

June 3, 1930.

I. K. RYSTEDT

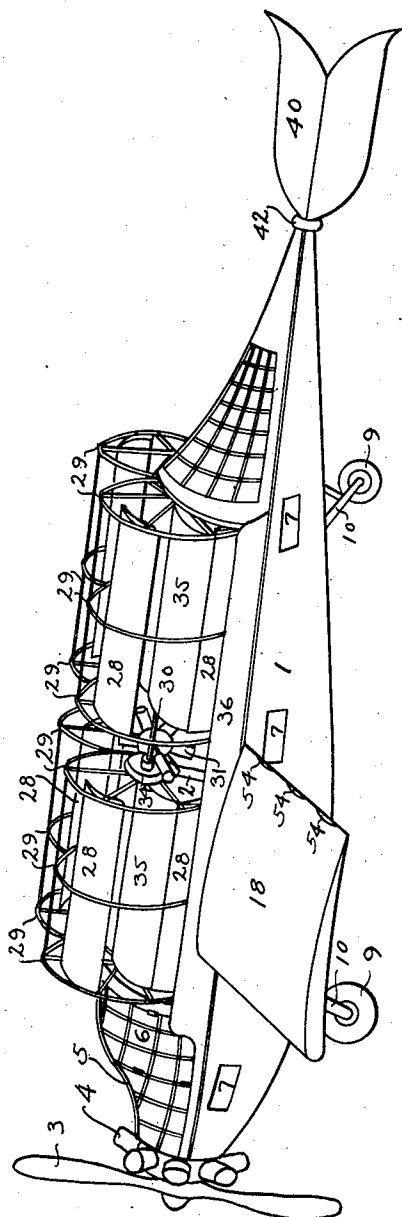
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AIRPLANE

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Fig. 1



INVENTOR
BY *I. K. Rystedt*
W. H. Rystedt
ATTORNEY

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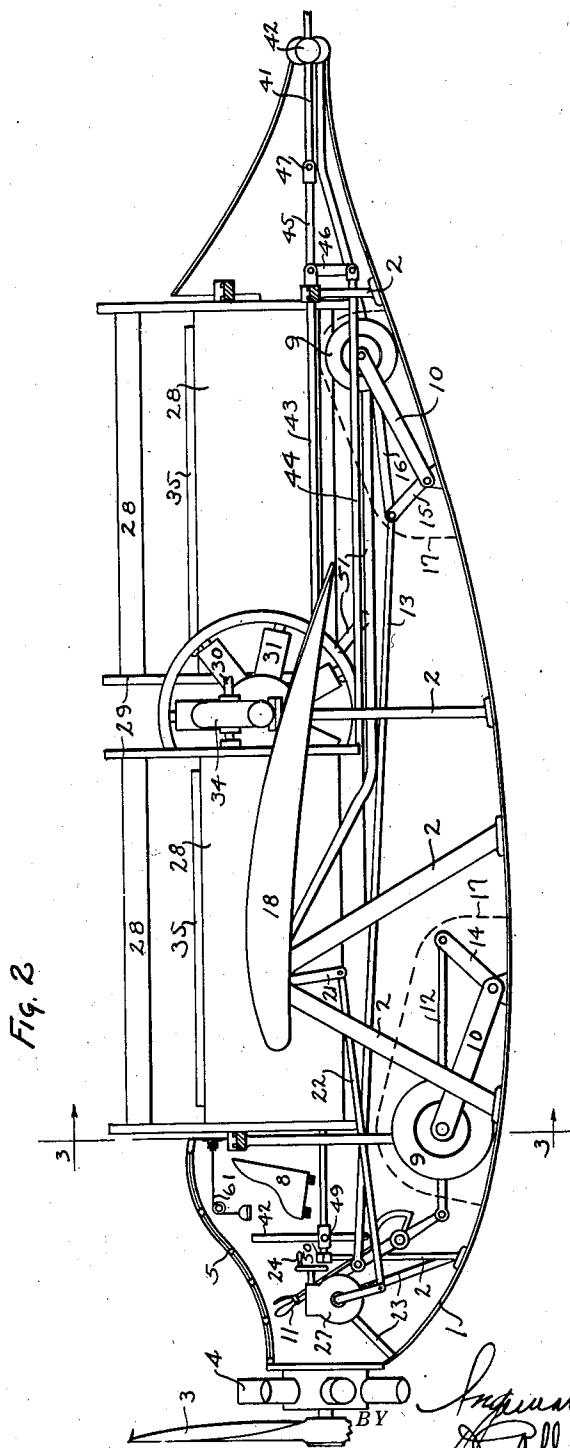
I. K. RYSTEDT

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AIRPLANE

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INVENTOR
I. K. Rystedt
BY *Edw. H. Rystedt*
ATTORNEY

June 3, 1930.

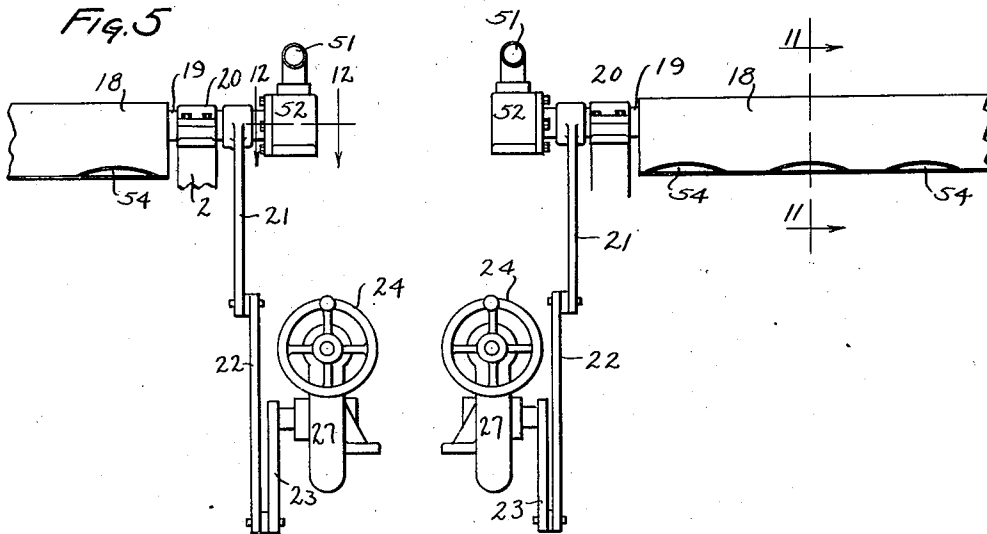
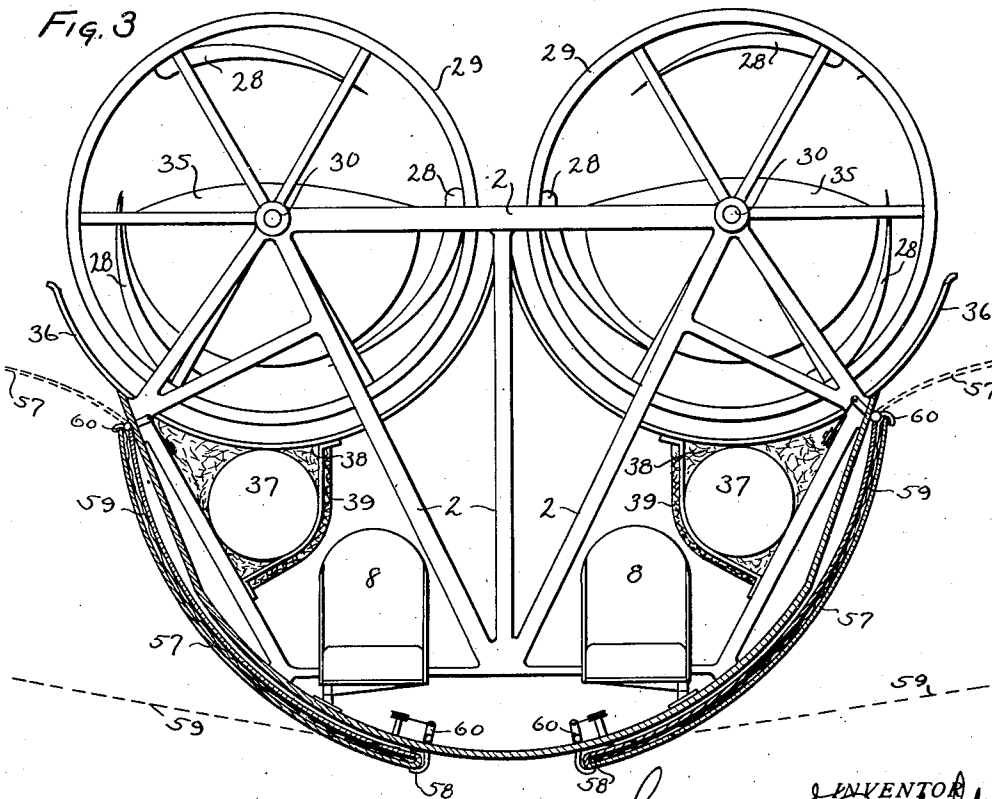
I. K. RYSTEDT

1,761,053

AIRPLANE

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INVENTOR
BY *I. K. Rystedt*
W. H. Rystedt
ATTORNEY

June 3, 1930.

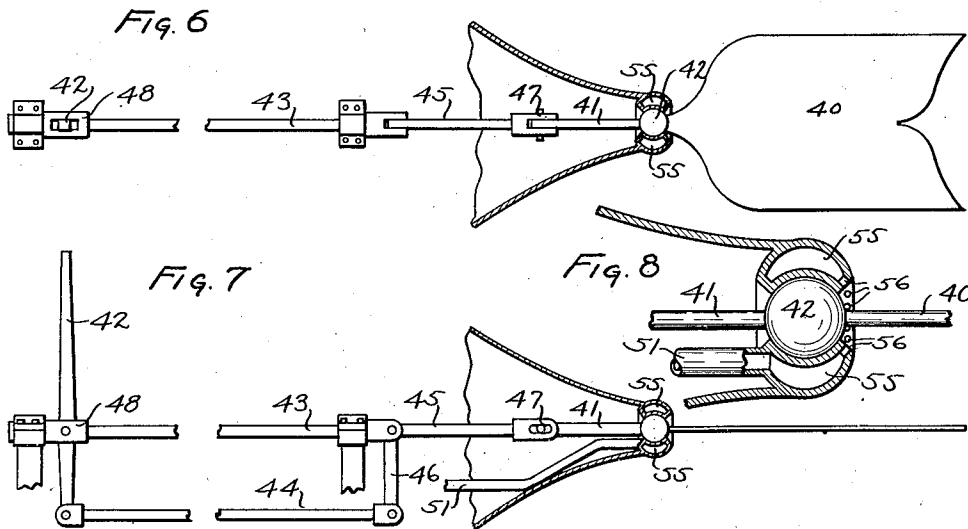
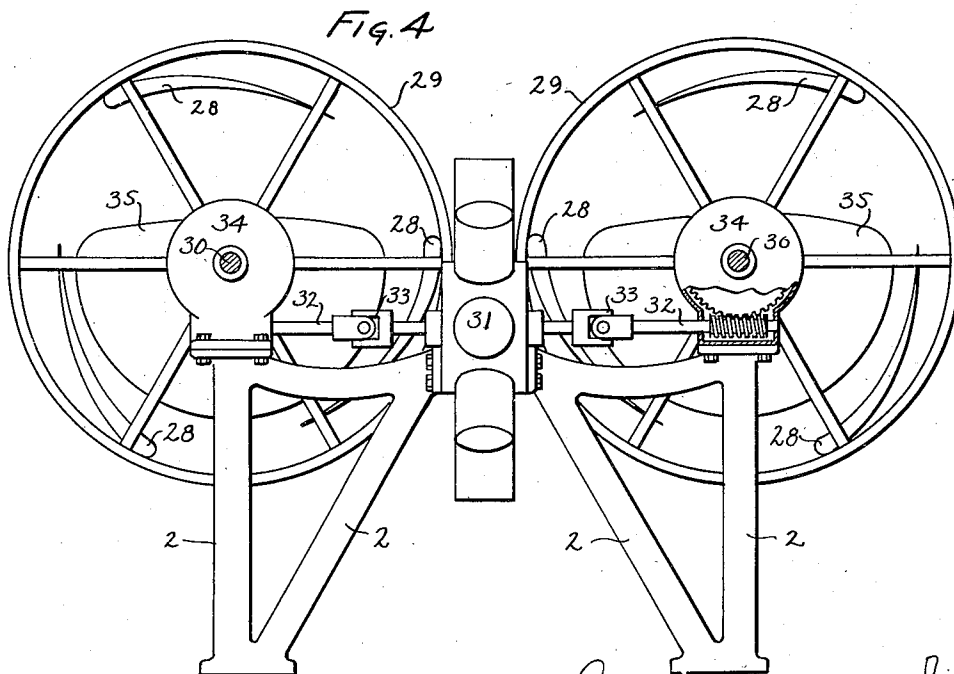
I. K. RYSTEDT

1,761,053

AIRPLANE

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5 Sheets-Sheet 4



INVENTOR
BY *I. K. Rystedt*
ATTORNEY

UNITED STATES PATENT OFFICE

INGEMAR K. RYSTEDT, OF DAYTON, OHIO

AIRPLANE

Application filed June 11, 1928. Serial No. 284,585.

This invention relates to the application of new principles in the construction of airplanes.

The invention as herein presented is a further development of the fundamental principle embodied in the airplane construction set forth in United States Letters Patent No. 1,075,863, issued to me on October 14, 1913.

The invention is directed to a solution of the problem of applying to airplane construction certain principles of construction for accomplishing natural flight, that is to say, the provision of nature in the bodies of birds which enables flight with far greater perfection than has been so far attained in mechanical flight.

The particular objects of the invention consist in the provision of added means for lifting the plane into the air more directly, for attaining elevation in shorter time and for sustaining the airplane in the air at slower forward speed than is possible with airplanes of the usual construction; the same means serving also for making a more direct descent, at slower speed and landing within a smaller prescribed area.

Incidental improvements to the main features of the invention consist in applying a parachute attachment in a novel manner to the air plane as an element of safety for effecting a forced launching; in providing means for preventing or minimizing the accumulation of ice on vital portions of the planes and rudder as a measure of safety in making a continuous flight over long distances; in providing means for retracting the landing gear within the body of the airplane; a novel construction of the rudder which has a wider range of movements and more responsive in function than the usual type of rudder; also a wider range of adjustment is provided for the laterally extended planes which increases the effectiveness of the planes for maneuvering the airplane.

The improved airplane is also capable of taking off and landing on the water and to be otherwise operated as a hydroplane.

In the preferred construction the airplane is provided with a forward driving propeller and a plurality of rotatable lifting planes,

the propeller and the planes being operated by separate motors, the distribution of weight of the structure as a whole being such that the equilibrium of the airplane will be maintained with one or the other of the motors inoperative.

To the end of attaining these objects of the invention the structure of the airplane consists of various novel mechanisms and arrangements for effecting mechanical flight with the added range in maneuvering the plane and increased safety herein claimed.

In the accompanying drawings which serve for illustrating the invention in a preferred construction:

Fig. 1 is a view in perspective of the airplane;

Fig. 2 is a view in side elevation with the body of the plane shown in section;

Fig. 3 is a cross sectional view on line 3—3 of Fig. 2, including a modification;

Fig. 4 is a detail view in end elevation of a double unit of the rotatable planes and motor;

Fig. 5 is a detail view in elevation of the controls for the lateral planes;

Figs. 6, 7 and 8 are detail views of the rudder;

Fig. 9 is a detail in side elevation of the rotatable planes and motor;

Fig. 10 is a detail view of one of the lateral planes and controlling mechanism;

Fig. 11 is a cross sectional view of one of the lateral planes taken on line 11—11 of Fig. 5;

Fig. 12 is a detail sectional view of a feature of the exhaust system taken on line 12—12 of Fig. 5.

As shown in the drawings, the body or fuselage of the airplane consists of a hull-shaped metal housing 1 including various frame structures 2 for supporting the operable parts. At the front a propeller 3 and motor 4 of well known construction are arranged in the usual manner in airplane construction.

The pilot's compartment is glass enclosed as indicated at 5 and is entered at the side by means of a door 6; which also serves as an entrance to the interior of the plane, other glass covered portions 7 being provided for

making general observations, suitable seats 8 being provided for the pilot and for observers or passengers, the upper deck of the fuselage at the rear being glass covered also for affording a wide range of view rearward.

The landing gear consists of front and rear trucks, there being preferably two pneumatic wheels 9 to each truck which are supported on pivoted frames 10 operable by a lever 11 adjacent the pilot's seat, rods 12—13 and arms 14—15—16 which connect the rods to the respective trucks, the connections serving for projecting and retracting the landing gear in the operation of the plane. The dotted outlines 17 indicate water-tight walls over the landing gear for adapting the plane for taking off and landing on water. When the plane is adjusted for continued flight the landing gear is in retracted position as indicated in Fig. 2.

The lateral planes 18 may be of any suitable construction. As here shown, the planes are of hollow metal formation being cambered on their under side and convexed on their upper side, the front edge of the wings being formed on a suitable radius to give the desired depth to the planes, the upper and lower walls being tapered rearwards. The planes are supported pivotally forward of their inner edges on hollow journals 19 operable in bearings 20 on the frame structure 2, and are connected by interposed links 21—22—23 to a manual control for each plane consisting of a hand wheel 24 forwardly adjacent the pilot's seat and a worm and gear connection 25—26 enclosed in a casing 27 which serves for giving a highly responsive, wide range angular adjustment of each plane on its journal 19 independently of the other plane which increases the effect of the lateral planes in controlling the airplane in other than straight away flying, as in maneuvering the plane in turning, changing the direction of flight, or for retarding the speed for landing.

The airplane as here shown is provided with two sets of horizontally disposed, rotatable planes in axial alignment one plane with another of the opposite sets, the planes being interposed axially between the pilot's compartment and the rear end of the fuselage and confined generally laterally and vertically to the stream lines of the over-all structure of the airplane.

Each unit of the rotatable planes consists of a plurality of planes 28 constructed of any suitable material, as wood or hollow metal, the planes being convex on their upper surface, cambered or concavical with a pronounced curve on their under side and inclined at a suitable angle rearward for effecting the required tangential lifting force or torque of the planes. The planes are supported in relatively fixed relation on opposite spoked ends 29, the open cylindrical structure as a whole being rotatable on shafts

30 supported in suitable bearings in the frame structure 2.

A stationary multiple radial cylinder motor, common to both sets of the rotatable planes, is used as here shown, for driving the planes, the connection between the motor and each plane consisting in a divided shaft 32, a universal joint 33 between the sections of the shaft, and a worm gear drive 34 connecting the drive shaft to shaft 30 upon which the plane is mounted. The planes of each set are driven in inverse direction one to the other, each plane rotating around a semi-circular hollow body 35 supported on shaft 30 and extended between the ends 29, the greater portion of the body being below the center of rotation of the planes. The lower portion of each unit of the planes is enclosed in a semi-circular casing 36, there being the required clearance between the bodies 35 and the covering casings 36 for the free movement of the planes.

Operation of the rotatable planes produces an upward lift on the airplane of sufficient force to take all or part of the load off the lateral planes 18 and the forward driving propeller 3 in ascending or descending regardless of the forward speed, the rotatable planes having the further effect of stabilizing the plane fore and aft and maintaining its equilibrium at relatively lower speeds than is possible with airplanes of the usual construction.

Both motors 4 and 31 are suitably connected to fuel supply tanks 37 supported in shock absorbing material 38 and enclosed between asbestos covered walls 39 adjacent the passenger compartment and the casings 36.

The rudder 40 of the airplane, as here shown, is flat, generally rectangular-shaped and is connected to the rudder shaft 41 by a universal joint 42, the shaft 41 being connected to the rudder control lever 42 adjacent the pilot's seat by interposed rods 43—44 and levers 45—46 and compensating joints 47—48 so arranged that universal angular adjustments of the rudder can be effected, within the required range by means of the control lever which is supported in brackets 49—50 for both pivotal and rotatable movements. The wide range of adjustments serve for giving the rudder a relatively greater effect upon the movements of the airplane.

Means are provided, as herein shown, for conducting the exhaust from motor 31 to the lateral planes 18 and to the rudder for preventing or minimizing the formation of ice thereon when flying in wet and freezing weather, thus to provide a further safeguard to the operation of the airplane. The connections for conducting the exhaust to the lateral planes consist of a pipe line 51 leading from the motor to the opposite planes, the lines leading to chambers 52 which discharge through the hollow journals 19 upon which the

planes are mounted into the forward portion of the planes, the journals being suitably apertured as indicated at 53 for distributing the heat in the planes, the exhaust from the planes being through a series of ports 54 along the rear edge of the planes. The discharge to the rudder is into a jacket 55 which encloses the universal joint 42 circumferentially, and thence through a series of ports 56 over the adjacent surfaces of the rudder.

Opposite parachute structures 57 may be attached, as shown in Fig. 3, along the opposite sides of the airplane below the plane of the lateral planes 18, the parachutes as collapsed being arranged in plural folds extending fore and aft and conforming to the adjoining surface of the airplane, the parachutes being spaced one from another on fold lines 58 to provide clearance for the landing gear 9. Wire cables or struts 59 are suitably arranged in the folds for supporting the parachutes when the same are released and opened for effecting a landing, the parachutes serving more especially for sustaining the airplane for making a gradual descent in an emergency when a normal landing cannot be accomplished. Any suitable releasing devices as the clasps 60 releasable by pulling a cord 61 adjacent the pilot's seat may serve for supporting the folded parachutes and for releasing the same for emergency use.

Certain of the detail structure of the airplane as herein shown and described is shown more or less conventionally for illustrative purposes, my invention relating more especially to fundamentals or principles of construction as embodied in the rotatable lifting planes in their correlation to the forward driving propeller and the lateral planes, and the wide range of adjustments of the lateral planes and the rudder for governing the movements of the airplane. As far as I am aware the principles of airplane construction set forth in my issued patent herein referred to and the further amplification of new principles and improvements of the earlier constructions are broadly new in the art. I desire to claim the same broadly therefore, as to the new principles and as to new structure herein presented and defined and comprehended in the appended claims.

I claim as my invention:

1. An airplane including a forward driving propeller, a stream line fuselage, a semi-cylindrical housing, open upward intermediate the ends of the fuselage substantially within the plane thereof, and a rotatable plane operable in the housing, and opposite laterally extended stationary planes intermediate the ends of the rotatable plane.

2. An airplane including a forward driving propeller, a stream line fuselage, a semi-cylindrical housing, closed at its ends and under side and open upward, intermediate the ends of the fuselage substantially with-

in the plane thereof, and a plurality of planes rotatable as a unit in a suction relation in said housing, and opposite laterally extended stationary planes intermediate the ends of the rotatable plane.

3. An airplane including a forward driving propeller, a stream line fuselage, a plurality of opposite semi-cylindrical housings, closed at their ends and under sides and open upward, intermediate the ends of the fuselage on opposite sides of its axial center substantially within the plane thereof, and a plurality of planes rotatable as a unit in each housing in synchronized operation one plane with another, and opposite laterally extended stationary planes intermediate the ends of the rotatable plane.

4. An airplane including a forward driving propeller, a stream line fuselage, a hollow, closed housing intermediate the ends of the fuselage substantially within the plane thereof, a semi-cylindrical housing arranged under, spaced from and enclosing the hollow housing, a plurality of planes rotatable as a unit through said space between the housings in suction relation therewith, and opposite laterally extended stationary planes intermediate the ends of the rotatable plane.

In testimony whereof I affix my signature.

INGEMAR K. RYSTEDT.