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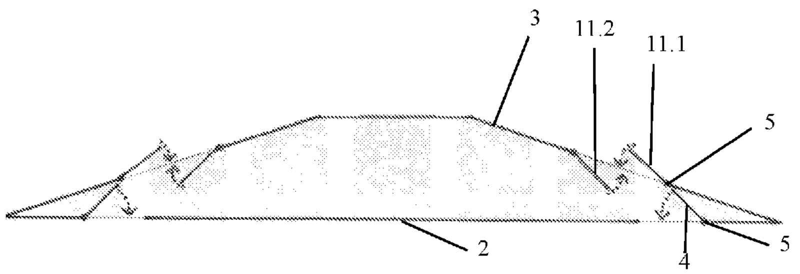

Fig. 2b

(57) Abstract: A rotating uplift and carrier disk (1) consists of a hollow body comprising a leading casing (3) and a flat base (2) which is provided with at least two pairs of flaps, with one pair of flaps consisting of a double flap (11) on the leading casing (3) and a single flap (4) on the base (2) and the flaps of one pair are arranged one above the other or diagonally or one against the other, and the flaps are attached to the rotating disk (1) along one edge of the flap (4) on which they are tilted. The single flap (4) opens into the disk (1) and the double flap (11) is divided into two opposing sections that open against each other, with the first section (11.1) of the double flap (11) opening out of the rotating disk (1) at an angle of maximum 20° to the closed position, and the other section (11.2) of the double flap (11) opening into the rotating disk (1) at an angle of at least 20° to the closed position.

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A rotating uplift and carrier disk for vertical take-off and landing, and also for forward flight, the mode of flight and its use

Field of Technology

Specially developed rotating disk, allowing the vertical take-off of any transport or passenger aircraft

State of the Art

Since time immemorial, flight engineers have been trying to find a concept combining the advantages of a helicopter and an aircraft. What they want is to design a machine that is fast and manoeuvrable, and can start and land anywhere. The existing technical solutions are attempting to achieve the optimal STOL characteristics, that is, to design an aircraft capable of the short take–off and landing, by modifying existing carrier surfaces (such as flaps and slats). According to the information available it is known that the magnitude of resistive force increases at the same ratio as the magnitude of the uplift force is increased by these means (flaps, slats). Therefore, for any machine to be lifted off the ground, it requires the uplift force that is generated in different types of aircraft by different methods:

a) by horizontal movement generated by pulling force of a drive unit and so by the relative speed of the aeroplane in relation to static air (gaseous) environment that generates the uplift force by acting on the fixed or rotating carrier surfaces required for the flight (aeroplanes, gyroplanes);

b) by vertical acceleration of the air (gas) stream in the downward direction, thereby generating an uplift force (on rotating carrier surfaces) or a reactive force (air/gas stream) acting in the upward direction (helicopters, convertiplane, vertical take-off jet aircraft).

At present, there are two basic types of machines used in aviation, the fixed wing aircraft and the equipment that is capable of vertical ascent.

Fixed wing aircraft

Fixed wing transport or passenger aircraft that needs a sufficiently long runway for movement in the air and can reach speeds of up to about MACH 3 (over 3000 km/hour). The aircraft moves using the uplift force that is generated above and under the wing of the aircraft. The air on the upper side of the wing flows faster than on the lower side, generating a pressure difference that is lifting the wing upwards. The aircraft that is capable of high speed going forward does not have any structural elements that would temporarily increase its resistance and uplift so that it would stop moving forward and start moving only upwards. By increasing the resistive force, the overall wing profile characteristics (Cy/Cx) start to deteriorate, resulting in a decrease in uplift.

In addition, if it were possible to stop the forward motion of this aeroplane by means of its construction features, the plane would fall down because it would stop being subjected to the required uplift force generated by its speed. Increasing the resistive and uplift forces of fixed wing aeroplanes, and thereby reducing its forward speed, is achieved by extending flaps and slats but their efficiency is not great and serves only for the safe take-off and landing.

Machine capable of vertical ascent

The first representative is a helicopter, which is capable of vertical ascent, by generating uplift with rotating surfaces (blades, wings) in its own, downwardly accelerated air stream, which means that the resultant force is due to the vertical acceleration of the air flow downwards, which is very inefficient and energy intensive. It does not need a runway and reaches a maximum speed of 400 km/h. However, the helicopter is a very complex and expensive machine requiring constant maintenance, it is naturally unstable in a hover position. Coaxial counter-rotating rotors or intersecting counter-rotating rotors that do not have their forward speed constrained are even more complex.

The convertiplane combines the features of the aircraft and the helicopter at the same time. It is capable of vertical take-off and landing, but the necessary large propellers are tilted into a vertical position and, once on the ground, they cannot be tilted to a horizontal position. The diameter of the propellers is quite large, approaching the size of the helicopter rotors. The convertiplane has a complex construction and its transition from hover position to forward flight is complicated, as it requires to tilt the propellers by 90°. Therefore, it is also not possible to land from or after the horizontal flight.

Combination of both types

A modern flying machine is the so-called gyroplane (also gyrocopter or autogyro). Like a helicopter, it is an aeroplane heavier than air that is equipped with rotating carrier surfaces called the rotors. However, unlike helicopters, the gyroplane does not have a rotor driven by its own engine; instead, it is provided with a motor driven propeller (which can be either a pull propeller or a push-propeller) the pulling force of which causes the gyroplane to move forward. The forward motion generates aerodynamic forces that rotate the rotor. The rotor blades are not rotated actively by a drive unit, they rotate by themselves due to the air flowing between the rotor blades. For the air to flow between the blades, the gyroplane has to move forward, which is done by a push-engine with a propeller. Depending on the wind force, to start the gyroplane's rotor spinning with revolutions required for a take-off, a starting distance of about 100 meters is required.

Because it is necessary to maintain a constant forward motion, the gyroplane cannot just hover in the air in one place. The gyroplane does not allow flight at a level below the multiple of one gram, which can be caused not only by a pilot error, but also by turbulent weather. In the case of a multiple zero gram, the uplift and weight are equal to zero and the rotor resistance drops to a insignificant value. However, the propeller thrust and fuselage resistance will remain as they are, causing a moment that leads to an inverted half loop. Yet, the gyroplane is safer than a helicopter and, in the event of a rotor failure, the gyroplane will sail safely to the ground. Nowadays, gyroplanes are popular mainly among the aviation enthusiasts.

The first prototype aircraft with a vertical take-off was Harrier, but it consumed a considerable amount of fuel during take-off, and a vertical take-off was conducted only rarely. In the Soviet Union, a great emphasis was put on the planes capable of vertical take-off. Several types have been constructed with the names like Freehand, Forger and Freestyle with engines and moveable jets. Another aircraft mentioned was ZELL (Zero-Length Launch). This combat aircraft took off from an inclined launch platform using rocket engines. The Bell-Boeing V-22 was moving by tipping propellers or rotors, air-blast engines, jet and turboprop engines. However, none of the aircraft mentioned above found its use.

The latest prototype aircraft from the company Airbus is described in the Patent US2016/0236774. The aircraft consists of a fuselage with carrier wings and pylons fitted on the sides of the fuselage. The aircraft has four rotors consisting of propeller blades. The rotors are active during the aircraft's take-off, and when reaching the required altitude, the rotor blades are hidden in the hole in the pylon to minimise air resistance. The disadvantage of this design is the increased size and weight of the entire aircraft structure with the pylons attached, as well as the large resistive force acting on the pylons. The prototype aircraft takes off as a helicopter (it has propeller blades just as a helicopter) and then continues flying like a classic aeroplane (making use of engines and long wings).

Currently there is not known any functional machine that would be capable of vertical take-off and landing without, at the same time, the machine's structure constraining its forward speed. With all existing known configurations of drive units and carrier surfaces (fixed or rotating), it is not possible to achieve such a force resultant, allowing controlled vertical take-off and landing (VTOL) and forward flight.

Description of the Invention

A rotating uplift and carrier disk has been developed, which is designed for vertical take-off and landing and also for the forward, horizontal or continuously rising flight. It makes maximum use of the aerodynamic forces to direct air flow round the bodies, like an aircraft's fuselage with wings on the sides, for horizontal flight and for the uplift generated by rotation like the helicopters for vertical take-off.

The rotating uplift and carrier disk consists of a hollow body comprising a leading casing and a flat base which is provided with at least two pairs of flaps, with one pair of flaps consisting of a double flap on the leading casing and a flap on the base and one pair of the flaps arranged one above the other or diagonally or one against the other, and the flaps attached to the rotating disk along one edge of the flap on which they are tilted. The single flap opens into the disk and the double flap is divided into two opposing sections that open against one other, with the first section of the double flap opening out of the rotating disk at an angle of maximum 20° to the closed position, and the other section of the double flap opening into the rotating disk at an angle of at least 20° to the closed position.
For example, the first section of the double flap is tilted upwards, the second section (11.2) of the double flap (11) is tilted downwards inside the rotating disk, the bottom flaps on the base are tilted inside the rotating disk and parallel to the first section of the double flap, with these two flaps now being aligned one opposite the other.

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Or, with an advantage, the first section of the double flap is tilted upwards at an angle, the second section of the double flap is tilted downwards inside the rotating disk, the bottom flaps on the base are tilted inside the rotating disk and parallel to the first section of the double flap (however, these two flaps are not aligned one opposite the other), but the flap (4) overlaps a part of the first section of the double flap, since it is longer than the first section of the double flap, and therefore provides a larger open space for the air flowing between the top and bottom flaps.

Advantageously, the flaps are attached to the rotating disk with a flexible coupling, a swivel coupling, or the flaps are attached using the swing joints. Advantageously, the shape of the flaps is extending and one pair of flaps can be fitted against one another along the extension. The flaps are connected to the opening mechanism so their opening and closing is done, with an advantage, mechanically, hydraulically or pneumatically. The flaps can be tilted around the axis of the rotating disk or the circle inscribed in the rotating disk.

The mode of flight of the flying machine is such that the rotating disk is rotating, the opening mechanism opens the flaps and the uplift force generated will allow the rotating disk to take off. After reaching the required altitude, the opening mechanism will close the flaps and the rotating disk then starts gliding in the air and the flying machine is able to move forward.

The hollow body of the rotating uplift and carrier disk for both vertical take-off and forward flight has an aerodynamic profile and, as an advantage, a circular plan.
With the flaps in closed position, the rotating disk is smooth, the rotating mechanism is turned off and it forms an uplift

body or, as the case may be, a carrier surface for the forward movement. During the flight, the body does not change its height and continues to move freely forward. The spinning rotating disk with the flaps in open position generates an uplift with zero forward speed, therefore generating a vertical force and the body starts moving upwards. Both the options can be variably combined during the flight. From the vertical climb caused by the flaps on the rotating disk in open position, the machine is switched to horizontal motion by shutting the flaps on the rotating disk, and vice versa.

When using a rotating wing, the flying machine does not operate as a helicopter or as a aeroplane, but combines the advantageous features of both the flying machines.

Controlling a flying machine with a rotating disk installed is the same as controlling a classic aircraft or a helicopter, with the difference being that a vertical flight controller has been installed in the cockpit. This controller regulates the spinning of the rotating disk and the opening and closing of the flaps. By gradually increasing the revolutions of the rotating disk and opening the flaps, the machine is switched over to vertical flight. By gradually increasing the revolutions of the engine/propeller, slowing down the rotation of the rotating wing, and closing its flaps, the aircraft's rotating disk will be stopped and the machine will be switched over to a horizontal flight. During the horizontal flight, the machine is controlled using stabilising, levelling and steering controls. For vertical landing the opposite procedure is used: the revolution of the propellers is slowed down or, as the case may be, the engine power is decreased, the revolutions of the rotating disk are increased and the flaps are opened.

The use of a rotating wing has a number of advantages that no flying machine has been able to use so far. In small towns or on islands, there will be no need to build long runways for airplanes, as the flying machine with the rotating disk will be able to raise in the air from a single spot. The small-cabin flying machines that can replace helicopters will be able to fly at supersonic speed, because the rotating disk does not "cut" through the air and therefore does not slow down the horizontal flight. The urgent transport of people in critical condition, for example as in the case of a car accident, will be so much more effective. In the event of unfortunate engine failure, the flying machine can float down safely to the ground, because the rotating disk operates as a uplift component that enables the aircraft to float. Last but not least, it will no longer be so difficult to construct the small-cabin flying machines such as helicopters, and the cost of their production will be reduced and there will be more flying machines to serve the individual people.

Summary of flying machine's benefits:

1) The rotating disk does not slow down the horizontal flight – it may exceed the speed of sound.
2) Energy saving – In a horizontal/forward flight, the flying machine is supported by the uplift force of the rotating disk.
3) It is not noisy.

4) Cheaper and simpler construction.
5) Increased life expectancy.
6) Greater security – in the event of engines failure, the flying machine float down to the ground, landing safely.

The rotating uplift and carrier disk can be used in any type of flying machine, it can be a rotating disk of any size, and there can be any number of rotating disks on a single machine.

The first example is a flying machine, replacing a helicopter, with a rotating wing making use of mainly a vertical take-off, which includes a circular disk with flaps instead of propeller blades as used in classic helicopters. In addition, this flying machine must be provided with drive propellers on the sides of the fuselage, which can be alternatively tilted and, together with the rotating disk, they act as ailerons, or flight control surfaces, necessary to control the flying machine about the longitudinal axis. Revolutions of propeller and flaps settings are computer controlled, all being connected to the pilot controller kit. The pilot has a flight control system equipment in the cabin like in a classic helicopter, plus a vertical flight controller. The circular disk does not slow down the flight, like a helicopter rotor does, and so it can even exceed the speed of sound. Throughout the flight, the flying machine with the circular disk is held in the air during the horizontal flight by the uplift force generated by the circular disk. The energy saving is up to 50%, doubling the flight range of the flying machine with the circular disk. In addition, during the flight the rotating disk is not as noisy as the rotor blades used until the present. The flying machine has a fixed rotor that is not tilted to any side and it is driven directly by the engine through the gearbox. There is no need for the collective control of the propeller and the cardan driveshaft for the rear propeller. Rotating disk flaps are operated mechanically, using a servo motor or hydraulically. The flying machine can be driven by electric motors or turbines.

The other example is a conventional passenger or transport aircraft, which has at least one rotating disk on the top section of the fuselage. Depending on the size and weight of the aircraft, there are two or more rotating discs positioned on the aircraft. The rotating disk is the carrier surface, so the aircraft does not have long wings, the small wings are sufficient to carry jet engines that drive the aircraft. This aircraft is suitable wherever there is a need to transport a large number of persons or a cargo and there is no airport available.

Summary of presented drawings

Fig. 1 a) The top view of a rotating disk (the leading casing of the rotating disk) with four double flaps.
b) The central cross section of a rotating disk with bottom and upper flaps.
c) The bottom view of a rotating disk (rotating disk base).

Fig. 2: a) The top view of a rotating disk (the leading casing of the rotating disk) with two double flaps.
b) The central cross section of a rotating disk with bottom and upper flaps in the open position.
c) The central cross section of a rotating disk with bottom and upper flaps in the open position.
d) The central cross section of a rotating disk with bottom and upper flaps in the closed position.

Fig. 3: The top view of the leading casing of a rotating disk with three double flaps – ().

Fig. 4: The top view of the leading casing of a rotating delta disk with three flaps.

Fig. 5: The isometric view of the airplane with built-in two rotating disks with five double flaps.

Fig. 6: a) The side view of a helicopter with the rotating disk without flaps shown.
b) The view of a helicopter from above with the rotating disk without flaps shown.

Fig. 7: a) The view of a transport aircraft with two rotating disks without flaps shown.
b) The side view of a transport aircraft with two rotating disks without flaps shown.

Examples of Invention Execution

Example 1 a) – The flying machine according to Fig. 6 with one rotating disk with four flaps according to Fig.1

The flying machine (9) consists of a fuselage with a cabin, a drive unit, two jet engines (turboprop engines) on the sides of the fuselage, the stabilising, levelling and steering components in the tail section of the fuselage. The rotating disk (1) is connected to the drive unit that rotates the disk. The rotating disk (1), which has a shape of a blunted cone, consists of a base (2) and a leading casing (3), with the base (2) that can be closed with four single flaps (4) and the casing (3) that can be closed with four double flaps (11). The double flap (11) is divided into two opposite sections which open against each other, with the first section (11.1) of the double flap (11) opening out of the rotating disk (1) at an angle of 20° to the closed position and the second section (11.2) of the double flap (11) opening into the rotating disk (1) at an angle of 20° to the closed position. The flaps (4) open into the rotating disk (1) in parallel with the second sections (11.2) of the double flaps (11). The double flaps (11) on the leading casing (3) are attached to this casing (3) with flexible couplings (5) on the perimeter edge (6) of the double flap (11) and the single flaps (4) on the base (2) are fixed to this base (2) with the flexible couplings (5) on the upper edge (7) of the flap (4). The double flaps (11) on the leading casing (3) have a shape tapering towards the edge of the rotating disk (1) and are tilted at the upper edge (7) of the double flap (11), while the flaps (4) on the base (2) have a shape widening towards the centre of the rotating disk (1) and are tilted to the inside of the rotating disk (1) on the perimeter edge (6) of the flap (4). Both the single flaps (4) and the double flaps (11) are opened mechanically.

The flying machine (9) uses the rotating disk (1) as a carrier surface, while the double flaps (11) and single flaps (4) are used during a vertical take-off. During the take-off, the disc (1) is rotated and the flaps (4) and double flaps (11) are opened so as to generate the uplift force, with the air flowing over the leading casing (3) and through the open double flaps (11) into the rotating disc (1) and out through the flaps (4) under the base (2) of the disc (1), thereby generating the uplift force that lifts the flying machine up in the air.

After the ascent, to start the forward flight, the double flaps (11) and single flaps (4) are closed, the drive unit (8) of the rotating disk (1) is turned off, and the disc (1) starts to function as a carrier surface and, during the forward flight, the flying machine operates as a transport aircraft.

Example 1b) – The flying machine according to Fig. 6 with one rotating disk with two flaps tilting up and down according to Fig. 2

The flying machine (9) consists of a fuselage with a cabin, a drive unit, two turboprop engines on the sides of the fuselage, the stabilising, levelling and steering components in the tail section of the fuselage. The rotating disk (1) is connected to the drive unit (8) that rotates the disk. The rotating disk (1), which has a shape of blunted cone, consists of a base (2) and a leading casing (3), with the base (2) that can be closed with two single flaps (4) and the casing (3) that can be closed with two double flaps (11), with double flaps (11) on the casing (3) and single flaps on the base (2) being positioned opposite each other. The double flaps (11) on the leading casing (3) are attached to this casing (3) with flexible couplings (5) on the perimeter edge (6) of the double flaps (11) and the flaps (4) on the base (2) are fixed to this base (2) with the flexible couplings (5) on the upper edge (7) of the flap (4). The double flaps (11) on the leading casing (3) have a shape tapering towards the centre of the rotating disk (1) and the first section (11.1) of the double flap (11) and the second section (11.2) of the double flap (11) are tilted against one another at the upper edges (7) of the double flaps (11), while the flaps (4) on the base (2) have a shape widening towards the centre of the rotating disk (1) and are tilted upwards to the inside of the rotating disk (1) on the perimeter edge (6) of the flap (4). Both the single flaps (4) and the double flaps (11) are opened hydraulically.

Fig. 2b) shows a version where the first section (11.1) of the double flap (11) is tilted upwards at an angle of 18°, the second section (11.2) of the double flap (11) is tilted downwards into the space of the rotating disk (1), the single flaps (4) on the base are tilted into the space of the rotating disk (1) and in parallel with the first section (11.1) of the double flap (11), with these two flaps (4) now being aligned one behind the other.

Fig. 2c) shows a version similar to Fig. 2b) where the first section (11.1) of the double flap (11) is tilted upwards at an angle of 18°, the second section (11.2) of the double flap (11) is tilted downwards into the space of the rotating disk 1, the single flaps (4) on the base are tilted into the space of the rotating disk (1) and in parallel with the first section (11.1) of the double flap (11); however, these two flaps are not one behind the other as in Fig. 2b), but the flap 4 overlaps a part of the first section (11.1) of the double flap (11) because it is longer than the first section (11.1) of the double flap (11) and thereby providing a larger open space for the air flowing between the upper and lower flaps (4).

The flying machine (9) uses the rotating disk (1) as a carrier surface, while the double flaps (11) and single flaps 4) are used during a vertical take-off. During the take-off, the disc (1) is rotated and the flaps (4) and double flaps (11) are opened to generate an uplift force, with the air flowing over the leading casing (3), through the open double flaps (11) into the rotating disc (1) and out through the disk (1) under the base (2) of the disc (1), thereby generating the uplift force that lifts the flying machine up in the air. After the ascent, to start the forward flight, the double flaps (11) and single flaps (4) are closed, the drive unit (8) of the rotating disk (1) is turned off, and the disc (1) starts to function as a carrier surface and, during the forward flight, the flying machine operates as a transport aircraft.

Example 2a) – The flying machine according to Fig. 7 with two rotating disks according to Fig. 2 with four flaps that are tilted sideways

The flying machine (10) consists of a fuselage with a cabin, two drive units, two jet engines (turboprop engines) on the sides of the fuselage, and two side wings and tail wings. The rotating disks (1) are connected to the drive unit (8) that rotates the disks. The rotating disk (1), which has a shape of blunted cone, consists of a base (2) and a leading casing (3), with the base (2) and the casing (3) that can both be closed with four flaps (4)/(11) which are positioned opposite each other. The double flaps (11) on the leading casing (3) are attached with four flexible couplings (5) on either side of the double flap (11); that is, the first section (11.1) of the double flap (11) is on the one side attached to the leading casing (3) with two flexible joints (5), while the other side can be tilted upwards, and the second section (11.2) of the double flap (11) is on the one side attached to the leading casing (3) with two flexible joints (5) while the other side can be tilted inside the disk (1). Single flaps (4) on the base (2) are fixed to this base (2) with two flexible couplings (5) on the opposite side of the second section (11.2) of the double flap (11) positioned on the leading casing (3), and the other side of flaps (4) can be tilted inside the disk (1).

The double flaps (11) on the leading casing (3) and on the base (2) are widening towards the centre of the rotating disk (1). Both the flaps (4) and the double flaps (11) are opened pneumatically.

The flying machine (10) uses two rotating disks (1) as a the carrier surfaces, while the double flaps (11) and single flaps 4) are used during a vertical take-off. During the take-off, the disks (1) are rotated (they are rotating in opposite direction against one another) and the single flaps (4) and double flaps (11) are opened generating an uplift force, with the air flowing over the leading casing (3), through the open double flaps (11) into the rotating disc (1) and through the single flaps (4) under the base (2) of the disc (1), thereby generating the uplift force that lifts the flying machine up in the air. After the ascent, to start the forward flight, the single flaps (4) and the double flaps (11) are closed and, with the leading casing and the base both providing smooth surfaces, the drive units (8) of the rotating disks (1) are turned off, and the disks (1) starts to function as the carrier surfaces and, during the forward flight, the flying machine operates as a transport aircraft.

Example 2b – The flying machine according to Fig. 7 with two rotating disks with three flaps that are tilted sideways according to Fig. 4

The flying machine (10) consists of a fuselage with a cabin, two drive units, two propeller engines on the sides of the fuselage, two side wings and tail wings. The rotating disks (1) are connected to the drive unit (8) that rotates the disks. The rotating disk (1), which has a shape of blunted cone, consists of a base (2) and a leading casing (3), with the base (2) that is closed with three double flaps (11) of rectangular shape and the casing (3) that is closed with three single flaps (4) of rectangular shape, and with the double flaps (11) and single flaps (4) are on the casing (3) and on the base (2) positioned symmetrically in the direction of rotation. The double flaps (11) on the leading casing (3) are attached with four flexible couplings (5) and positioned in pairs on the opposite sections of the double flap (11), on the one side of the first section (11.1) and the second section (11.2) of the double flap (11), with the first section (11.1) opening out of the rotating disk (1) at an angle of 15° and the second section (11.2) of the double flap (11) opening to the inside of the rotating disk (1). The single flaps (4) on the base (2) are fixed to this base (2) with two flexible couplings (5) on the opposite side of the second sections (11.2) of the double flaps (11) positioned on the leading casing (3), and the other side of flaps (4) can be tilted inside, that is, in parallel with the first section of the double flap (11). The single flaps (4) are tilted on the edge opposite the perimeter edge (6) with the flexible couplings (5). Both the single flaps (4) and the double flaps (11) are opened hydraulically.
The flying machine (10) uses two rotating disks (1) as a carrier surface, while the single flaps 4) are used during a vertical take-off. During the take-off, the disks (1) are rotated (they are rotating in opposite direction against one another) and the double flaps (11) and the single flaps (4) are opened to generate an uplift force, with the air flowing over the leading casing (3), through the open double flaps (11) into the rotating disc (1) and out through the single flaps (4) under the base (2) of the disc (1), thereby generating the uplift force that lifts the flying machine up in the air. After the ascent, to start the forward flight, the single flaps (4) are close, the drive units (8) powering the rotating disks (1) are turned off, and the disks (1) start to function as the carrier surfaces and, during the forward flight, the flying machine operates as a transport aircraft.

List of marks for terms

(1)	rotating disk
(2)	base of rotating disk (1)
(3)	leading casing of rotating disk (1)
(4)	flap
(5)	flexible coupling
(6)	perimeter edge of flap (4)
(7)	upper edge of flap (4)
(8)	drive unit
(9), (10)	flying machine
(11)	double flap
(11.1)	first section of the double flap (11)
(11.2)	second section of the double flap (11)

Applicability in Industry

Flying machines capable of both forward flight and vertical take-off and landing.

CLAIMS

1. A rotating uplift and carrier disk (1) for vertical take-off and landing, and also for forward flight characterized by the fact that it consisting of a hollow body comprising a leading casing (3) and a flat base (2), which is provided with at least two pairs of single flaps (4) and double flaps (11), with one pair of flaps consisting of a double flap (11) on the leading casing (3) and a single flap (4) on the base (2), which are arranged one above the other or diagonally or one opposite the other, with the single flaps (4) and the double flaps (11) being attached to the rotating disk (1) along one edge on which they are tilted, the single flap (4) opens into the disk and the double flap (11) is divided into two opposing sections that open against each other, with a first section (11.1) of the double flap (11) opening out of the rotating disk (1) at an angle of maximum 20° to the closed position, and a second section (11.2) of the double flap (11) opening into the rotating disk at an angle of at least 20° to the closed position.

2. The rotating uplift and carrier disk (1) for vertical take-off and landing, and also for forward flight according to Claim 1 characterized by the fact that the hollow body has a circular plan.

3. The rotating uplift and carrier disk (1) for vertical take-off and landing, and also for forward flight according to Claim 1 characterized by the fact that the hollow body has a hexagonal plan.

4. The rotating uplift and carrier disk (1) for vertical take-off and landing, and also for forward flight according to Claim 1 characterized by the fact that the single flaps (4) and/or the double flaps (11) have a widening shape in one pair the flaps (4) and (11) are positioned opposite one another along the widening shape.

5. The rotating uplift and carrier disk (1) for vertical take-off and landing, and also for forward flight according to Claim 1 characterized by the fact that the single flaps (4) and/or the double flaps (11) are attached to the rotating disk (1) along one of their edges with a flexible coupling (5).

6. The rotating uplift and carrier disk (1) for vertical take-off and landing, and also for forward flight according to Claim 1 characterized by the fact that the single flaps

(4) and/or the double flaps (11) are attached to the rotating disk (1) along one of their edges with the swivel coupling.

7. The rotating uplift and carrier disk (1) for vertical take-off and landing, and also for forward flight according to Claim 1 characterized by the fact that the single flaps (4) and/or the double flaps (11) are attached to the rotating disk (1) with the swing joint.

8. The rotating uplift and carrier disk (1) for vertical take-off and landing, and also for forward flight according to Claim 1 characterized by the fact that the single flaps (4) and/or the double flaps (11) are opened mechanically, hydraulically or pneumatically.

9. The rotating uplift and carrier disk (1) for vertical take-off and landing, and also for forward flight according to Claim 1 characterized by the fact that the single flaps (4) and/or the double flaps (11) are connected to the opening mechanism.

10. The rotating uplift and carrier disk (1) for vertical take-off and landing, and also for forward flight according to Claim 1 characterized by the fact that it consisting of four pairs of the single flaps (4) and the double flaps (11).

11. The rotating uplift and carrier disk (1) for vertical take-off and landing, and also for forward flight according to Claim 1 characterized by the fact that the single flaps (4) and/or the double flaps (11) are tilted around the axis of the rotating disk (1).

12. The rotating uplift and carrier disk (1) for vertical take-off and landing, and also for forward flight according to Claim 1 characterized by the fact that the single flaps (4) and/or the double flaps (11) are tilted around the circle inscribed in the rotating disk (1).

13. A mode of flight using the rotating uplift and carrier disk (1) for vertical take-off and landing, and also for forward flight according to Claim 1 characterized by the fact that the rotating disk (1) rotates, the opening mechanism opens the single flaps (4) and the double flaps (11) and the uplift force generates allowing the rotating disk (1) to take off, and after reaching the required altitude, the opening mechanism closes the single flaps (4) and the double flaps (11) and the rotating disk then starts to glide in the air.

14. Using the rotating uplift and carrier disk (1) for vertical take-off and landing, and also for forward flight according to Claim 1 as a carrier and take-off mechanism of the flying machine.

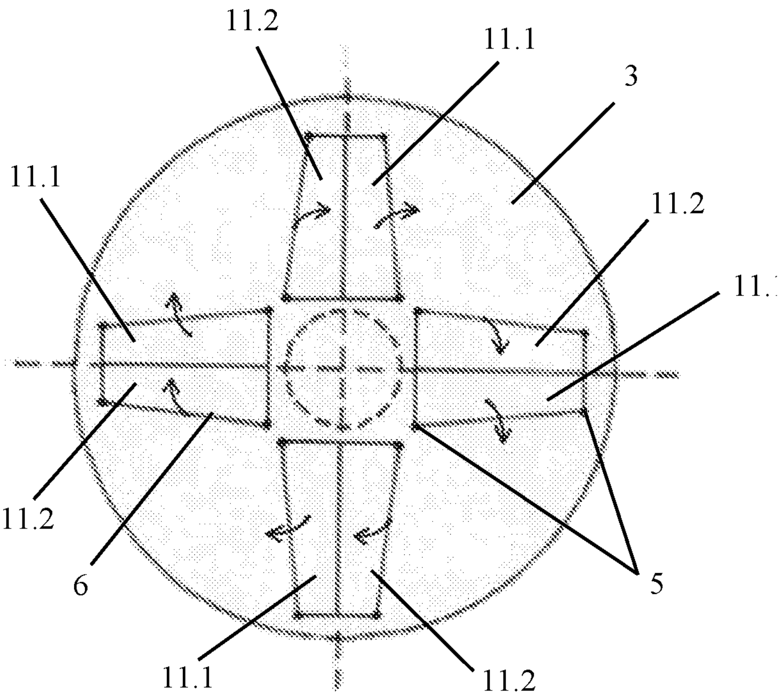

Fig. 1a

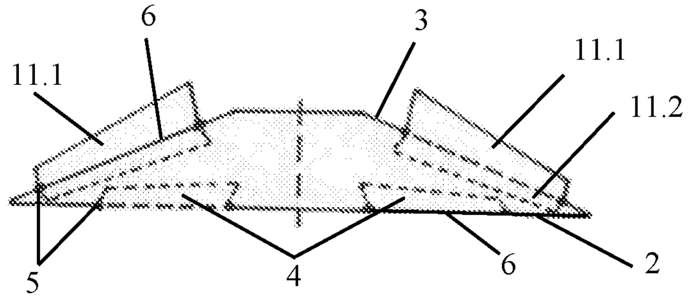

Fig. 1b

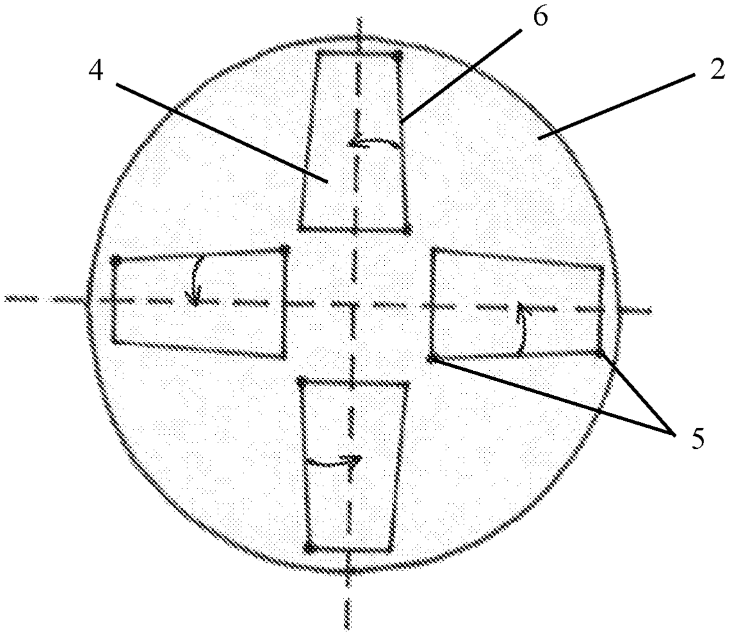

Fig. 1c

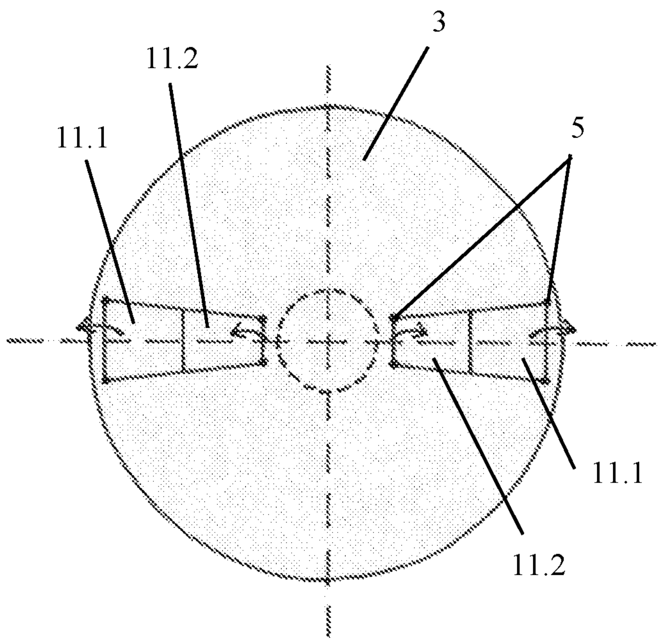

Fig. 2a

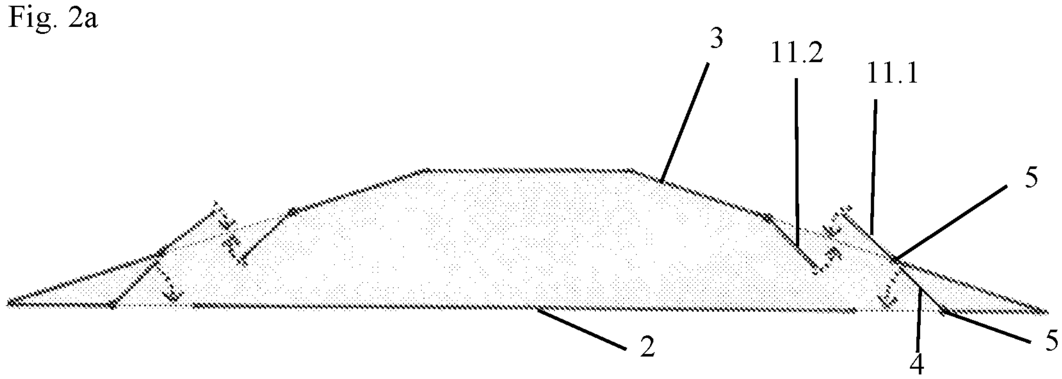

Fig. 2b

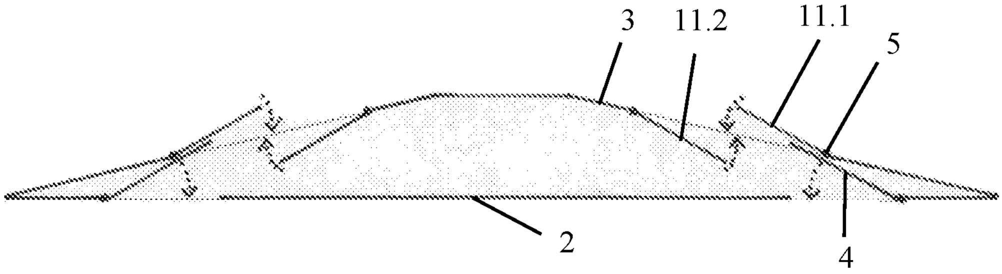

Fig. 2c

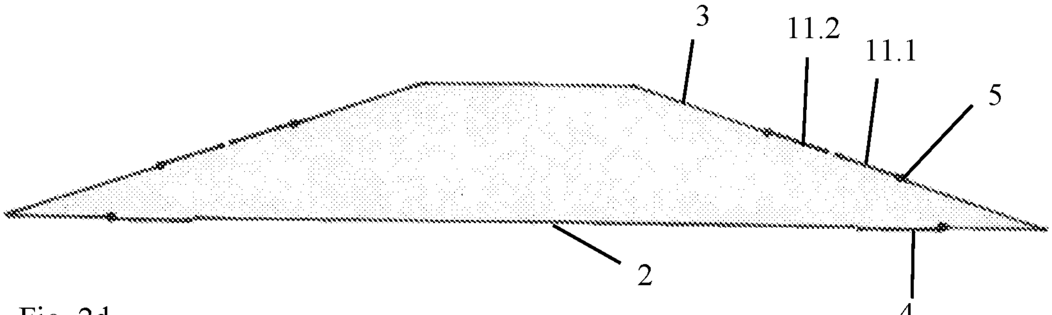

Fig. 2d

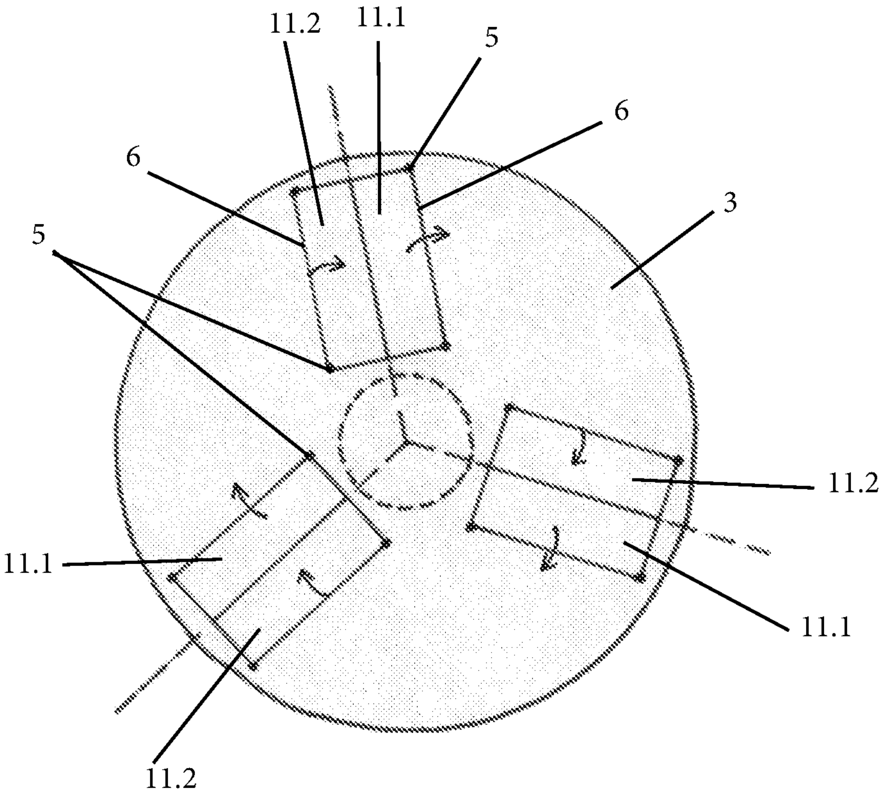

Fig. 3

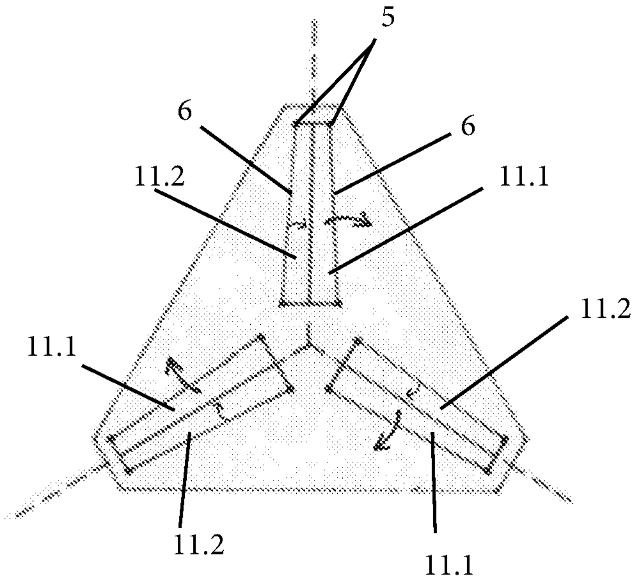

Fig. 4

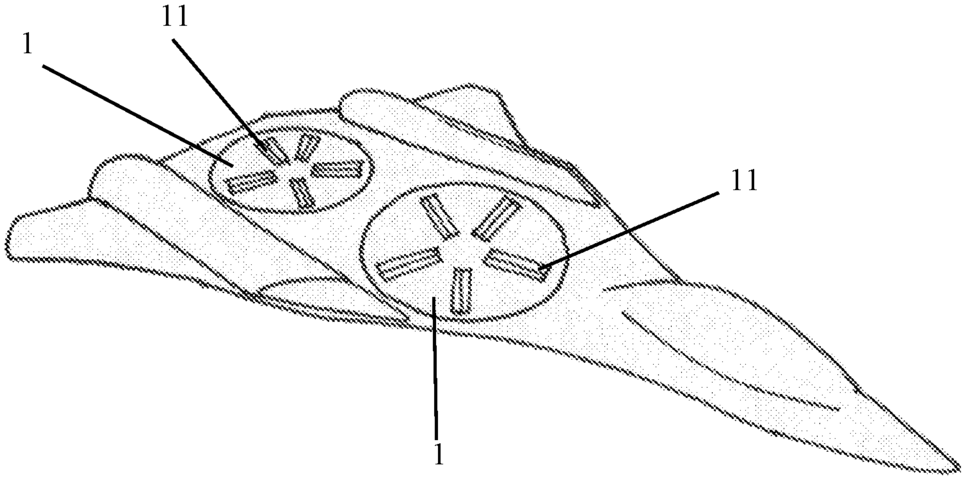

Fig. 5

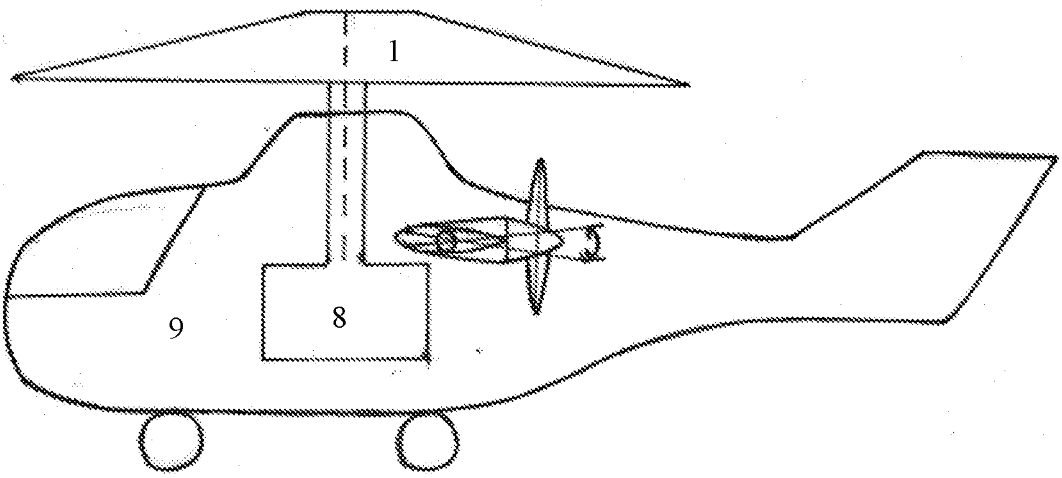

Fig. 6a

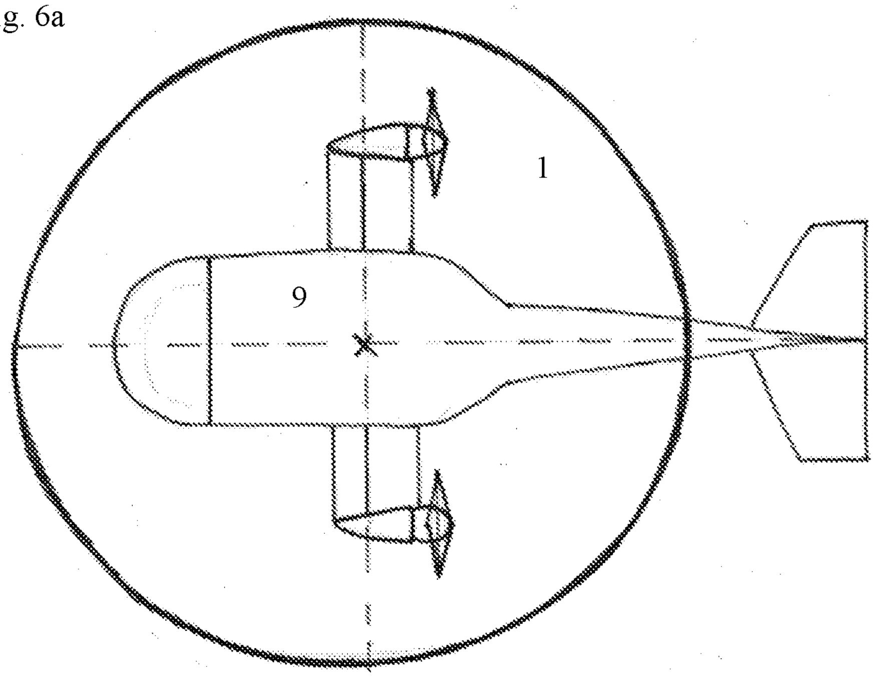

Fig. 6b

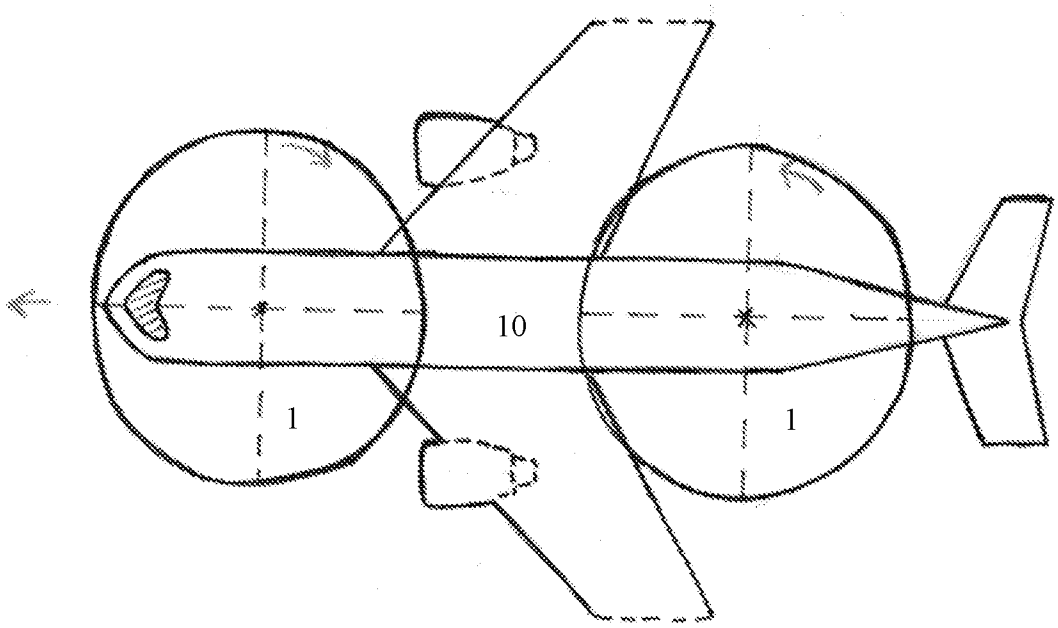

Fig. 7a

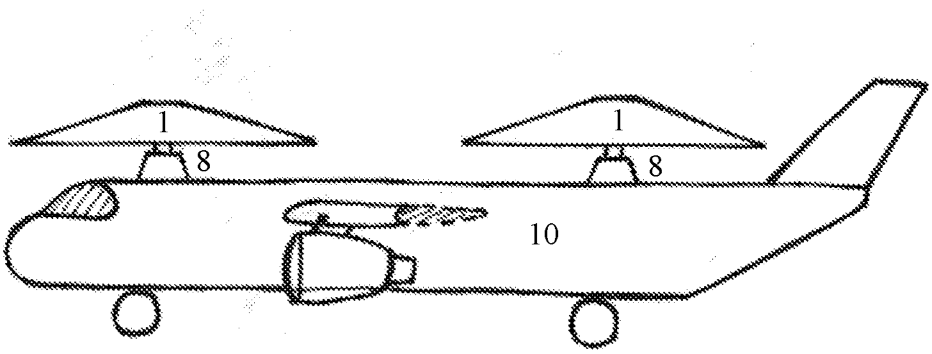

Fig. 7b

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2019/053116

A. CLASSIFICATION OF SUBJECT MATTER
INV. B64C27/32 B64C39/06
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B64C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 433 819 A (CARRINGTON ALFRED C [US]) 28 February 1984 (1984-02-28) column 2, line 54 - column 3, line 24 column 5, line 60 - column 6, line 17; figures 1-5	1-14
A	WO 90/01002 A1 (TOLLERVEY RICHARD HENRY [AU]) 8 February 1990 (1990-02-08) page 3, line 15 - page 4, line 19; figures 1-15	1-14
A	US 6 450 446 B1 (HOLBEN BILL [US]) 17 September 2002 (2002-09-17) column 4, line 13 - column 5, line 43; figures 1-4	1-14
A	BE 533 753 A (G MIGNOT) 28 May 1958 (1958-05-28) the whole document	1-14

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 July 2019	29/07/2019

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Hofmann, Udo

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2019/053116

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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WO 9001002	A1	08-02-1990	AU 587363 B1	10-08-1989
			WO 9001002 A1	08-02-1990
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