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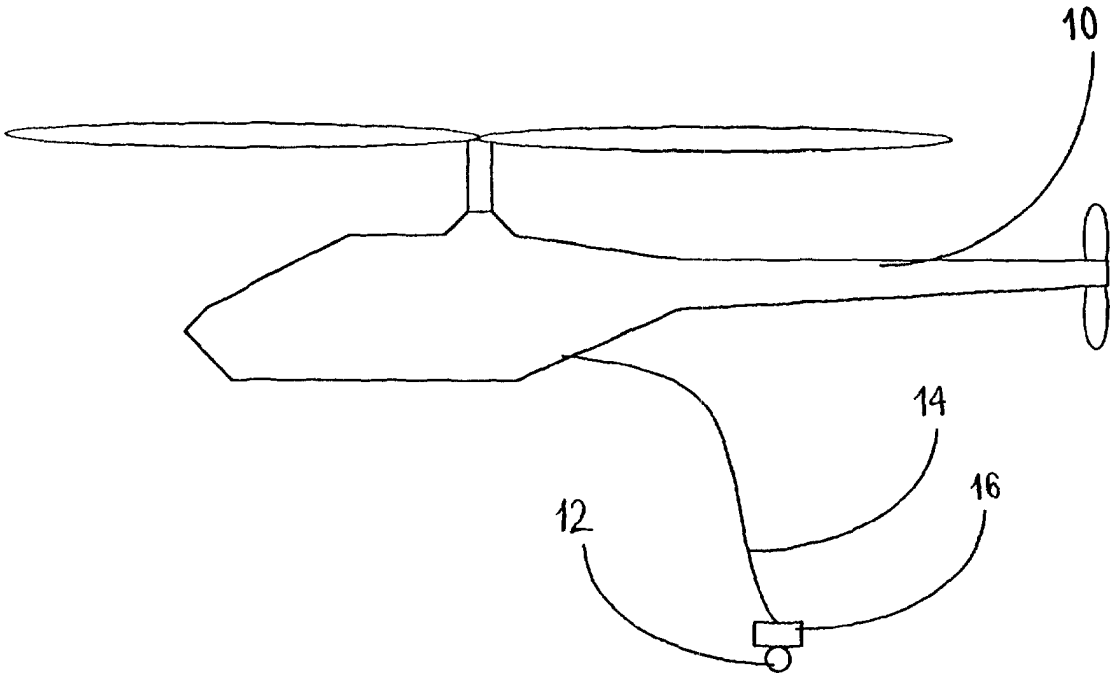
(54) Title: STEALTH AIRBORNE SYSTEM



(57) Abstract: A stealth airborne suspended operating system, such as imaging sensor (camera), dusting sprinkling device etc., for suspension and operation beneath an aircraft, the system comprising a suspension device of predetermined length, connectable to the aircraft; and a platform suspended from the suspension device, the platform carrying an operating system. The length of the suspension device may be adjustable. The platform may be maneuvered to a desired position by a maneuvering device.

WO 02/075235 A2

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

STEALTH AIRBORNE SYSTEM

FIELD OF THE INVENTION

The present invention relates to airborne stealth systems for photography, surveillance or other activities. More particularly, the present invention relates to a stealth system for airborne activities.

BACKGROUND OF THE INVENTION

Airborne photography is widely used for acquiring aerial pictures containing, especially but not only, intelligence information. One of the main problems in obtaining aerial pictures, particularly for intelligence use, is operating an airborne photography mission without being spotted from the ground.

There are several available solutions for acquiring aerial pictures without being discovered. One of the solutions is that the aircraft will fly in high enough alttitudes in order to overcome detection systems. However, photographing aerial pictures from heights where the aircraft is not spotted by detection systems is prone to resolution problems or clouds blocking the photographic system field of view. Due to the distance between the ground

and the camera on the aircraft, the resolution of the resulting pictures is very poor. Cameras are also available on satellite systems that are constantly positioned in non-detectable heights, however pictures taken from satellites are also artifact-prone and also have poor resolution. Forthermore, satellites are not always available when needed, as they follow predetermined orbits or are fixed over specific locations, and not everyone may access them for obtaining pictures.

Another difficulty arising from photographing from high alttitudes heights are clouds that may be situated below the aircraft on which the camera is installed. Regular cameras cannot provide pictures that penetrate the clouds and IR (infrared) cameras that can penetrate the clouds cannot detect objects that are detected with regular cameras.

In many cases, clouds cause problems even when using an unmanned aircraft (UAV). Low clouds force the vehicle to fly low in order to photograph below the clouds. In this way, the aircraft may be discovered.

In other instances there may be a need for an airborn operation carried out at low alttitudes, that may pose a threat to the aircraft. For example, in marijuana fileds law enforcement forces sometimes dust the crops to eliminate them. Drug lords guard their investments by positioning armed guards that may fire upon aircraft dusting their field. In such instances it is desired to use high alttitude aircraft with low alttidue accessories.

There is a need to provide a system enabling photographing or carrying out other activities from relatively low heights and still avoiding detection of the the aircraft.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a new and unique stealth low-alttitude airborne system suspended from a high-alttitude aircraft.

It is another object of the present invention to provide a new and unique stealth airborne low-alttitude system suspended from a high-alttitude aircraft suitable for surveillance, photography or other sensory activity.

It is another object of the present invention to provide a new and unique stealth airborne low-alttitude system suspended from a high-alttitude aircraft suitable for crop dusting or other activities.

It is thus provided in accordance with a preferred embodiment of the present invention, a stealth airborne suspended operating system, for suspension and operation beneath an aircraft, the system comprising:

a suspension device of predetermined length, connectable to the aircraft; and

a platform suspended from the suspension device, the platform carrying an operating system.

Furthermore, in accordance with a preferred embodiment of the presnet invention, the suspension device comprises a cable.

Furthermore, in accordance with a preferred embodiment of the presnet invention, the suspension device comprises a telescopic pole.

Furthermore, in accordance with a preferred embodiment of the presnet invention, the suspension device is hollow.

Furthermore, in accordance with a preferred embodiment of the presnet invention, the length of the suspension device is manually or automatically adjustable.

Furthermore, in accordance with a preferred embodiment of the presnet invention, the platform is provided with maneuvering device.

Furthermore, in accordance with a preferred embodiment of the presnet invention, the maneuvering device comprises an unmanned aircraft (UAV).

Furthermore, in accordance with a preferred embodiment of the presnet invention, the maneuvering device includes at least one motorized rotor.

Furthermore, in accordance with a preferred embodiment of the presnet invention, the manevuvering device includes two substantially perpendicular motorized rotors so as to achieve desired planar positioning.

Furthermore, in accordance with a preferred embodiment of the presnet invention, the operating system comprises imaging sensor.

Furthermore, in accordance with a preferred embodiment of the presnet invention, the imaging sensor is a camera.

Furthermore, in accordance with a preferred embodiment of the presnet invention, the operating system is a sprinkling device.

Furthermore, in accordance with a preferred embodiment of the presnet invention, the length of the suspension device is more than 10 meters.

Furthermore, in accordance with a preferred embodiment of the presnet invention, the length of the suspension device is in the range of tens of meters.

Furthermore, in accordance with a preferred embodiment of the presnet invention, there is provided a method for airborne stealth operation over a target location, the method comprising:

providing an aircraft

providing a suspension device of predetermined length, connectable to the aircraft;

providing a platform suspended from the suspension device, the platform carrying an operating system;

flying the aircraft with the suspended operating system to a position over the target location;

keeping the aircraft substantially at a first predetermined alttitude, so that the suspended operating system is suspended at a second lower alttitude; and

operating the operating system at that second lower alttitude.

Furthermore, in accordance with a preferred embodiment of the presnet invention, the aircraft is flown over or inside cloud cover, and wherein the length of the suspension device enables the suspended operating system to be below the cloud cover.

Other advantages and aspect of the present invention will become aparent after reading the presnet specification and viewing the accompanying drawings.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 illustrates an aircraft provided with a camera suspended on a flexible cable in accordance with a preferred embodiment of the present invention.

Figure 2 illustrates an aircraft provided with a crop-dusting sprinkler suspended on a telescopic pole in accordance with another preferred embodiment of the present invention.

Figure 3 illustrates a stealth low-alttitude airborne system, provided with a maneuvering device.

DETAILED DESCRIPTION OF THE INVENTION AND FIGURES

The present invention is aimed at providing low-alttitude surveillance or other operating system suspended from a high-alttitude aircraft. This is desired when there is a need to hide the aircraft carrying the surveillance (or other operating) system from watchful eyes on the ground. In cases when there is a special need to place the system at very low alttitudes, such as in

the case of photography in low-cloud cover conditions, or crop-dusting an illegal crops field, conventional aircraft and even UAV are bound to be discovered, and the mission may be jeopardized or even fail in such cases.

In a preferred embodiment of the present invention an aerial photographic system is provided that is suspended from an aircraft. The aircraft can fly in a high-alttitude so that it is not detected or spotted while the photographic system suspends from the aircraft at a lower alttitude.

Reference is now made to Figure 1 illustrating an aircraft provided with a camera suspended from the aricraft on a cable in accordance with a preferred embodiment of the present invention. An aircraft preferably a helicopter 10 is provided in order to carry the photographic system. A camera 12 is suspended from helicopter 10 using a cable 14 that is released from helicopter 10 (either from its fuselage or from within the cabin). The separation of the two systems, the aircraft and the photographic system, facilitates photographing aerial pictures in relatively good conditions (such as below the clouds) while preventing discovery of the aircraft that hovers over the clouds from the ground. The suspended system is much smaller in dimension than the aircraft and hence much less detectable. In this way the aircraft remains relatively safe and undetected at high-alttitude (or above the cloud cover) whereas the suspended system is conveniently at low-alttitude, which provides for better working conditions for that system. This also allows the suspended system to be small in size for the aircraft may include part of the system that needs not to be on the lower platform, and the aircraft may also provide the suspended system its power, control etc, and maintain its

elevation. Being suspended from the aircraft, the suspended can rely on the aircraft for holding its elevation, providing energy and control for the suspended system, and thus the suspended system can be minimized to include only essential parts (such as the camera lens or the distal end of a fiber optic, or other sensor such as IR sensor, for photographic or imaging systems or the sprinkler of the crop-dusting system etc.).

Camera 12 is suspended from the aircraft on cable 14 and in a preferred embodiment of the present invention is navigated to remain in position (or relocate to a different preferred position) by means of a maneuvering device 16. The maneuvering device may be any system that can maneuver the suspended system being controlled from the aircraft.

Reference is now made to Figure 3 illustrating a suspended system in accordance with a preferred embodiment of the present invention, provided with maneuvering device. Camera 100 is attached at a bottom of a platform 102 that connects to the cable of the aircraft (the aircraft is not shown in Figure 3). The maneuvering device comprises at least one motorized rotor (preferably bi-directional) - in the embodiment shown there are two two motorized rotors 104 that are attached preferably laterally and over the camera on the sides of platform 102. Motors 104 maneuver the platform that carries camera 100 so that it does not swing freely on the cable in order to retain its position or in order to move the camera to another position. The motors may be remotely controlled from the aircraft or from the ground, either manually or automatically. In a preferred embodiment of the present invention the maneuvering device is provided with automatic positioning means such as

global positioning system (GPS) means for location and positioning the suspended system. In another preferred embodiment of the present invenion the automatic positioning means include image tracking means (such as the ones used in automatic navigation of UAVs). The motorized rotors may be replace with other steering means, such as jet propulsion means etc.

Maneuvering device 16 can be also a UAV that is remotely controlled from the ground or from the aircraft itself or automatically (the controlls included in the suspended system platform).

Reference is now made to Figure 2, illustrating an aircraft provided with a crop dusting sprinkler suspended on a telescopic pole in accordance with a preferred embodiment of the present invention. A telescopic pole 22 is provided beneath helicopter 20 with a distally connected sprinkler 24 (communicating with a reservoir of chemicals located in the aircraft itself through a duct or a pipe located inside the telescopic pole). Telescopic pole 22 may be elongated to any desired length so as to establish adequate elevation of the suspended system beneath the aircraft. If, for example, the aircraft flies in an undetected height, the sprinkler may be dropped to a lower alttitude using the telescopic pole so as to acquire better and more efficient position for dusting.

It is noted that the aircraft may be any type of aircraft, for example manned or unmanned fixed-wing or rotor wing aircraft.

The suspension mean, be it the cable, the telescopic pole or other suspension device, is preferably operable to adjust its length so as to allow repositioning of the suspended system platform at a desired distance below

the aircraft. In order to fly the aircraft within or over the clouds and maintain the suspended platform below the clouds cover it is recommended that the length of the suspension device be more than 10 meters and preferably in the range of tens of meters. However different lengths may also be used and covered by the scope of the present invention.

It should be clear that the description of the embodiments and attached Figures set forth in this specification serves only for a better understanding of the invention, without limiting its scope.

It should also be clear that a person skilled in the art, after reading the present specification could make adjustments or amendments to the attached Figures and above described embodiments that would still be covered by the present invention.

CLAIMS

1. A stealth airborne suspended operating system, for suspension and operation beneath an aircraft, the system comprising:

a suspension device of predetermined length, connectable to the aircraft; and

a platform suspended from the suspension device, the platform carrying an operating system.

2. The system as claimed in Claim 1, wherein the suspension device comprises a cable.

3. The system as claimed in Claim 1, wherein the suspension device comprises a telescopic pole.

4. The system as claimed in Claim 1, wherein the suspension device is hollow.

5. The system as claimed in Claim 1, wherein the length of the suspension device is manually or automatically adjustable.

6. The system as claimed in Claim 1, wherein the platform is provided with maneuvering device.

7. The system as claimed in Claim 6, wherein the maneuvering device comprises an unmanned aircraft (UAV).

8. The system as claimed in Claim 6, wherein the maneuvering device includes at least one motorized rotor.

9. The system as claimed in Claim 8, wherein the manevuvering device includes two substantially perpendicular motorized rotors so as to achieve desired planar positioning.

10. The system as claimed in Claim 1, wherein the operating system comprises imaging sensor.

11. The system as claimed in Claim 10, wherein the imaging sensor is a camera.

12. The system as claimed in Claim 1, wherein the operating system is a sprinkling device.

13. The system as claimed in Claim 1, wherein the length of the suspension device is more than 10 meters.

14. The system as claimed in Claim 1, wherein the length of the suspension device is in the range of tens of meters.

15. A method for airborne stealth operation over a target location, the method comprising:

providing an aircraft;

providing a suspension device of predetermined length, connectable to the aircraft;

providing a platform suspended from the suspension device, the platform carrying an operating system;

flying the aircraft with the suspended operating system to a position over the target location;

keeping the aircraft substantially at a first predetermined alttitude, so that the suspended operating system is suspended at a second lower alttitude; and

operating the operating system at that second lower alttitude.

16. The method as claimed in Claim 15, wherein the aircraft is flown over or inside cloud cover, and wherein the length of the suspension device enables the suspended operating system to be below the cloud cover.

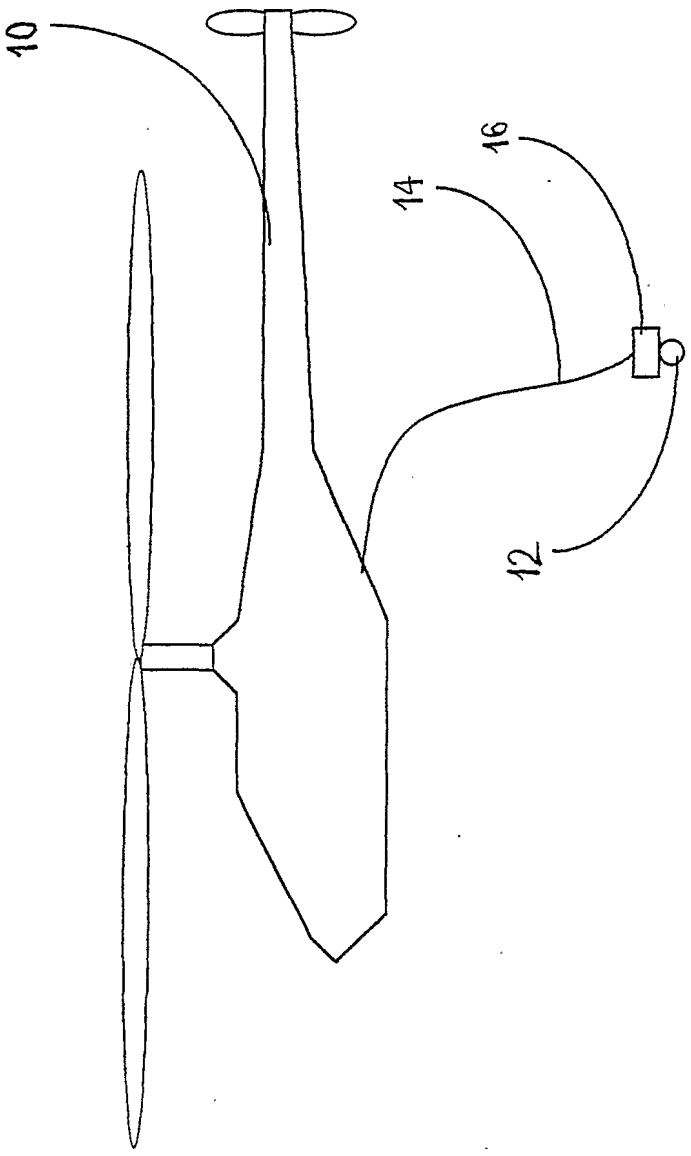


Fig. 1

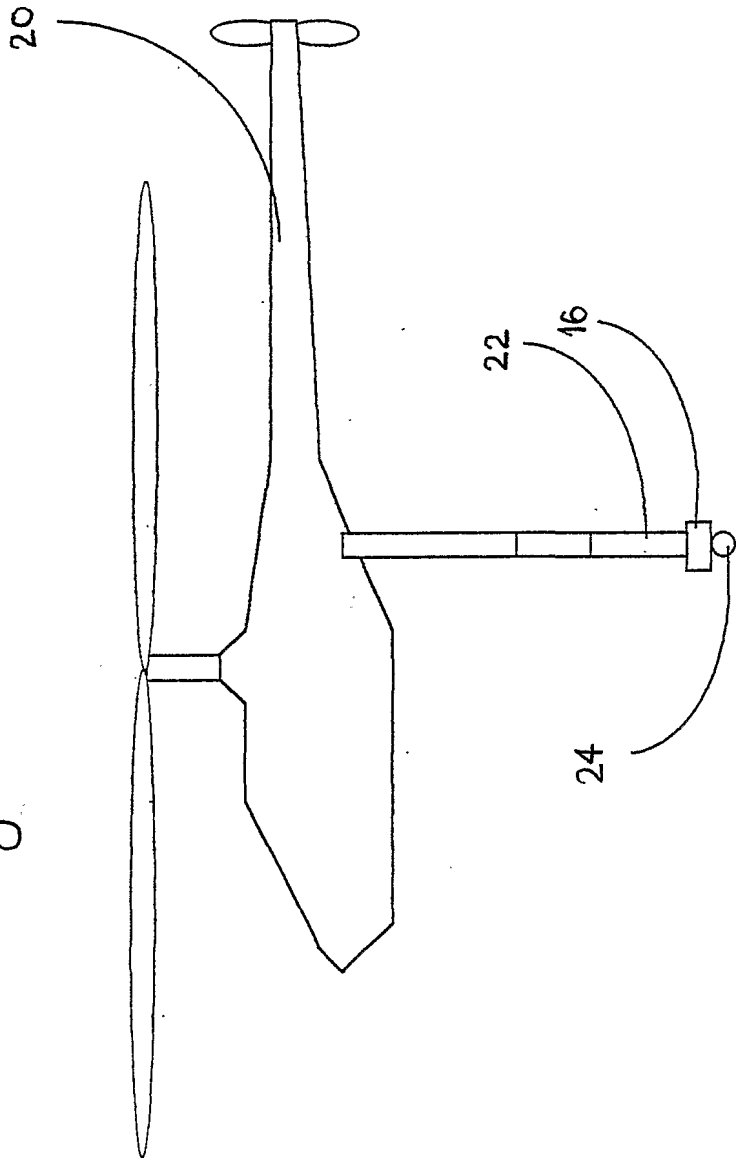


Fig. 2

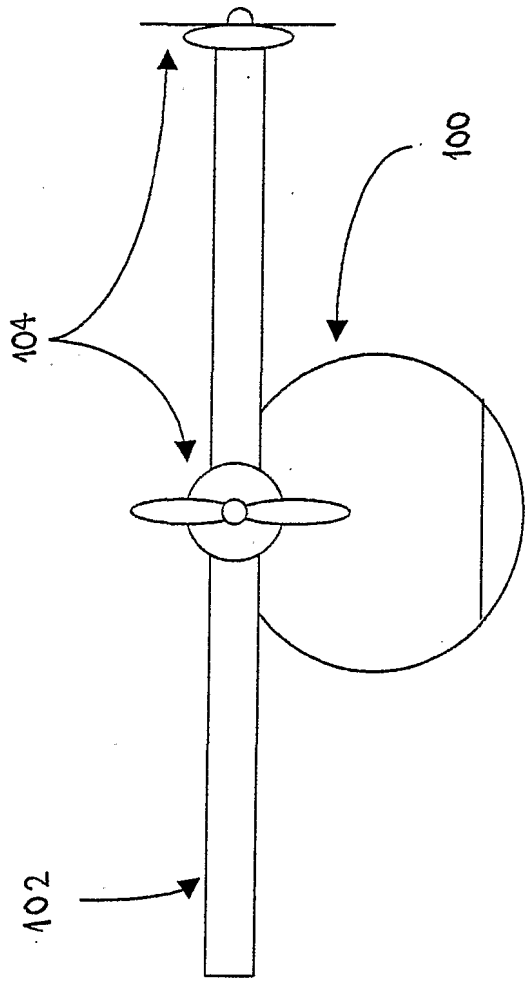


Fig. 3