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(54) **Title:** APPARATUS FOR MOVING CAMERA

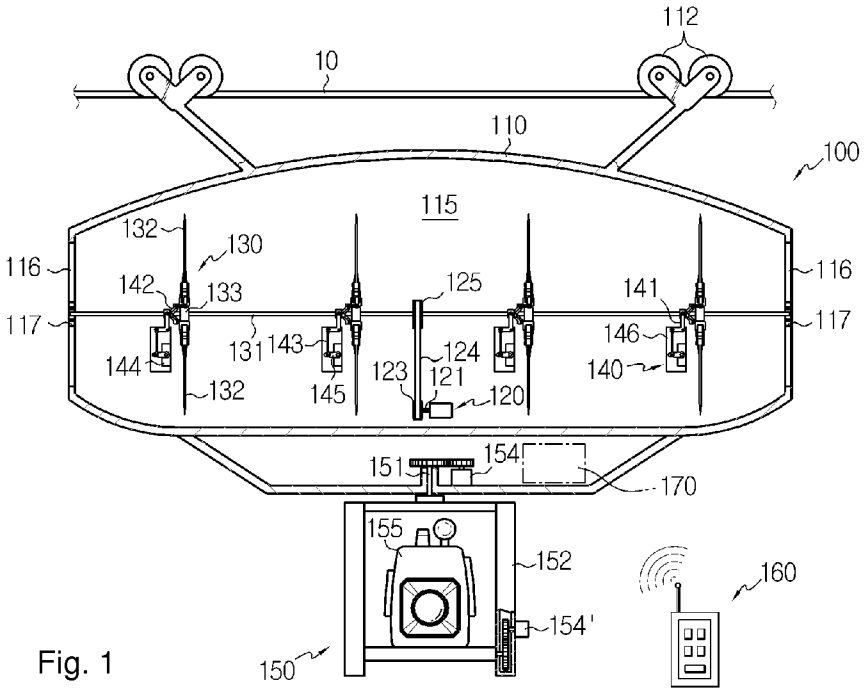

Fig. 1

(57) **Abstract:** The present invention relates to a camera moving apparatus, and in particular to a camera moving apparatus, which can rapidly move a camera held on a cable or wire using a propeller and move the camera vertically and horizontally to improve a photographing range and rapidly change a moving direction of the camera.

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Description

APPARATUS FOR MOVING CAMERA

Technical Field

[1] The present invention relates to a camera moving apparatus, and in particular, to a camera moving apparatus, which can rapidly move a camera held on a cable or wire using a propeller and rapidly change a moving direction of the camera.

Background Art

[2] As well known, a camera is used to photograph an object in sports, movie, drama or advertisement. Generally, the camera photographs an object in a fixed state, however in some cases, the camera photographs an object in a moving state for a special scene.

[3] To move the camera rapidly, a pull is given to a cable or wire, on which the camera is held.

[4] However, the movement of the camera using the cable or wire has disadvantages: the camera should be held on a cable or wire, there is a limitation in the moving speed of the camera, it is difficult to change the moving direction of the camera, it is impossible to suddenly stop moving the camera, and additional manpower is required to draw the cable or wire.

Disclosure of Invention

Technical Problem

[5] The present invention is designed to solve the above-mentioned problems, and therefore it is an object of the present invention to provide a camera moving apparatus, which does not require additional manpower to move a camera and does not limit a moving speed, and can suddenly stop moving the camera and easily change a moving direction of the camera.

Technical Solution

[6] In order to achieve the above-mentioned object, a camera moving apparatus according to the present invention comprises a frame having a hollow formed longitudinally therein, and rollers installed above the frame and moving along a cable or wire in contact with the cable or wire; a propeller installed in the frame and rotated by a driving motor; and a photographing unit connected to the frame and configured to receive a camera therein, wherein the frame held on the cable or wire is moved by rotation of the propeller.

[7] A camera moving apparatus according to another aspect of the present invention comprises a frame having a driving motor and rollers installed above the frame and moving along a cable or wire in contact with the cable or wire; a propeller installed to the frame and rotated by the driving motor; and a photographing unit connected to the

frame and configured to receive a camera therein, wherein the frame held on the cable or wire is moved by rotation of the propeller.

[8] Preferably, the camera moving apparatus further comprises a pitch member for changing a blade angle of the propeller, wherein the pitch member includes a connection member connected to each blade of the propeller; and a servomotor connected to the connection member and configured to reciprocate the connection member, wherein the servomotor is rotated at a preset angle to change the blade angle of the propeller, thereby changing a direction of a propelling power of the propeller.

[9] Meanwhile, the camera moving apparatus further comprises a driving unit connected to the frame and configured to reciprocate the photographing unit in a horizontal direction that intersects a moving direction of the frame by rotation/reverse rotation of a motor.

[10] Preferably, the driving unit includes a truss connected to the frame; a moving unit where the photographing unit is installed and installed movably along a periphery of the truss; and a motor installed in the truss and configured to move the moving unit.

[11] At this time, preferably the camera moving apparatus further comprises a weight member installed at the opposite location to the photographing unit installed to the moving unit for movement with the photographing unit, and having weight corresponding to weight of the photographing unit.

[12] And, preferably the camera moving apparatus further comprises an auxiliary propeller installed below the frame and rotated by an auxiliary motor in a direction intersecting the propeller.

[13] Further, preferably the camera moving apparatus further comprises a moving means connected to both ends of the cable or wire for moving the cable or wire, wherein the moving means includes two moving frames, each having a moving motor and rollers installed above the moving frame and moved along another cable or wire in contact with the another cable or wire; a moving propeller installed in each moving frame and rotated by the moving motor; and a connection unit provided below each moving frame, wherein the cable or wire contacted with the rollers of the frame is connected to the connection unit of each moving frame, and wherein each moving frame held on the another cable or wire is moved by rotation of the moving propeller.

[14] Preferably, the camera moving apparatus further comprises a moving pitch member for changing a blade angle of the moving propeller, wherein the moving pitch member includes a connection member connected to each blade of the moving propeller; and a servomotor connected to the connection member for reciprocating the connection member, wherein the servomotor is rotated at a preset angle to change a blade angle of the moving propeller, thereby changing a direction of a propelling power of the moving propeller.

[15] Here, preferably the photographing unit is rotatably installed to the frame.

[16] Preferably, the camera moving apparatus further comprises a wireless communication device for wirelessly controlling operation of the pitch member and the photographing unit.

Brief Description of the Drawings

[17] These and other features, aspects, and advantages of preferred embodiments of the present invention will be more fully described in the following detailed description, taken accompanying drawings. In the drawings:

[18] FIG. 1 is a partial cross-sectional view illustrating a camera moving apparatus according to a first embodiment of the present invention.

[19] FIGs. 2 to 4 are views illustrating operation of a propeller of the camera moving apparatus according to the first embodiment of the present invention.

[20] FIG. 5 is a block diagram illustrating a wireless communication device used in the camera moving apparatus according to the present invention.

[21] FIG. 6 is a side view illustrating a camera moving apparatus according to a second embodiment of the present invention.

[22] FIG. 7 is a front view illustrating a camera moving apparatus according to a third embodiment of the present invention.

[23] FIG. 8 is a plan view illustrating a driving unit of the camera moving apparatus according to the third embodiment of the present invention.

[24] FIG. 9 is a side view illustrating a camera moving apparatus according to a fourth embodiment of the present invention.

[25] FIG. 10 is a plan view illustrating a camera moving apparatus according to a fifth embodiment of the present invention.

[26] FIG. 11 is a side view illustrating the camera moving apparatus according to the fifth embodiment of the present invention.

Best Mode for Carrying Out the Invention

[27] Hereinafter, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings. Prior to the description, it should be understood that the terms used in the specification and the appended claims should not be construed as limited to general and dictionary meanings, but interpreted based on the meanings and concepts corresponding to technical aspects of the present invention on the basis of the principle that the inventor is allowed to define terms appropriately for the best explanation. Therefore, the description proposed herein is just a preferable example for the purpose of illustrations only, not intended to limit the scope of the invention, so it should be understood that other equivalents and modifications could be made thereto without departing from the spirit and scope of the invention.

[28] FIG. 1 is a partial cross-sectional view illustrating a camera moving apparatus according to a first embodiment of the present invention.

[29] Referring to FIG. 1, the camera moving apparatus 100 comprises a frame 110, a propeller 130 installed and rotated in the frame 100, a pitch member 140 for changing a blade angle of the propeller 130 and a photographing unit 150 for receiving a camera 155 therein.

[30] A hollow 115 is formed longitudinally in the frame 110, rollers 112 are installed above the frame 110 and moved along a cable or wire 10 (hereinafter, for convenience of description, commonly referred to as a 'wire'), and a driving motor 120 is installed in the frame 110 for rotating the propeller 130.

[31] The hollow 115 formed in the frame 110 serves as a passage, in which thrust is generated from rotation of the propeller 130 to be described below, and in other words, through which wind is passed.

[32] The rollers 112 are contacted with the wire 10, and preferably each pair of rollers 112 is installed at a front portion and a back portion of the frame 110. At this time, the roller 112 has a groove (not shown) formed along the periphery thereof for receiving the wire 10. Accordingly, the wire 10 is inserted into and contacted with the groove of the roller 112, and thus, the frame 110 is stably moved without slip from the wire 10 during movement.

[33] Meanwhile, although this embodiment shows that each pair of rollers 112 is installed at a front portion and a back portion of the frame 110, the present invention is not limited in this regard, and it is obvious that if the roller 112 is located on the wire 10 and can stably move the camera moving apparatus 100, the roller 112 may be installed regardless of its number and location.

[34] The driving motor 120 is installed in the frame 110 and rotates a rotational shaft 131 of the propeller 130. Preferably, a driving gear 123 is installed on a driving axis 121 of the driving motor 120, a longitudinal gear 125 is installed on the rotational shaft 131 of the propeller 130, and the driving gear 123 and the longitudinal gear 125 are connected by a belt 124. Thus, the rotational shaft 131 is provided with and rotated by a rotational power of the driving motor 120.

[35] As the driving motor 120 is rotated, the propeller 130 is rotated, and consequently a thrust is generated and the frame 110 is moved along the wire 10. Preferably, the driving motor 120 is driven by a battery (not shown) provided in the frame 110.

[36] Meanwhile, although this embodiment shows that the rotational power is applied to the rotational shaft 131 using the driving gear 123, the belt 124 and the longitudinal gear 125 to rotate the propeller 130, the present invention is not limited in this regard, and the present invention may use any structure capable of rotating the rotational shaft 131.

[37] Further, support bars 116 are formed ahead of and behind the hollow 115 of the frame 110 to support the rotational shaft 131, and bearings 117 are installed such that the rotational shaft 131 is inserted into the support bars 116. Accordingly, the rotational shaft 131 of the propeller 130 is installed and rotated in the lengthwise direction of the frame 110.

[38] The propeller 130 includes the rotational shaft 131, a boss 133 inserted into and fixed at the rotational shaft 131, and a plurality of blades 132 installed at the boss 133. That is, as the rotational shaft 131 is rotated, the boss 133 fixed at the rotational shaft 131 is rotated, and accordingly the blades 132 installed at the boss 133 are rotated. At this time, the blades 132 are installed to be rotated at a predetermined angle relative to the boss 133. Meanwhile, although this embodiment shows four propellers 130, the number of propellers may be properly decreased or increased in consideration of moving speed.

[39] At this time, the moving direction of the frame 110 is changed by change of the blade angle, i.e. pitch of the propeller 130. The pitch is changed by the pitch member 140. As a servomotor 144 of the pitch member 140 is rotated at a predetermined angle, the blades 132 connected to the servomotor 144 are rotated at a predetermined angle, and thus the pitch is changed.

[40] Further, the moving speed of the frame 110 is changed by the rotational speed and blade angle of the propeller 130, and thus it is possible to change freely the moving speed of the frame 110. And, a sudden stop of movement of the frame 110 is made by change of the pitch of the propeller 130. That is, if the driving motor 120 is continuously driven for a predetermined time while the blade angle (pitch) of the propeller 130 is changed and the rotational direction of the driving motor 120 remains unchanged, the movement of the frame 110 is stopped or the moving speed of the frame 110 is changed.

[41] The pitch member 140 for changing the blade angle of the propeller 130 includes a connection member 142 connected to each blade 132 of the propeller 130 and the servomotor 144 for moving the connection member 142. That is, when the connection member 142 connected to each blade 132 is moved using the servomotor 144, force is applied to the blade 132 connected to the connection member 142 in one direction to change the pitch of the blade 132.

[42] At this time, preferably the present invention has two blades 132 and two connection members 142, and more preferably the connection members 142 are located in opposite directions. That is, when the connection members 142 are moved by the servomotor 144, the blades 132 connected to the connection members 142 work in opposite directions, so that the pitch of the blades 132 is changed.

[43] Specifically, the connection members 142 are moved by the servomotor 144, and the

servomotor 144 includes a moving part 145, a connecting bar 143 and a support unit 141. Preferably, the servomotor 144 is fixedly installed in a support panel 146 that is provided in the frame 110. The connection members 142 are connected to the support unit 141, the support unit 141 is connected to the connecting bar 143, and the connecting bar 143 is connected to the moving part 145. The support unit 141 has a rotational pin (141a of FIG. 2) installed at the center thereof, and preferably the rotational pin is installed such that the support unit 141 is rotated relative to the center thereof.

[44] At this time, although this embodiment shows that the servomotor 144 includes the connecting bar 143 and the support unit 141 and is configured to move the connection member 142, the present invention is not limited in this regard, and the present invention may have various alternative embodiments, for example, the moving part 145 of the servomotor 144 may be directly connected to the connection member 142 for moving the connection member 142.

[45] The moving part 145 of the servomotor 144 is rotated to reciprocate the connection members 142 in the lengthwise direction of the rotational shaft 131. Thus, the servomotor 144 is driven, and the pitch of the blades 132 connected to the connection members 142 is changed. Here, preferably the moving part 145 of the servomotor 144 is selectively rotated -90 or 90 degrees.

[46] Meanwhile, although this embodiment shows the servomotor 144 is installed in the support panel 146 provided in the frame, to move the connection members 142, the present invention is not limited in this regard, and the present invention may use any structure, in which the servomotor 144 is installed on the rotational shaft 131 of the propeller 130 or in the frame 110 and connected to the connection members 142 to change the blade angle of the propeller 130.

[47] Specifically, the change of pitch of the propeller 130 is described with reference to FIGs. 2 to 4.

[48] FIG. 2 illustrates a state that the pitch of the blades 132 of the propeller 130 is unchanged. The moving part 145 of the servomotor 144 which moves the connection members 142 connected to the blade 132 to change the pitch of the blades 132 of the propeller 130 is in a state of, for example, 0 degree, and thus, although the propeller 130 is rotated by the rotational shaft 131, the frame 110 is in a stationary state without movement, because the blades 132 have no angle. This is because pitch is not formed in the blades 132, and thus thrust is not generated.

[49] FIG. 3 illustrates a state that the propeller 130 having the changed pitch of the blades 132 is rotated by rotation of the rotational shaft 131. At this time, the blades 132 have the changed pitch of cross section, and the connection members 142 connected to the blades 132 change the pitch of the blades 132 by drive of the servomotor 144. For

example, when the moving part 145 of the servomotor 144 is rotated -90 degrees, the connecting bar 143 connected to the moving part 145 rotates the support unit 141, so that the connection members 142 connected to the support unit 141 are moved in the lengthwise direction of the rotational shaft 131 and the blades 132 connected to the connection members 142 are rotated at a predetermined angle in opposite directions with regard to the boss 133. Accordingly, because the blades 132 have pitch, as the propeller 130 is rotated by the rotational shaft 131, thrust is generated in the direction of an arrow A and the camera moving apparatus 100 is moved in the direction of the arrow A. That is, the rollers 112 of the frame 110 are moved along the wire 10 by thrust.

[50] FIG. 4 illustrates a state that the blades 132 of the propeller 130 are rotated in a different direction from FIG. 3. As mentioned above, the pitch of the blades 132 is changed by operation of the servomotor 144. For example, when the moving part 145 of the servomotor 144 is rotated +90 degree, the connecting bar 143 connected to the moving part 145 rotates the support unit 141, consequently moves the connection members 142, and the blades 132 connected to the connection members 142 are rotated in opposite directions with regard to the boss 133. The blades 132 of FIG. 4 has pitch of the opposite direction to the blades 132 of FIG. 3. Accordingly, as the propeller 130 is rotated by the rotational shaft 131, thrust is generated in the direction of an arrow B and the camera moving apparatus 100 is moved in the direction of the arrow B. Here, the pitch of the blades 132 of the propeller 130 is changed while the propeller 130 is being rotated. That is, the change of the pitch of the blades 132 without a reverse rotation of the driving motor 120 allows change of a moving direction of the camera moving apparatus 100 and an easy sudden stop of movement of the camera moving apparatus 100 without imposing burden on the driving motor 120.

[51] Meanwhile, although this embodiment shows that the moving part 145 of the servomotor 144 for changing the pitch of the blades 132 is rotated -90 or 90 degrees, the present invention is not limited in this regard, and if the pitch of the blades 132 can be changed, the moving part 145 of the servomotor 144 may be rotated, for example -45 or 45 degrees. Further, although this embodiment shows that the servomotor 144 of the pitch member 140 is installed in the blades 132 of each propeller 130, the present invention is not limited in this regard, and the present invention may use any structure capable of changing the blade angle using the servomotor 144, for example a structure in which one servomotor is connected to blades of all propellers.

[52] As mentioned above, in the case that the connection members 142 are moved to change the pitch of the blades 132, thrust caused by the change of the pitch of the blades 132 is changed to control the moving speed of the camera moving apparatus 100. For example, in the case that the pitch of the blades 132 is changed 45 degrees,

thrust of 10 is generated, and in the case that the pitch of the blades 132 is changed 20 degrees, thrust of 4 is generated. Thus, the rotating speed of the propeller 130 and the blade angle of the propeller 130 are changed to freely control the moving speed of the camera moving apparatus 100.

[53] Referring to FIG. 1, the photographing unit 150 is rotatably installed to the frame 110, preferably below the frame 110. This is for easily maintaining the center of gravity of the camera moving apparatus 100.

[54] The photographing unit 150 includes a cover 152, the camera 155 installed in the cover 152, and a servomotor 154 for rotating the cover 152. At this time, the cover 152 is made of a transparent material, and preferably has a predetermined rigidity. This is for protecting the camera 155 angle from the external environment or from collision with any object because the frame 110 moves at a high speed. Specifically, the photographing unit 150, in particular the cover 152 is installed to be rotated 360 degrees in a horizontal direction by the servomotor 154. That is, the cover 152 has a rotational axis 151 inserted therein, so that the cover 152 is rotated by the servomotor 154.

[55] And, a separate servomotor 154' may tilt a bottom surface of the cover 152 having the camera 155, consequently tilt the camera 155.

[56] Meanwhile, the camera moving apparatus 100 comprises a wireless communication device 180 for wireless control. For this purpose, the camera moving apparatus 100 comprises a receiving circuit unit 170 in the frame 110, and the receiving circuit unit 170 is controlled by a controller 160 as a sending circuit unit.

[57] Specifically, referring to FIG. 5, the wireless communication device 180 includes the sending circuit unit, i.e. the controller 160 and the receiving circuit unit 170.

[58] The sending circuit unit 160 may include an oscillating unit 161, a power amplifying unit 162, a modulation unit 163, and an antenna 165.

[59] The oscillating unit 161 serves as an oscillator and generates a high frequency current using an LC generator of wide oscillation frequency or a crystal oscillator of high frequency stability, and the high frequency current outputted from the oscillating unit 161 is amplified by the power amplifying unit 162. At this time, the power amplifying unit 162 is associated with the modulation unit 163 configured to modulate a signal. The modulation unit 163 superposes a low frequency modulating signal on a carrier wave. That is, an input signal inputted through the modulation unit 163, for example a signal inputted by an operation button (not shown) of the controller 160 is superposed on a high frequency current of specific frequency outputted from the oscillating unit 161, and the high frequency current is amplified by the power amplifying unit 162.

[60] The high frequency current generated through the above-mentioned configuration is transmitted to the antenna 165, and an electric wave is generated and radiated in the air.

[61] Meanwhile, the electric wave generated through the sending circuit unit 160 is detected by the receiving circuit unit 170. The receiving circuit unit 170 may include an antenna 175, a high frequency amplifying unit 172, a demodulation unit 173 and a microprocessor 174.

[62] The signal received by the antenna 175 of the receiving circuit unit 170 is amplified through the high frequency amplifying unit 172 and inputted into the demodulation unit 173, and the demodulation unit 173 separates the modulating signal.

[63] Here, the high frequency amplifying unit 172 includes an input circuit and an amplifying circuit. The input circuit matches the antenna 175 with an input terminal of a front end amplifier to separate a desired signal from external noises or interference, and the amplifying circuit amplifies the selected desired signal.

[64] Then, the signal received through the high frequency amplifying unit 172 is inputted into the demodulation unit 173, and the demodulation unit 173 separates the modulating signal, and the separated signal is inputted into the microprocessor 174.

[65] The microprocessor 174 receives the signal, and commands and controls an operation corresponding to the signal. For example, in the case that the microprocessor 174 receives a signal for changing the pitch of the propeller 130, the microprocessor 174 operates the servomotor 144 according to the input signal to change the blade angle of the propeller 130.

[66] Meanwhile, the wireless communication device 180 used in the camera moving apparatus 100 of the present invention can employ both of simplex operation and duplex operation as a communication type. In particular, the duplex operation performs sending and receiving functions simultaneously, and thus is very useful to the camera moving apparatus 100 of the present invention. In the case of duplex operation, two different frequencies are used, so that the camera moving apparatus 100 is controlled by the controller 160 and a display or an image taken by the camera 155 of the photographing unit 150 is transmitted to a server.

[67] Further, the present invention may control the camera moving apparatus 100 by wire, supply power using a cable and transmit the taken image or display by wire.

[68] FIG. 6 is a side view illustrating a camera moving apparatus according to a second embodiment of the present invention.

[69] Referring to FIG. 6, the camera moving apparatus 200 comprises a frame 210 having a driving motor 220 installed therein, propellers 130 installed and rotated at a front portion and a back portion of the frame 210, pitch members 140 for changing the blade angle of the propellers 130 and a photographing unit 150 for receiving a camera 155. At this time, the propellers 130, the pitch members 140 and the photographing unit 150 of this embodiment shown in FIG. 6 represent the same reference numerals and elements as those of the first embodiment. That is, the camera moving apparatus 200

performs substantially the same function as the camera moving apparatus 100 shown in FIGs. 1 to 4, however this embodiment is different from the first embodiment in aspect of a configuration of the frame 210 and an installation location of the propellers 130.

[70] According to the second embodiment of the present invention, the driving motor 220 is installed in the frame 210, and rollers 112 are installed above the frame 210 and get in contact with a wire 10. The propellers 130 are installed and rotated at a front end and a back end of the frame 210 on a rotational shaft 221 of the driving motor 220. Accordingly, as the propellers 130 are rotated, the rollers 112 are moved along the wire 10, and thus the frame 210 is moved along the wire 10. Meanwhile, although this embodiment shows two propellers 130, the number of propellers may be properly decreased or increased in consideration of moving speed.

[71] The moving speed of the camera moving apparatus 200 is controlled by the rotating speed of the propellers 130, and the moving direction of the camera moving apparatus 200 is controlled by the blade angle, i.e. pitch of the propellers 130. And, to suddenly stop moving the camera moving apparatus 200 or maintain a stationary state of the camera moving apparatus 200, the blade angle is changed using the pitch members 140. The change of the blade angle is made while the propellers 130 are being rotated.

[72] As mentioned above, a structure for changing the blade angle using the pitch members 140 is the same as the first embodiment. And, the photographing unit 150 is rotatably installed to the frame 210, which is the same as the first embodiment.

[73] FIG. 7 is a front view illustrating a camera moving apparatus according to a third embodiment of the present invention, and FIG. 8 is a plan view illustrating a driving unit of the camera moving apparatus according to a third embodiment of the present invention.

[74] Referring to FIGs. 7 and 8, the camera moving apparatus 300 comprises a frame 210 having a driving motor 220 installed therein, propellers 130 installed and rotated at a front end and a back end of the frame 210, pitch members 140 for changing the blade angle of the propellers 130, a photographing unit 350 for receiving a camera 155 therein, and a driving unit 390 for moving the photographing unit 350. At this time, the frame 210, the propellers 130 and the pitch members 140 of this embodiment shown in FIGs. 7 and 8 represent the same reference numerals and elements as those of the second embodiment. That is, the camera moving apparatus 300 performs substantially the same function as the camera moving apparatus 200 of FIG. 6, however this embodiment is different from the second embodiment in that this embodiment further comprises the driving unit 390 for moving the photographing unit 350.

[75] According to the third embodiment of the present invention, the driving unit 390 includes a truss 391 connected to the frame 210, a moving unit 393 installed movably along the periphery of the truss 391 and a motor 392 for moving the moving unit 393.

[76] The truss 391 is installed below the frame 210, and preferably is installed having a predetermined length in the direction intersecting a moving direction of the frame 210. More preferably, the truss 391 is installed such that the frame 310 is located at the center of the truss 391. This is for balancing the truss 391.

[77] The moving unit 393 is installed movably along the periphery of the truss 391. At this time, the moving unit 393 is moved along the periphery of the truss 391 by the motor 392 installed in the truss 391, and the photographing unit 350 is installed to the moving unit 393, so that the photographing unit 350 moves in a moving direction of the moving unit 393. The moving unit 393 is made of a belt, a chain, a wire or a cable, and is moved by rotation/reverse rotation of the motor 392. For example, the moving unit 393 is made of a chain, and is wound on a rotational gear 394 installed on a rotational axis of the motor 392 and receives a rotational force to make a movement. Meanwhile, although this embodiment shows the moving unit 393 made of a chain, the present invention is not limited in this regard, and if the moving unit 393 can be moved along the periphery of the truss 391, the present invention may use the moving unit 393 of any structure.

[78] Meanwhile, the driving unit 390 having the photographing unit 350 may further include a weight member 395 having weight corresponding to that of the photographing unit 350 to balance the truss 391. Preferably, the weight member 395 has the same weight as the photographing unit 350, and the weight member 395 is installed in the diagonally opposite corner of the photographing unit 350, and thus is moved together with the photographing unit 350. Therefore, the weight member 395 prevents the driving unit 390 from slanting to one direction due to the photographing unit 350, so that overload of the motor 392 is prevented to improve the life of the motor 392 and prevent the camera moving apparatus 300 from slanting. At this time, the photographing unit 350 is rotatably installed to the moving unit 393, which is the same as the first and second embodiments.

[79] The moving speed of the camera moving apparatus 300 is controlled by the rotating speed of the propellers 130, and the moving direction of the camera moving apparatus 300 is controlled by changing the blade angle of the propellers 130. At this time, a structure for changing the blade angle of the propellers 130 using the pitch members 140 is the same as the first and second embodiments of the present invention.

[80] As a result, the camera moving apparatus 300 is moved in the lengthwise direction of the wire 10, and thus has an effect that a photographing range is widened because the photographing unit 350 moved in the direction intersecting the moving direction of the frame 210 by the driving unit 390.

[81] Additionally, the camera moving apparatus 300 according to the third embodiment of the present invention is formed based on the structure of the frame 210 according to

the second embodiment, however the camera moving apparatus 300 may be formed based on the structure of the frame 110 according to the first embodiment, which can achieve the object of the present invention. And, although this embodiment shows the driving unit 390 is installed to one frame 210, the present invention is not limited in this regard, and the present invention may comprise a plurality of frames, for example two frames to easily balance the camera moving apparatus 300.

[82] FIG. 9 is a side view illustrating a camera moving apparatus according to a fourth embodiment of the present invention.

[83] Referring to FIG. 9, the camera moving apparatus 400 comprises a frame 210 having a driving motor 220 installed therein, propellers 130 installed and rotated at a front end and a back end of the frame 210, pitch members 140 for changing the blade angle of the propellers 130, a photographing unit 150 for receiving a camera 155, auxiliary propellers 430 installed and rotated below the frame 210, and auxiliary pitch members 440 for changing the blade angle of the auxiliary propellers 430. At this time, the frame 210, the propellers 130 and the pitch members 140 of this embodiment shown in FIG. 9 represent the same reference numerals and elements as those the second embodiment. That is, the camera moving apparatus 400 performs substantially the same function as the camera moving apparatus 200 of FIG. 6, however this embodiment is different from the second embodiment in that this embodiment further comprises the auxiliary propellers 430 and the auxiliary pitch members 440.

[84] According to the fourth embodiment of the present invention, the auxiliary propellers 430 are installed below the frame 210 and rotated in the direction intersecting the propellers 130. Specifically, auxiliary motors 420 are installed below the frame 210 at both sides of the photographing unit 150, and the auxiliary propellers 430 are installed and rotated at a front end and a back end of each auxiliary motor 420. The blade angle of the auxiliary propellers 430 is changed by the auxiliary pitch members 440, and each of the auxiliary pitch members 440 includes a connection member connected to a blade of the auxiliary propeller 430 and a servomotor connected to the connection member for reciprocating the connection member. The auxiliary pitch member 440 has substantially the same structure as the pitch member 140 of the above-mentioned embodiments. That is, as the blade angle of the auxiliary propellers 430 is changed by the auxiliary pitch members 440, the direction of thrust is changed. The auxiliary pitch members 440 rotate the auxiliary propellers 430 to prevent the frame 210 from swinging due to wind blowing in the lateral direction of the frame 210, so that thrust is generated in the opposite direction to the blowing direction of wind. Accordingly, when the propellers 130 of the frame 210 are rotated, the camera moving apparatus 400 is moved without swing. And, in the case that an arbitrary swing is required to the camera moving apparatus 400 according to a photographing technique, an arbitrary

swing is generated by rotation of the auxiliary propellers 430 to move the frame 210.

[85] Meanwhile, although not shown in FIG. 9, a gyro device may be installed to prevent swing of the camera moving apparatus 400. The gyro device is a well-known technique for automatically preventing swing using gyro precession, and thus its detailed description is omitted.

[86] It is obvious that the propellers 130 and the auxiliary propellers 430 can be operated selectively individually or simultaneously.

[87] Meanwhile, although this embodiment shows two blades 432 of each auxiliary propeller 430, the present invention is not limited in this regard, and the number of blades may be properly decreased or increased in consideration of moving speed.

[88] Further, the photographing unit 150 is rotatably installed to the frame 210, which is the same as the above-mentioned embodiments.

[89] Additionally, the camera moving apparatus 400 according to the fourth embodiment of the present invention is formed based on the structure of the frame 210 according to the second embodiment, however the camera moving apparatus 400 may be formed based on the structure of the frame 110 according to the first embodiment, which can achieve the object of the present invention.

[90] FIG. 10 is a plan view illustrating a camera moving apparatus according to a fifth embodiment of the present invention, and FIG. 11 is a side view illustrating the camera moving apparatus according to a fifth embodiment of the present invention.

[91] Referring to FIGs. 10 and 11, the camera moving apparatus 500 comprises a frame 110 having rollers 112 contacted with a wire 10, propellers 130 installed and rotated in the frame 210, pitch members 140 for changing the blade angle of the propellers 130 and a photographing unit 150 for receiving a camera 155, a moving means 501 having moving propellers 530 for moving the wire 10 contacted with the rollers 112 installed above the frame 110, and moving pitch members 540 for changing the blade angle of the moving propellers 530. At this time, the frame 110, the propellers 130, the pitch members 140 and the photographing unit 150 of this embodiment shown in FIGs. 10 and 11 represent the same reference numerals and elements as those of the first embodiment. That is, the camera moving apparatus 500 performs substantially the same function as the camera moving apparatus 100 shown in FIGs. 1 to 4, however this embodiment is different from the first embodiment in that this embodiment further comprises the moving means 501.

[92] According to the fifth embodiment of the present invention, the moving means 501 includes two moving frames 510 each having a moving motor 520 and rollers 512 moving along another cable or wire 10' above the moving frame 510, moving propellers 530 installed in the moving frame 510 and rotated by the moving motor 520, and a connection unit 519 provided below the moving frame 510.

[93] A hollow 515 is formed longitudinally in the moving frame 510, the rollers 512 are installed above the moving frame 510 and moved along the cable or wire 10' (hereinafter, commonly referred to as a 'wire'), and the moving motor 520 is installed in the moving frame 510 for rotating the moving propellers 530. The hollow 515 formed in the moving frame 510 serves as a passage, in which thrust is generated from rotation of the moving propellers 530, and in other words, through which wind is passed. The moving frame 510, the moving propellers 530 and the moving motor 520 perform substantially the same function as the frame 110, the propellers 130 and the driving motor 120 of the first embodiment, respectively. And, moving pitch members 540 for changing the blade angle of the moving propellers 530 have the same structure and perform the same function as the pitch members 140 for changing the blade angle of the propellers 130.

[94] Each connection unit 519 is installed below the two moving frames 510. The connection unit 519 is formed in the shape of a ring for easy connection of the wire 10 contacted with the rollers 112 of the frame 110. That is, both ends of the wire 10 contacted with the rollers 112 of the frame 110 are connected to the connection units 519 installed to the two moving frame 510. Accordingly, the frame 110 is moved in the lengthwise direction of the wire 10 due to thrust generated by rotation of the propellers 130 installed in the frame 110. The frame 110 can be reciprocated or suddenly stopped by changing the blade angle of the propellers 130 using the pitch members 140, which is the same structure as the first embodiment as mentioned above.

[95] In the same way, the blade angle of the moving propellers 530 rotated by the moving motor 520 installed in the moving frame 510 is changed by the moving pitch members 540. Accordingly, as the pitch of the moving propellers 530 is changed, the moving frame 510 is moved in the lengthwise direction of the wire 10' contacted with the rollers 512 installed above. At this time, preferably the two moving frames 510 are moved simultaneously. As the moving frames 510 are moved, the wire 10 connected to the moving frames 510 and the frame 110 held on the wire 10 are moved simultaneously.

[96] It is obvious that the propellers 130 and the moving propellers 530 can be operated selectively individually or simultaneously.

[97] As a result, the two moving frames 510 are moved back and forth, i.e. in the lengthwise direction of the wire 10', and the frame 110 is moved in a horizontal direction, i.e. in the lengthwise direction of the wire 10 connected to the moving frames 510, thereby widening a photographing range. Although not shown in FIG. 10, the wire 10' for moving the moving frame 510 is connected to cranes at both ends. Accordingly, the camera moving apparatus 500 can photograph an object in a vertical direction by adjusting the height of the cranes and movement of the cranes, and thus a

photographing range is further widened.

[98] Meanwhile, although this embodiment shows two blades 532 of each moving propeller 530, the present invention is not limited in this regard, and the number of blades may be properly decreased or increased in consideration of moving speed.

[99] Additionally, the camera moving apparatus 500 according to the fifth embodiment of the present invention is formed based on the structure of the frame 110 according to the first embodiment, however the camera moving apparatus 500 may be formed based on the structure of the frame 210 according to the second embodiment, which can achieve the object of the present invention.

[100] As described in the first embodiment, the camera moving apparatuses 200, 300, 400 and 500 may be wirelessly controlled by the wireless communication device 180, and it is obvious that the camera moving apparatuses 200, 300, 400 and 500 may be controlled by wire.

[101] As such, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

Industrial Applicability

[102] As mentioned above, the camera moving apparatus according to the present invention operates propellers wirelessly, and thus does not require additional manpower for moving the camera and does not limit the moving speed of the camera. And, when operating a driving motor, the present invention changes the blade angle (pitch) of the propellers, thereby allowing a sudden stop and an easy change of moving direction. Therefore, the present invention eliminates the need of reverse rotation of the driving motor to improve life of the driving motor.

[103] Meanwhile, the present invention further comprises auxiliary propellers to prevent swing of the camera moving apparatus or to swing the camera moving apparatus for various photographing techniques according to necessity. And, the present invention moves the camera moving apparatus horizontally and vertically to improve a photographing range.

Claims

[1] An apparatus for moving camera, comprising:
a frame having a hollow formed longitudinally therein, and rollers installed above the frame and moving along a cable or wire in contact with the cable or wire;
a propeller installed in the frame and rotated by a driving motor; and
a photographing unit connected to the frame and configured to receive a camera therein,
wherein the frame held on the cable or wire is moved by rotation of the propeller.

[2] An apparatus for moving camera, comprising:
a frame having a driving motor and rollers installed above the frame and moving along a cable or wire in contact with the cable or wire;
a propeller installed to the frame and rotated by the driving motor; and
a photographing unit connected to the frame and configured to receive a camera therein,
wherein the frame held on the cable or wire is moved by rotation of the propeller.

[3] The apparatus for moving camera according to claim 1 or 2, further comprising:
a pitch member for changing a blade angle of the propeller,
wherein the pitch member includes:
a connection member connected to each blade of the propeller; and
a servomotor connected to the connection member and configured to reciprocate the connection member,
wherein the servomotor is rotated at a preset angle to change the blade angle of the propeller, thereby changing a direction of a propelling power of the propeller.

[4] The apparatus for moving camera according to claim 3, further comprising:
a driving unit connected to the frame and configured to reciprocate the photographing unit in a horizontal direction that intersects a moving direction of the frame by rotation/reverse rotation of a motor.

[5] The apparatus for moving camera according to claim 4,
wherein the driving unit includes:
a truss connected to the frame;
a moving unit where the photographing unit is installed and installed movably along a periphery of the truss; and
a motor installed in the truss and configured to move the moving unit.

[6] The apparatus for moving camera according to claim 5, further comprising:
a weight member installed at the opposite location to the photographing unit installed to the moving unit for movement with the photographing unit, and

having weight corresponding to weight of the photographing unit.

[7] The apparatus for moving camera according to claim 3, further comprising:
an auxiliary propeller installed below the frame and rotated by an auxiliary motor in a direction intersecting the propeller.

[8] The apparatus for moving camera according to claim 7, further comprising:
an auxiliary pitch member for changing a blade angle of the auxiliary propeller,
wherein the auxiliary pitch member includes:
a connection member connected to each blade of the auxiliary propeller; and
a servomotor connected to the connection member for reciprocating the connection member, and
wherein the servomotor is rotated at a preset angle to change the blade angle of the auxiliary propeller, thereby changing a direction of a propelling power of the auxiliary propeller.

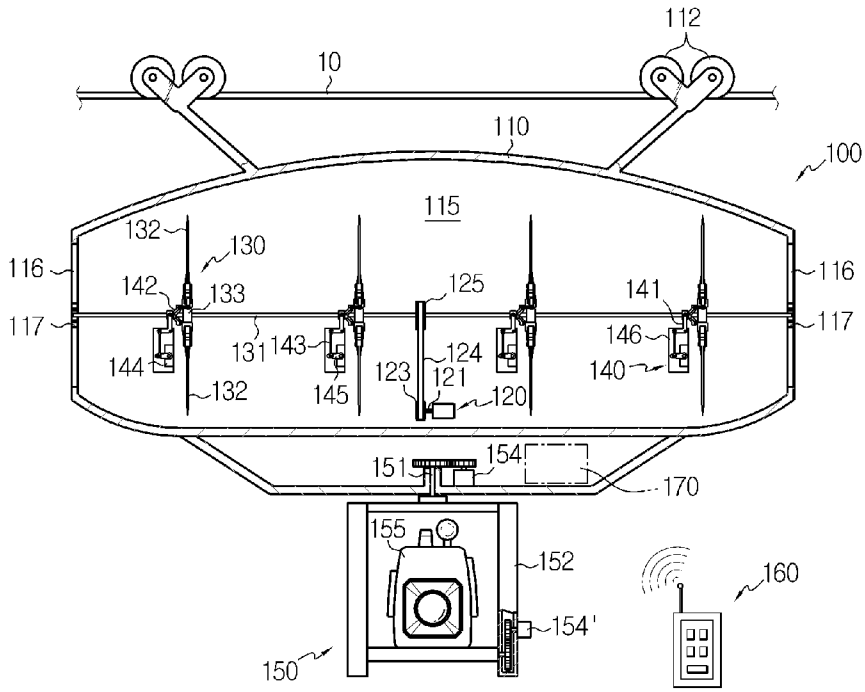
[9] The apparatus for moving camera according to claim 3, further comprising:
a moving means connected to both ends of the cable or wire for moving the cable or wire,
wherein the moving means includes:
two moving frames, each having a moving motor and rollers installed above the moving frame and moved along another cable or wire in contact with the another cable or wire;
a moving propeller installed in each moving frame and rotated by the moving motor; and
a connection unit provided below each moving frame,
wherein the cable or wire contacted with the rollers of the frame is connected to the connection unit of each moving frame, and
wherein each moving frame held on the another cable or wire is moved by rotation of the moving propeller.

[10] The apparatus for moving camera according to claim 9, further comprising:
a moving pitch member for changing a blade angle of the moving propeller,
wherein the moving pitch member includes:
a connection member connected to each blade of the moving propeller; and
a servomotor connected to the connection member for reciprocating the connection member,
wherein the servomotor is rotated at a preset angle to change a blade angle of the moving propeller, thereby changing a direction of a propelling power of the moving propeller.

[11] The apparatus for moving camera according to claim 3,
wherein the photographing unit is rotatably installed to the frame.

[12] The apparatus for moving camera according to claim 11, further comprising:
a wireless communication device for wirelessly controlling operation of the pitch member and the photographing unit.

[Fig. 1]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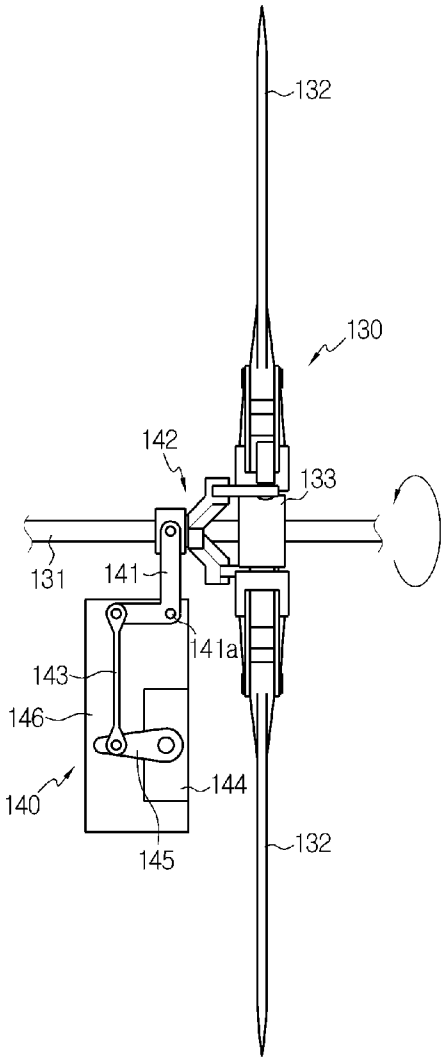
[Fig. 2]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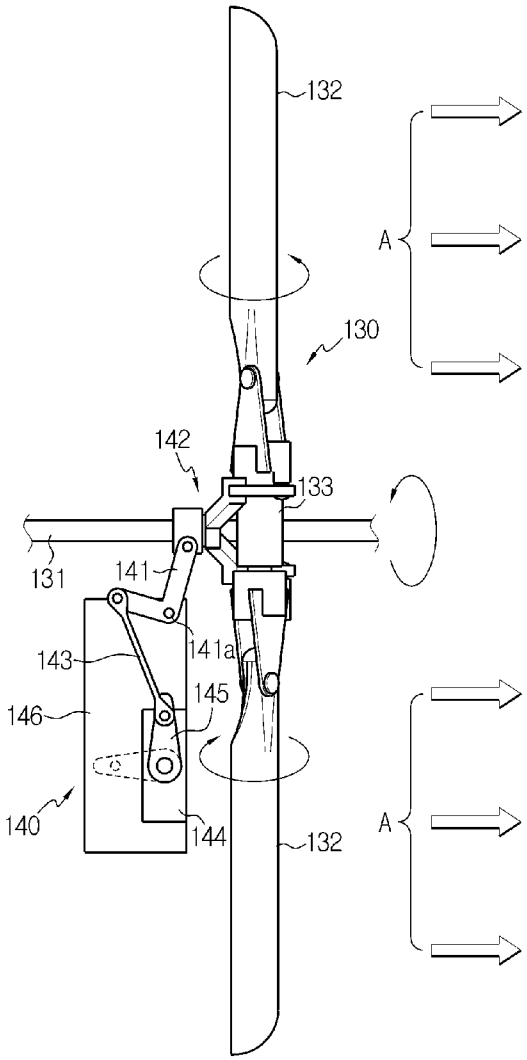
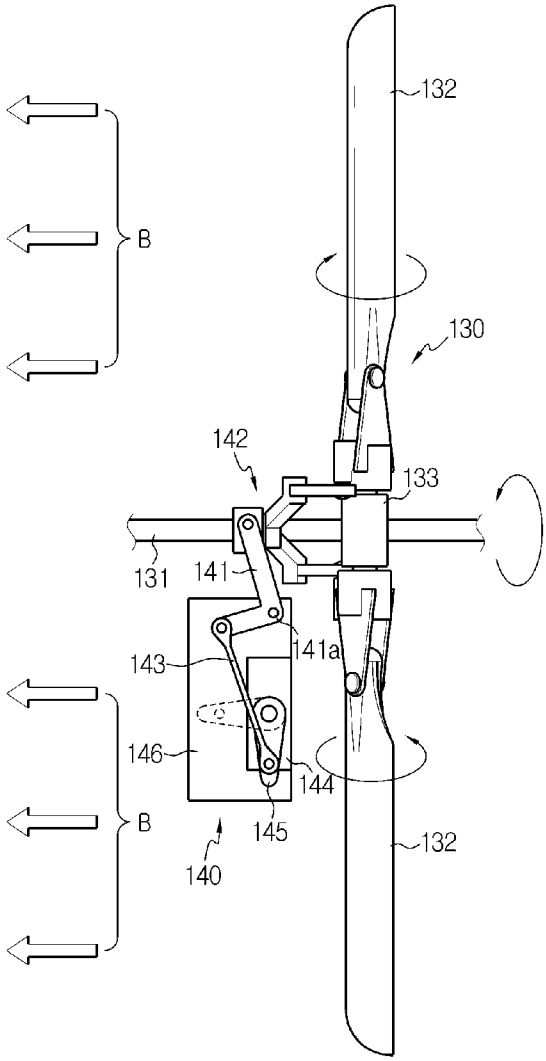
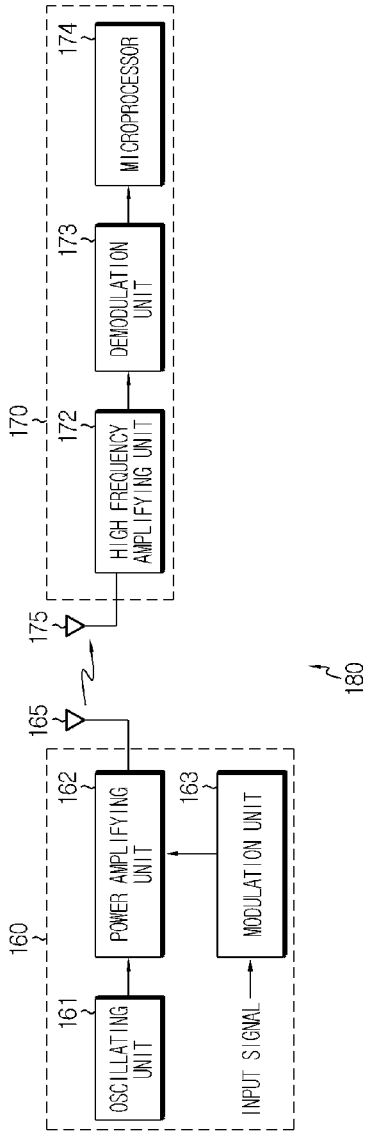
[Fig. 3]



[Fig. 4]



[Fig. 5]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MICROPROCESSOR
173
DEMODULATION UNIT
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HIGH FREQUENCY AMPLIFYING UNIT
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POWER AMPLIFYING UNIT
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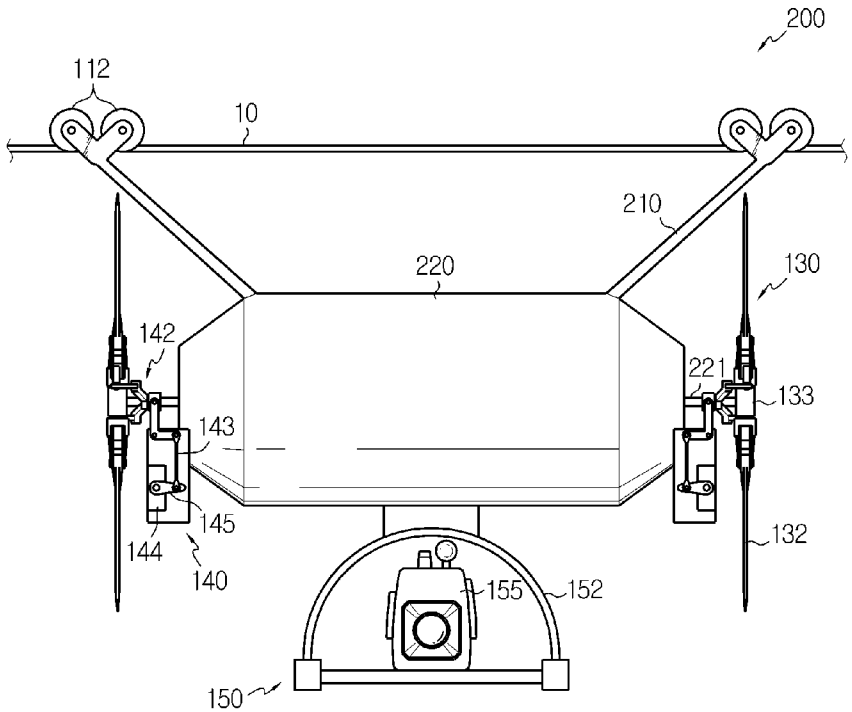
MODULATION UNIT
160
161
OSCILLATING UNIT
INPUT SIGNAL

[Fig. 6]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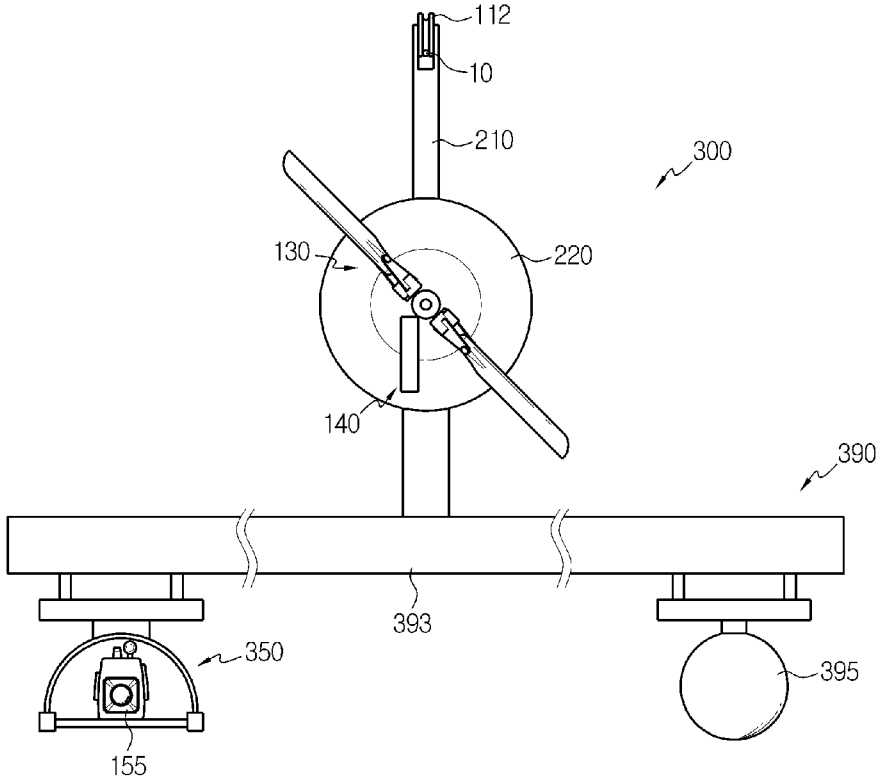
[Fig. 7]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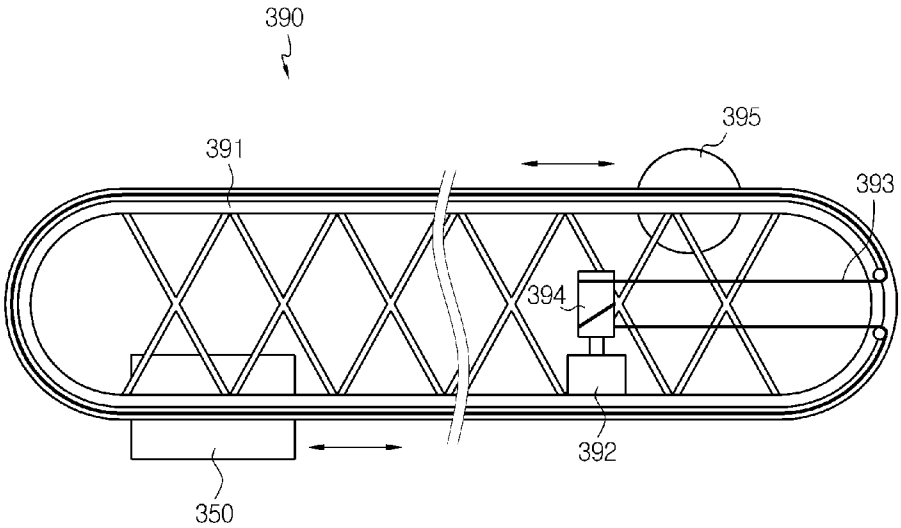
[Fig. 8]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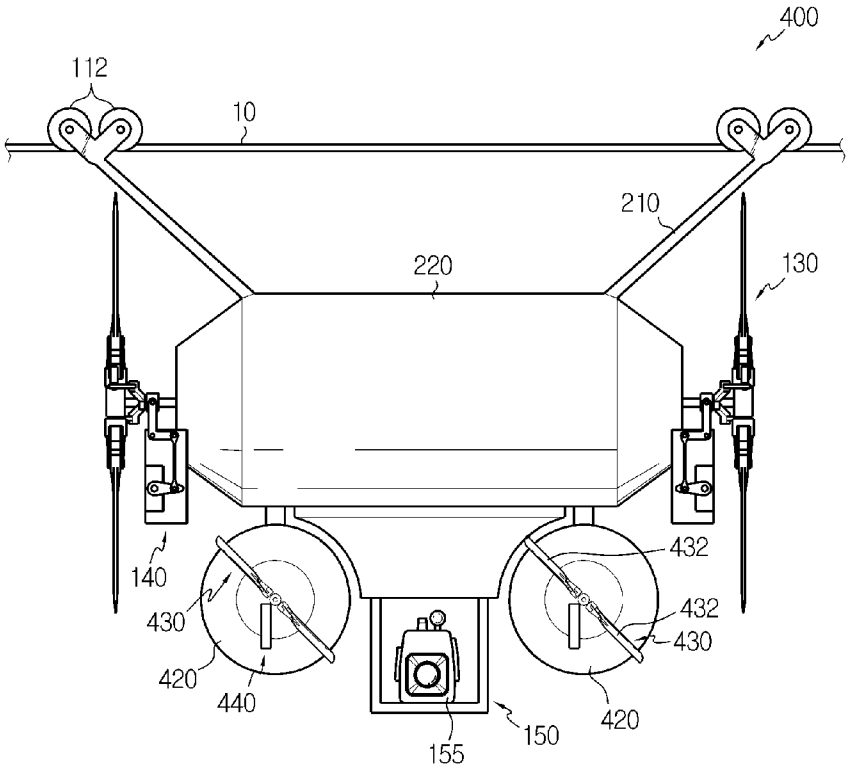
[Fig. 9]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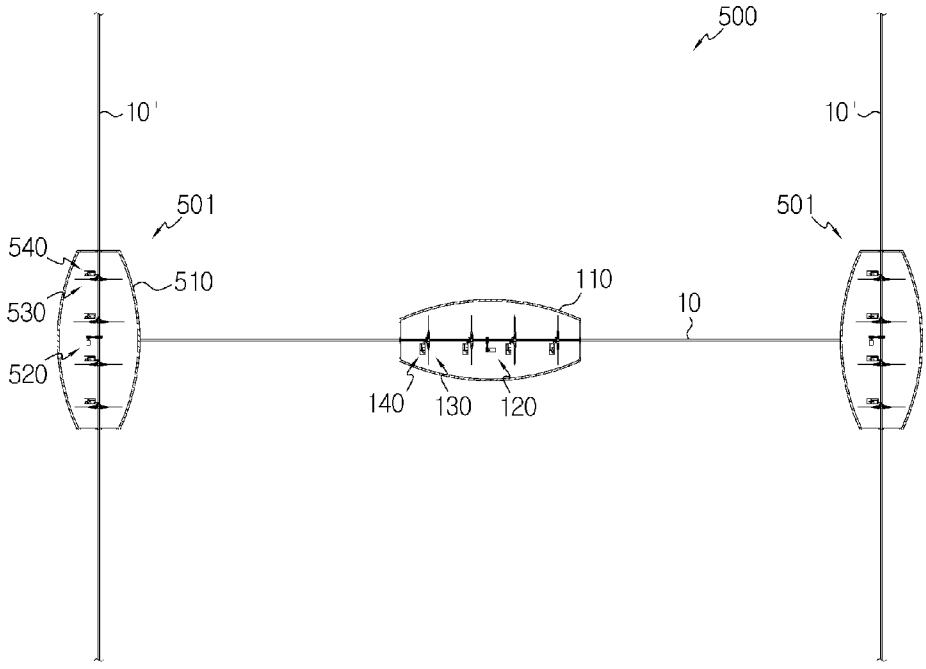
[Fig. 10]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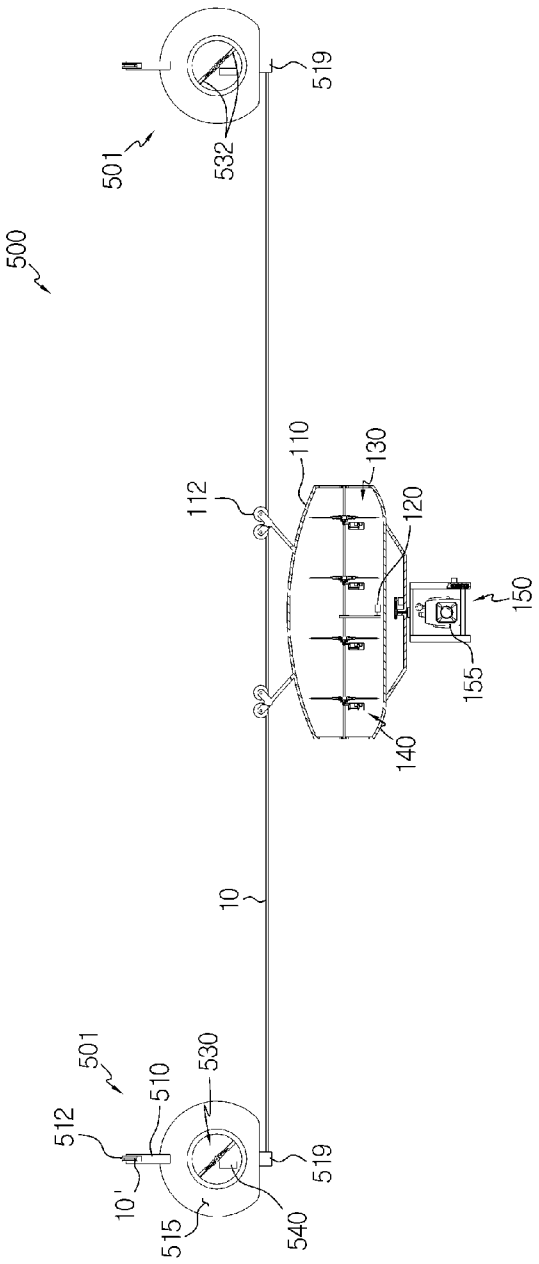
[Fig. 11]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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2008/002267

A. CLASSIFICATION OF SUBJECT MATTER

H04N 5/225(2006.01)i

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)
IPC 8 H04N, G08C, G03B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Utility models and applications for Utility models since 1975
Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKIPASS(KIPO internal) & Keywords: camera and (propel* or propels*)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4904996 A (R.A. Fernandes) 27 FEB 1990	1-2
A	See abstract; Figs. 6-8 and corresponding explanations	3-12
A	US 5420626 A (J. Lawrence et. al.) 30 MAY 1995 See abstract; Fig. 1 and corresponding explanations	1-12
A	KR 10-2005-0118370 A (CHUNG, TEAK SOO) 19 DEC 2005 See abstract; claims 1-2	1-12
A	KR 10-2003-0060035 A (SEO WON INDUSTRY CO., LTD.) 12 JUL 2003 See abstract; Figs. 6-7 and corresponding explanations	1-12

☐ 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
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"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
21 AUGUST 2008 (21.08.2008)	**21 AUGUST 2008 (21.08.2008)**

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
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Facsimile No. 82-42-472-7140

Authorized officer
AHN, JOON HYUNG
Telephone No. 82-42-481-5984

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2008/002267

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4904996 A	27.02.1990	None	
US 5420626 A	30.05.1995	AU 4845793 A1 WO 95/06897 A1	22.03.1995 09.03.1995
KR 10-2005-0118370 A	19.12.2005	None	
KR 10-2003-0060035 A	12.07.2003	None	