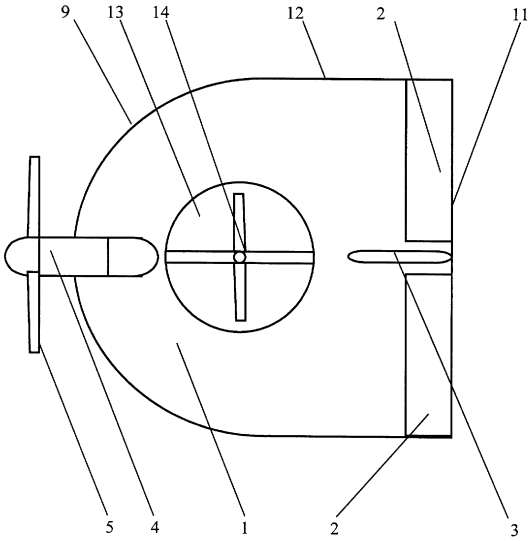
Unmanned flying vehicle



ФИГ.1

IPC classes for russian patent Unmanned flying vehicle (RU 2288140):

B64C39/02 - characterised by special use

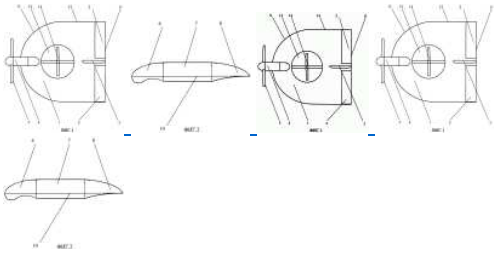
B64C39 - Aircraft not otherwise provided for

FIELD: aeronautical engineering; development of micro- and mini- unmanned f

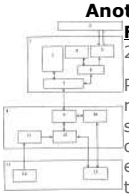
SUBSTANCE: proposed flying vehicle has cantilever wing equipped with aerody members, vertical tail, engine nacelle and one engine with propeller. Engine is nacelle. Flying vehicle is made according to flying wing arrangement without fu Leading edge of nose part of central profile is rounded-off and bent downward. tail section of central profile are bow-shaped curves with convex part directed curves come together to trailing edge of central profile. Outlines of upper and l of center part of central profile are straight parallel lines connected with respec of nose and tail sections of central profile. Wing leading edge in plan is formed circle whose center angle is equal to 180° with center lying on chord of wing ce Wing trailing edge is rectilinear in plan but not swept. Nose section of wing bou by wing leading edge is formed by rotation of nose and center parts of center p to said center of circle arc in plane perpendicular to plane of symmetry of flying running through chord of central profile. Tail section of wing is rectangular in p through chord of central profile. Terminal edges of rectangular section of wing engageable with leading edge of wing nose section.

EFFECT: improved aerodynamic and functional characteristics.

18 cl, 2 dwg

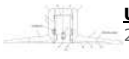


Another patents in same IPC classes:



Fighting vehicle reconnaissance complex / 2272753

Proposed reconnaissance complex includes main rotor with electric drive, platform flight control system and reconnaissance equipment mounted on unmanned flying platform. Reconnaissance equipment is provided with system for transmission of data to complex control unit mounted on fighting vehicle and transmission of commands from complex control unit to platform flight control unit. Platform is provided with specimen automatic tracking system. Data transmission system is equipped with unit of conjugation with object of installation. Said control unit is provided with operator's automated position with computer and control console. Units of reconnaissance complex are connected with operator's automated position through conjugation unit.



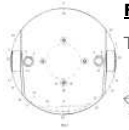
Unmanned aerial vehicle (options) / 2213024

The invention relates to aviation

Return unmanned aerial vehicle / 2185309

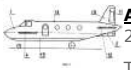
Multipurpose amphibian aircraft / 2179135

The invention relates to marine aircraft and for creation of rescue aircraft with vertical take-offs and landings



Flying saucer / 2175627

The invention relates to the field of aviation



Aircraft with a carrying case / 2168446

The invention relates to aviation

Assault suit / 2166897

The invention relates to aircraft, and in particular to aircraft special purpose, in p unmanned aerial vehicles designed to carry out aerial reconnaissance. The inver used in the development of micro and mini UAVs with flight speed from 30 to 10

Known unmanned aerial vehicle (UAV)that contains cantilever wing, equipped wi controls, vertical tail, nacelle and engine installed in the nacelle (EN 2181333 C2

However, this UAV is designed for high speed flight, has a complex aerodynamic mechanization of bearing surfaces.

Known unmanned aerial vehicle containing cantilever wing, equipped with aerod controls, vertical tail, nacelle, at least one engine with a propeller installed in the the payload (EN 2065379 C1, 20.08.1996).

The famous aircraft wing made of articulated from the bearing surfaces, mounte and tail parts of the fuselage and forming around it a closed path in the shape o polygon. Tail horizontal tail is made of articulated from n the existing surfaces, f shape of a closed polygon. The engines installed in the middle part of the fuselag pylons. The disadvantage is that the layout of the aircraft is low bearing capacity poor handling and difficulty providing longitudinal and directional stability, as we effective, due to the increased drag, the location of the engines. The design of th complex and low-tech.

Also known unmanned aerial vehicle (prototype)containing, as proposed, cantile equipped with aerodynamic controls, vertical tail, nacelle, at least one engine wi installed in the nacelle, and the payload (EN 2213024 C1, 27.09.2003).

Known from the patent RU 2213024 aerodynamic design of an unmanned aerial fuselage, connected in the rear part of the wing, and in the fore part of the Unite horizontal tail, vertical tail, and powerplant. While the fuselage at the tail end ar interconnected by a center section of the wing, and the fins are installed on each wing is made triangular with a small constant sweep of the leading edge and hig (>6). The power plant is located on the center wing slid the and between fins ar two engines, installed in the nacelle, mounted on the pylon.

However, for such aerodynamic design of the aircraft is characteristic deteriorati aerodynamic maneuvering and flight performance. This is because the vertical fi effective because of the shading of the stream by the fuselage in flight at high a There is also the shading of the stream incident on the wing, front wing, horizon surfaces, which also affects maneuvering and landing characteristics of the aircr that used for the wing characteristic boundary layer flow from the middle to the the occurrence of the limit disruption of flow even at relatively small angles of at angles of attack increase the bevel angle of flow behind the wing. Consequently aerodynamic and agile characteristics, reducing aerodynamic quality deteriorate properties, stability and controllability known aircraft (LA), especially at high ang Also known aerodynamic design has a low load-bearing properties due to the us with the traditional form of the profile is not optimized for low Reynolds numbers characteristic for flying small aircraft (mini and micro UAVs). This is because wh stream of the bearing surfaces at low Re number, which occur when flying small the dependence of the lift coefficient $su_{and}$from the angle of attack α characterize considerable ambiguity ("hysteresis") about the critical range. When increasing t attack is increased values $su_{and}$and , after separation of the flow from the surfac

The invention relates to clothing designed to protect against, as well as aircraft heavier than air

The plane (options) / 2148534

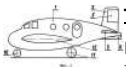
The invention relates to aviation and can be used to create a passenger cargo and Combi aircraft, the fuselage of the aircraft has a non-circular shape, formed by four segments of circles in the upper, lower and lateral parts, joined in the area of the main compartment

The plane / 2134649

The invention relates to the field of engineering

Unmanned aerial vehicle / 2133210

The invention relates to unmanned aerial vehicles (UAV) vertical takeoff and landing (GDP) and, in particular, to BLAH with toroidal fuselage and a pair of coaxial main rotors rotating in opposite directions in the annular channel formed by the fuselage, and providing the capability of vertical takeoff and landing



Transport aircraft / 2287454

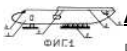
Proposed aircraft has fuselage, two half-wings, jet engine, vertical and horizontal stabilizers and landing gear. Each half-wing has through passages of rectangular section which are parallel relative to each other along half-wing span. Each through passage has lower passage whose inlet hole is located on lower surface of half-wing; upper passage is narrower as compared with lower passage and its outlet hole is located on upper surface of half-wing.

Double-deck horizontal takeoff and landing aircraft with tiltable wings / 2286287

Proposed aircraft has fuselage with upper and lower decks, front wing 3 located in nose section of fuselage at varying incidence of lifting surfaces and automatic system for longitudinal stabilization by means of interceptors or rudders. Aircraft is additionally provided with rear wing 4 located on upper surface of upper deck which is shifted relative to lower deck. Provision is made for front wing attachment and turning unit. Pivot axles of tiltable wings are articulated for obtaining the required angle of attack at aircraft longitudinal control; they are located at distance in length and height of fuselage to exclude aerodynamic effect of front wing on rear one. Front wing is mounted in nose section of fuselage on upper surface of lower deck.

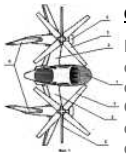
Aircraft / 2284949

Proposed aircraft has fuselage with tail unit in form of stabilizer with elevator and two end fins with rudder, wing, engine and landing gear. Aircraft is also provided with additional fuselages which are located in parallel and symmetrically relative to longitudinal axis; these fuselages are secured on upper surface of root section of each wing outer panel connected by means of coupling members with main fuselage. Secured to lower surface of tail section along longitudinal axis of main fuselage is fin with rudder and rear support. Cavity of each additional fuselage is communicated with cavity of main fuselage by means of passage of coupling members. Leading and trailing edges of wing outer panels and stabilizer are made in form of conchoid curve. Stabilizer is connected with tail section of each fuselage. Coupling members are made in form of flanges and adapter.



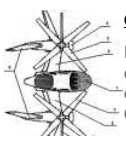
Aircraft / 2283261

Proposed aircraft has fuselage, engines, landing gear and control cabin. Aircraft is provided with trough-shaped wing, vertical fins with rudders, stabilizer and elevons. Wing is mounted on fuselage which has no tail section. Vertical fins with rudders are mounted underneath the wing. Stabilizer and elevons are mounted on trailing edge of wing.



Convertiplane / 2282566

Proposed convertiplane has fuselage 1 with cabin, wings 2 and two screws 3. Screws may change their position from vertical to horizontal. Convertiplane engines are mounted in fixed parts of elongated nacelles 4 which are mounted in center section of each wing 2. Mounted on movable part of each engine nacelles 4 are screws 3; nose horizontal fin 5 is located after screws 3. Fixed section of each engine nacelles 4 is provided with vertical tail unit 6 which is inclined inside relative to vertical longitudinal plane of fixed section of engine nacelle 4.



Convertiplane / 2282566

Proposed convertiplane has fuselage 1 with cabin, wings 2 and two screws 3. Screws may change their position from vertical to horizontal. Convertiplane engines are mounted in fixed parts

decreases lift coefficient, whose value is not restored until a substantial reductio of attack α. To eliminate this undesirable effect, it was necessary to develop a sp that is different (in addition to other features) limb bow down.

The placement of the power plant on the pylon (outside of the fuselage) also aff aerodynamic characteristics of the known UAV, as it increases the drag of the ai whole.

Also known UAV has a complex structure and spatial configuration, and consequ processability during production.

The objective of the proposed invention is to develop a model layout (i.e. in the and relative location of the individual who's structural elements wing, fuselage, engine, etc) small unmanned aerial vehicle, which provides a high aerodynamic (flight-technical characteristics and, in addition, the simplicity and high manufac design.

This technical result is achieved in that the unmanned aerial vehicle containing c equipped with aerodynamic controls, vertical tail, nacelle and at least one engine propeller installed in the nacelle according to the invention, made by bestusaain scheme "flying wing". The Central wing profile consists of the fore part, middle p part. The front edge of the forward part of the Central profile is made rounded a The shape of the caudal part of the Central profile is designed as an arched curv upward convex part and converging to the rear edge of the Central profile. The upper and lower contour of the middle part of the Central profile is designed as s lines connected to the respective contours of the nose and tail parts of the Centr front edge of the wing in the plane formed by the arc of a circle, the Central ang 180 degrees, with the center, the positioning on the Central chord of the wing p edge of the wing in the plan is made straight and not swept. The fore part of the plane bounded by the front edge of the wing, formed by rotation of the anterior parts of the Central profile, relative to that of the center of the arc of a circle in perpendicular to the plane of symmetry of the aircraft and passing through the the profile. The trailing portion of the wing in the plan is made rectangular and a forward part of the wing. While the end edges of the rectangular wing connected edge of the fore wing.

In addition, the wing can be performed with low aspect ratio, component equal t two.

It is advisable that the Central profile of the wing had a relative thickness of 12

Along with this, the vertical tail may consist of a set in the plane of symmetry of the end portion of the wing with a single vertical fin with rudder.

Also on the upper end of the vertical fin can be mounted horizontal tail.

The area of horizontal tail is not more than 10% of the area of the wing.

Provided that the vertical tail may consist of spaced relative to the plane of sym aircraft of the two fins, each of to the which is installed on the end of the respec rectangular wing. Each fin is equipped with an adjustable rudder.

It is advisable that the vertical fin keels were fitted with a camber angle of 5 to

Provided also that the aerodynamic controls can consist of two elevons mounted respective consoles wing.

It is recommended that each elevon was installed across the rear edge of the co wing.

Thus, it is expedient that on the rear edge of each elevon was set plate rigidly m angle of 90 degrees relative to the upper surface of the elevon.

Along with this, it is recommended that the relative height of the shield, represe of the height of the flap to the length of the chord of the elevon was less than or

Also on the rear edge of each elevon can be hinged flap with a possible deviation up and 90 degrees down when turning relative to the trailing edge of the elevon

It is advisable that the center of mass of the aircraft was located ahead of the ae center of the wing.

It is recommended that the nacelle was placed in the fore part of the wing in the symmetry of the aircraft.

Provided that the aircraft was equipped housed in a wing of the vertical annular Central is the first axis is located in the plane of symmetry of the aircraft, and in channel a lifting motor rotor cyclically variable-pitch blades.

In addition, the payload can be placed in the inner cavity of the wing.

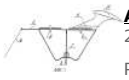
Along with this payload may consist of functionally interconnected sensors trans transmitting antenna, navigation system and power supply system.

Figure 1 shows the unmanned aerial vehicle in the plan.

Figure 2 shows the shape and parts of the Central wing profile.

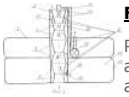
Unmanned aerial vehicle (UAV) contains cantilever wing (1), equipped with aero controls (2), vertical stabilizer (3), the nacelle (4) and at least one engine with a The engine is mounted in the nacelle. UAV made by bestusaain aerodynamic sch wing". The Central wing profile consists of the nasal part (6), middle part (7) an front edge of the forward part of the Central profile is made rounded and bent d constructive design of the leading edge of the bow profile virtually eliminates the of hysteresis in the dependence of the lift coefficient ($su_{and}$from angle of attack (of the caudal part of the Central Pro which I made as arcuate curves, facing upw part and converging to the rear edge of the Central profile. The contours of the contour of the middle part of the Central profile is designed as straight parallel li to the respective contours of the nose and tail parts of the Central profile. Front wing in the plane formed by the arc of a circle, the Central angle is equal to 180

of elongated nacelles 4 which are mounted in center section of each wing 2. Mounted on movable part of each engine nacelles 4 are screws 3; nose horizontal fin 5 is located after screws 3. Fixed section of each engine nacelles 4 is provided with vertical tail unit 6 which is inclined inside relative to vertical longitudinal plane of fixed section of engine nacelle 4.



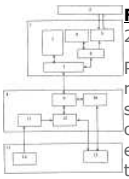
Aero electrically lifting flying vehicle / 2278061

Proposed aero electrically lifting flying vehicle has fuselage, electric motors whose shafts are connected with propellers and with electric power source located on ground or on transport facility by means of electric cables. Secured on fuselage above flying vehicle CG is line connected with length regulator found on ground or on transport facility. Flying vehicle is provided with at least one wing stabilizer mounted on fuselage. Said line is secured on fuselage through swivel truss mounted on fuselage by means of articulated joint.



Flying vehicle / 2277059

Proposed flying vehicle has fuselage for payload and ejection unit for acceleration of gas. Gas acceleration ejection unit includes at least two nozzles which are hermetically interconnected and at least one evacuated cavity which is communicated with reservoir. Two gas acceleration ejection units are mounted in succession. Nozzle of gas acceleration ejection unit is provided with cutoff device communicated with starting nozzle or with at least one navigation nozzle or with high-pressure receiver or with any combination of them. Cutoff device may be used for changing the area of gas flow including complete cutting-off of gas flow. Flying vehicle is also provided with at least two navigation nozzles which are hermetically interconnected.



Fighting vehicle reconnaissance complex / 2272753

Proposed reconnaissance complex includes main rotor with electric drive, platform flight control system and reconnaissance equipment mounted on unmanned flying platform. Reconnaissance equipment is provided with system for transmission of data to complex control unit mounted on fighting vehicle and transmission of commands from complex control unit to platform flight control unit. Platform is provided with specimen automatic tracking system. Data transmission system is equipped with unit of conjugation with object of installation. Said control unit is provided with operator's automated position with computer and control console. Units of reconnaissance complex are connected with operator's automated position through conjugation unit.

Flying stand / 2268845

Proposed flying vehicle consists of two annular wings located coaxially in parallel planes and rotating in opposite directions, pilot cabin secured immovably on flying vehicle platform, pilot seat for control of flying vehicle and engine mounted under pilot cabin for rotating annular wings and creating lifting force.

Aircraft / 2243922

Aircraft has fuselage with tail unit in form of fin with rudder and stabilizer, wing, elevator with drive, two landing gears and rear support. Side edges of rear end of fuselage have two lugs located opposite each other in parallel and symmetrically relative to longitudinal axis; each lug has hole for elevator. Wing and stabilizer edges are made according to exponential function curve. Elevator is made in form of lever on upper front portion. Drive of elevator includes rod whose one end is articulated to lever of control wheel and other end is articulated to lever of said elevator.

the center located on the chord (10) of the Central wing profile. The rear edge o is made straight and not swept. This improves the efficiency of the aerodynamic fore part of the wing in the plane bounded by the front edge of the wing, formec the anterior and middle parts of the Central profile relative to that of the center circle in the plane perpendicular to the plane of symmetry of the aircraft and pas the Central chord of the profile. The trailing portion of the wing in the plan is ma and adjacent to the forward part of the wing. While the end edge (12) of the rec connected with the front edge (9) fore wing. This constructive design of the wing small aircraft is the best in comparison with wings other forms of distribution cir that provides the t high values of aerodynamic characteristics. In addition, virtua the occurrence of divergence of the wing.

The use of a wing of small aspect ratio without breaking edges and small protruc allows you to tighten the disruption of the flow to large angles of attack, provide longitudinal stability and controllability and reduces the drag coefficient. So it m the wing was made with a small elongation components equal to or less than tw

To increase the lifting force is preferable that the Central profile of the wing had thickness of 12 to 14%.

Vertical stabilizer (3) may consist of a single vertical fin with rudder. The vertica in the plane of symmetry of the aircraft at the end portion of the wing. To increa aerodynamic qualities of the aircraft and improve longitudinal balance on the up vertical fin can be mounted horizontal stabilizer. The area of horizontal tail shoul 10% of the area of the wing.

To improve the landing characteristics provided that the vertical tail may consist relative to the plane of symmetry of the aircraft of the two fins, each of which is the end of the meet the overall console rectangular wing. Each fin is equipped w adjustable rudder. It is advisable that the fins spaced vertical fin were installed angle from 5 to 15 degrees. This tail can improve its performance by excluding t shading flow from the fuselage at high angles of attack.

Aerodynamic controls (2) can consist of two elevons mounted on the respective To improve the maneuverability of the aircraft it is recommended that each elev installed across the rear edge of the corresponding wing. Thus, it is expedient to balancing characteristics to the rear edge of each elevon was set plate rigidly mo angle of 90 degrees relative to the upper surface of the elevon. Along with this, recommended that the relative height of the shield, representing the ratio of the flap to the length of the chord of the elevon was less than or equal to 0.1. On th each elevon can be hinged flap with a possible deviation of 90 degrees up and 9 when turning relative to the trailing edge of the elevon.

To ensure sustainability, it is necessary that the center of mass of the aircraft w ahead of the aerodynamic center of the wing. For the mind is nisene drag nacell placed in the fore part of the wing in the plane of symmetry of the aircraft.

Provided that the aircraft can be equipped housed in a wing of the vertical annul (13), the Central axis is located in the plane of symmetry of the aircraft, and ins channel of the elevating motor (14) of the rotor cyclically variable-pitch blades.

To reduce drag payload can be placed in the inner cavity of the wing.

Depending on the flight task payload UAV may consist of functionally interconne transmitting unit transmitting antenna, navigation system and power supply sys

Unmanned aerial apparatus operates as follows.

Deploying ground-based remote unmanned aerial vehicle. Performed preflight pr Is start UAV, for example, a mobile or stationary starting installation. Start the e the start is carried out automatically or by operator command. Flight of the UAV accordance with flight activity in a given program, and by radio transmitted by t from the ground point to remote control. The ground station remote control firet the team, transmitted over the air to the avionics installed on the UAV. These cc control the flight of the aircraft with flight control and navigation systems, as we example, remote overview location and transmitting the video and telemetry da transceiver antenna and transceiver unit on the ground, point the remote contro

Control aircraft (LA) is carried out using elevons (2), rudder mounted on the ver pivoting rudders installed on war vertical stabilizer (3). The elevons are used to longitudinal and transverse controllability and balancing of aircraft, because they allerona mode, and in the elevators. Rejecting these modes simultaneously in op directions to control the LA relative to its longitudinal axis (roll). While deflection only up or only down is the management of LA relative to its transverse axis, i.e act as a rudder. Ground handling and balancing are achieved by a deviation of th (rudder) direction.

Because the center of mass of the aircraft is ahead of the aerodynamic center of increasing plainaki, for example, due to a gust of wind will cause an increase in While on an aircraft relative to the center of mass will have more time, calling th dive there is a reduction in the angle of attack and restore the specified direction

Additionally mounted on the UAV the lift motor provides vertical takeoff and lanc "hang" of the aircraft, as well as its stability in all flight modes.

1. Unmanned aerial vehicle containing cantilever wing, equipped with aerodynan vertical tail, nacelle, at least one engine with a propeller installed in the nacelle, payload, wherein the aircraft is made by bestusaain aerodynamic design a flying wing profile consists of the fore part, middle part and rear part, the front edge o part of the Central profile is made rounded and bent down, the shape of the cau Central profile as arcuate curves, facing upward convex part and converging to t the Central profile, and the contours of the upper and lower contours of the mid Central profile is designed as a direct parallel the data line, United with the corre contours of the nose and tail parts of the Central profile, the front edge of the w formed by the arc of a circle, the Central angle is equal to 180°, with the center

Central chord of the wing profile, the rear edge of the wing in the plan is made s
arrow-shaped nose portion of the wing in the plane bounded by the front edge o
formed by rotation of the anterior and middle parts of the Central profile relative
center of the arc of a circle in the plane perpendicular to the plane of symmetry
and passing through the Central chord of the profile, the trailing portion of the w
is made rectangular and adjacent fore wing, with the end edges of the rectangul
connected with the front edge of the fore wing.

2. Aerial apparatus according to claim 1, characterized in that the wing is made
elongation equal to or less than two.

3. Aerial apparatus according to claim 1 or 2, characterized in that the Central w
a relative thickness of 12 to 14%.

4. Aerial apparatus according to claim 1, characterized in that the vertical tail co
in the plane of symmetry of the aircraft at the end portion of the wing with a sin
with rudder.

5. Years the proportion apparatus according to claim 4, characterized in that on
of the vertical fin set horizontal tail.

6. The aircraft according to claim 5, characterized in that the area of the horizon
more than 10% of the area of the wing.

7. Aerial apparatus according to claim 1, characterized in that the vertical tail co
spaced relative to the plane of symmetry of the aircraft of the two fins, each of w
mounted on the end of the respective console rectangular wing, with each fin is
a rudder.

8. The aircraft according to claim 7, characterized in that the fins vertical fin set
angle from 5 to 15°.

9. Aerial apparatus according to claim 1, characterized in that the aerodynamic c
of two elevons mounted on the respective consoles wing.

10. The aircraft according to claim 9, characterized in that each elevon is installe
rear edge of the corresponding wing.

11. The aircraft according to claim 9 or 10, characterized in that the rear edge o
set plate rigidly mounted at an angle of 90° in relation to the upper surface of th

12. Aerial apparatus according to claim 11, characterized in that the relative hei
shield, representing the ratio of the height of the flap to the length of the chord
less iliamna 0,1.

13. The aircraft according to claim 9 or 10, characterized in that the rear edge o
hinged flap with a possible deviation of 90° up and at 90° down while rotating re
trailing edge of the elevon.

14. Aerial apparatus according to claim 1, characterized in that the center of ma
aircraft is ahead of the aerodynamic center of the wing.

15. Aerial apparatus according to claim 1, characterized in that the nacelle is pla
forward part of the wing in the plane of symmetry of the aircraft.

16. Aerial apparatus according to claim 1, characterized in that it has placed in t
annular channel, the Central axis is located in the plane of symmetry of the aircı
installed in the channel a lifting motor rotor cyclically variable-pitch blades.

17. Aerial apparatus according to claim 1, characterized in that the payload is pl
inner cavity of the wing.

18. Aerial apparatus according to 14, characterized in that the payload consists
interconnected electronic equipment monitoring transmitting unit transmitting a
navigation system and power supply system.