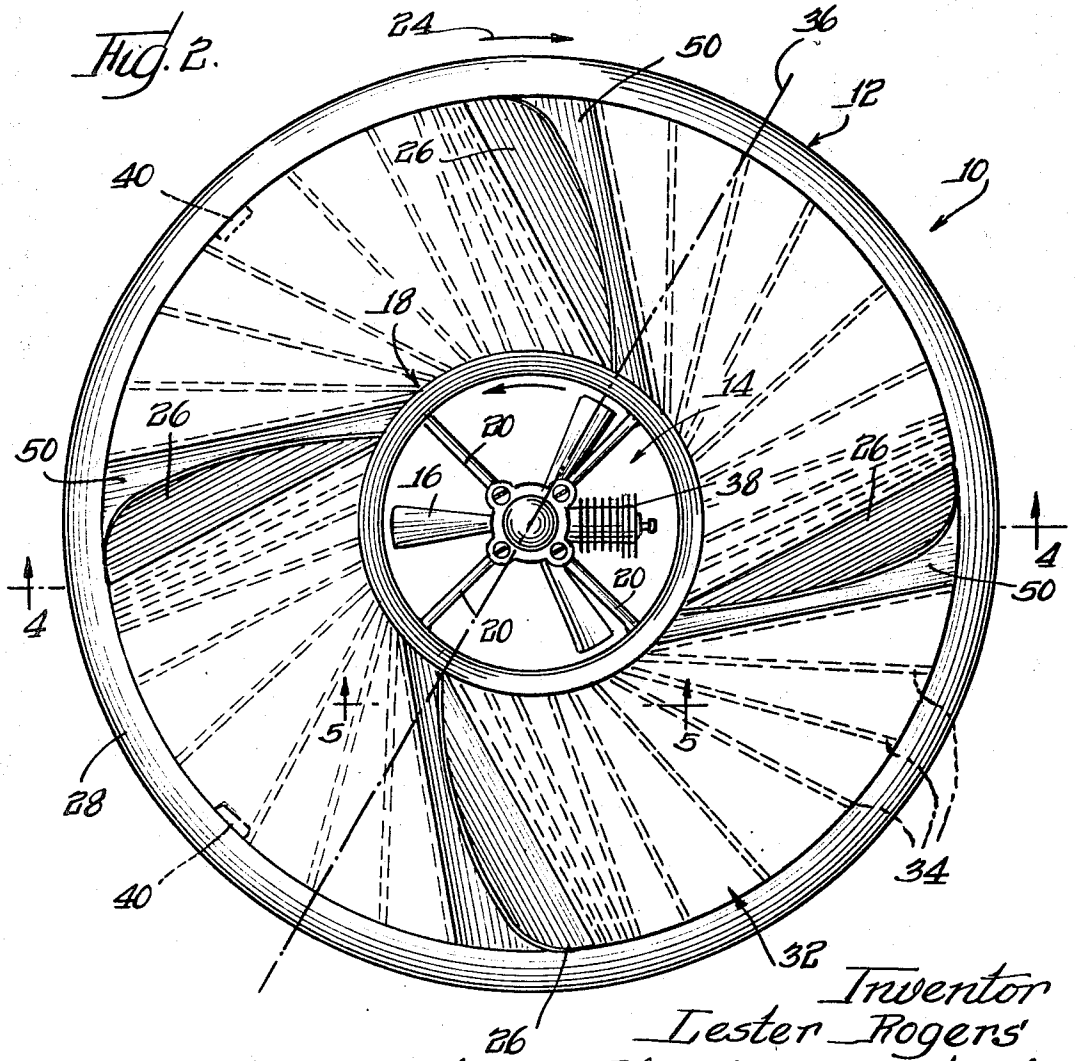


Fig. 2.



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Fig. 3.

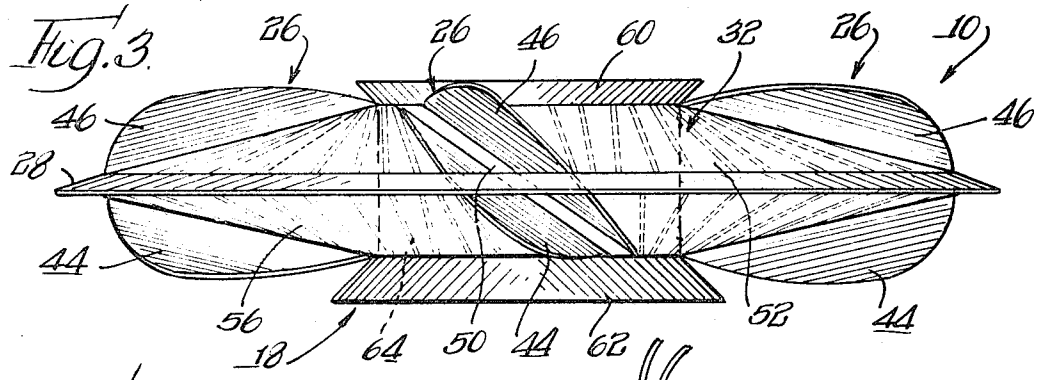


Fig. 4.

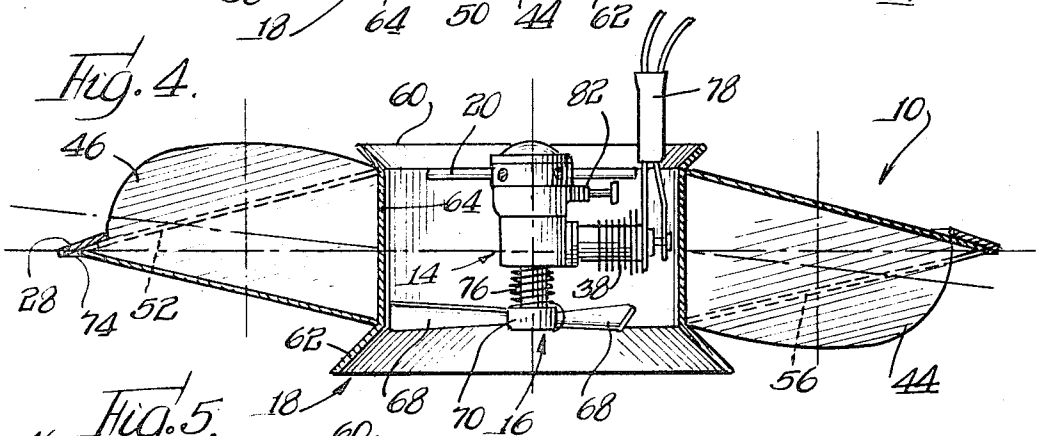


Fig. 5.

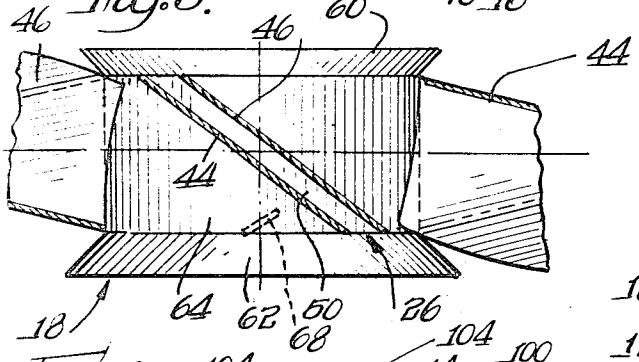


Fig. 6.

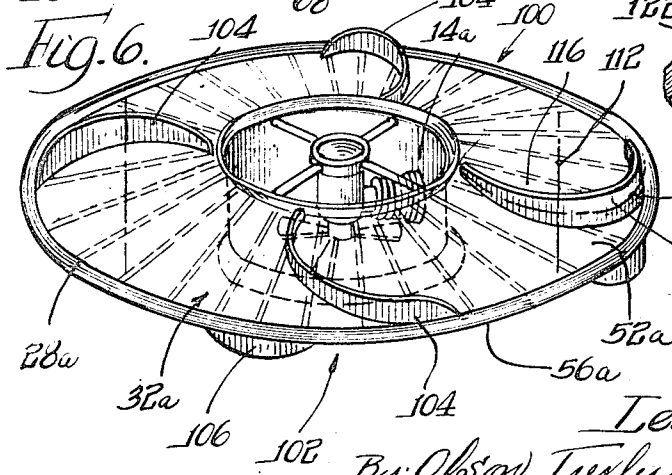
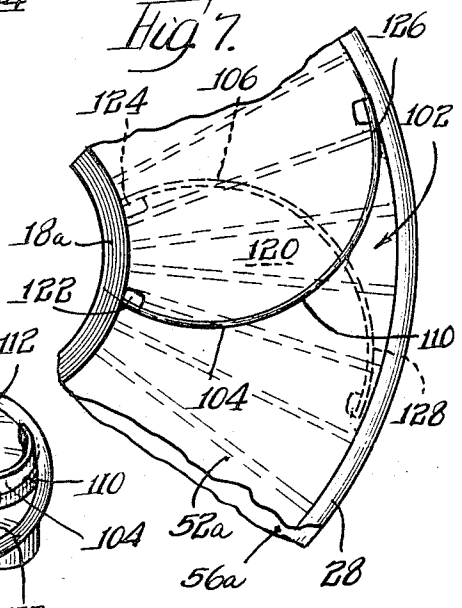


Fig. 7.



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United States Patent Office 3,394,906 Patented July 30, 1968

3,394,906

FLYING SAUCER STRUCTURE

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Filed May 24, 1966, Ser. No. 552,464
2 Claims. (Cl. 244—23)

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;

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 tranverse 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 **18***a* in which a motor **14***a* is mounted. An annular rim **28***a* is connected to the duct **18***a* by a sheet or membrane assembly **32***a*. The sheet or membrane assembly **32***a* includes an upper surface **52***a* and a lower surface **56***a*.

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 **18***a* to the rim **28***a*. The air foils include two separate fin members **104** and **106**. The fin members **104** are mounted on the upper sheet **52***a* 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 **14***a* is powering the craft in flight, the fin members **104** will deflect air upwardly away from the surface **52***a* 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 **56***a* of the aircraft **100**. However, as will be apparent from an inspection of FIG. 7, the fins **106** extend radially outwardly from the duct **18***a* 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 **56***a* 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 **18***a*. Similary, the fins **104** and **106** have radially outermost portions **126** and **128** which are displaced circumferentially relative to each other adjacent to the rim **28***a* 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 **14***a* 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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