US 20170209799A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2017/0209799 A1**

Shiu (43) **Pub. Date: Jul. 27, 2017**

(54) **USER-ASSEMBLED QUADROTOR TOY AND ASSEMBLING METHOD THEREOF**

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(21) Appl. No.: **15/004,466**

(22) Filed: **Jan. 22, 2016**

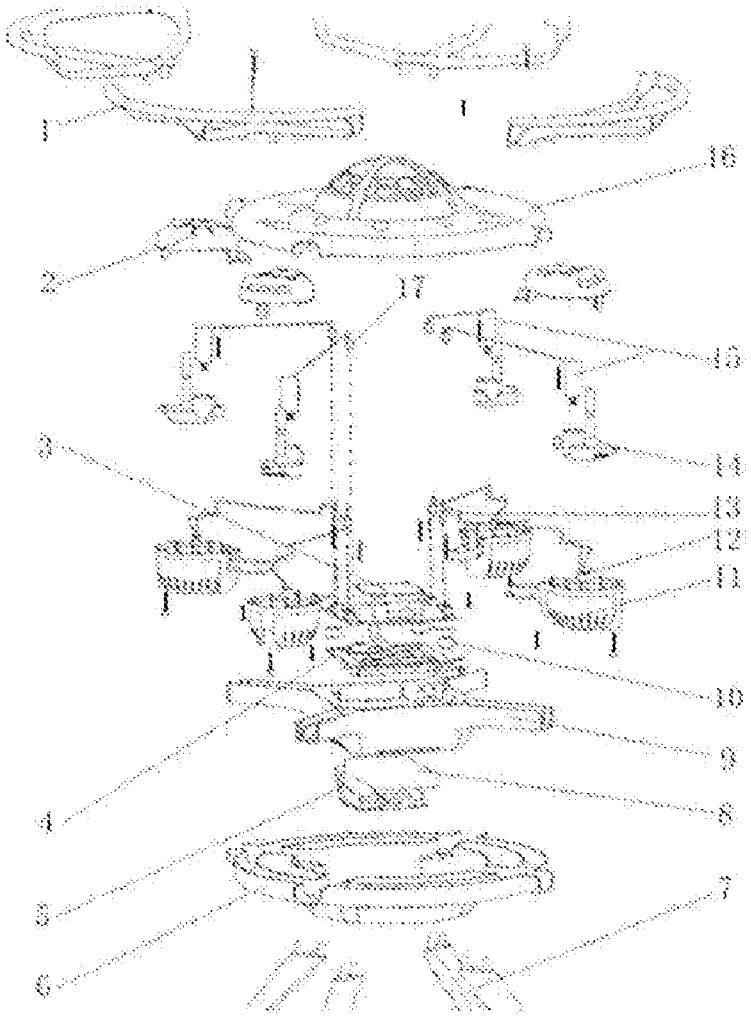
Publication Classification

(51) **Int. Cl.**
A63H 27/00 (2006.01)

(52) **U.S. Cl.**
CPC ***A63H 27/12*** (2013.01); ***A63H 27/001*** (2013.01)

(57) **ABSTRACT**

The invention discloses a user-assembled quadrotor toy, comprises motor top covers, a PCB control board, a battery cover, a shell bottom cover, landing gears, a battery, a quadrotor mounting rack, motor bottom covers, motor bracket assemblies, motor assemblies and a shell top cover; wherein the four corners of the quadrotor mounting rack are fixedly connected with the motor bottom covers through supports; the motor bracket assemblies arc fixedly connected in the motor bottom cover through screws; each motor assembly is fixedly connected to the corresponding, motor bracket assembly; each motor bottom cover is fixedly connected with the corresponding motor top cover through a screw; and the quadrotor mounting rack is fixedly mounted inside a protective shell composed of the shell bottom cover and the shell top cover. The invention is simple in structure and strong in interestingness it's capable of enabling a user to either have fins and excitement.



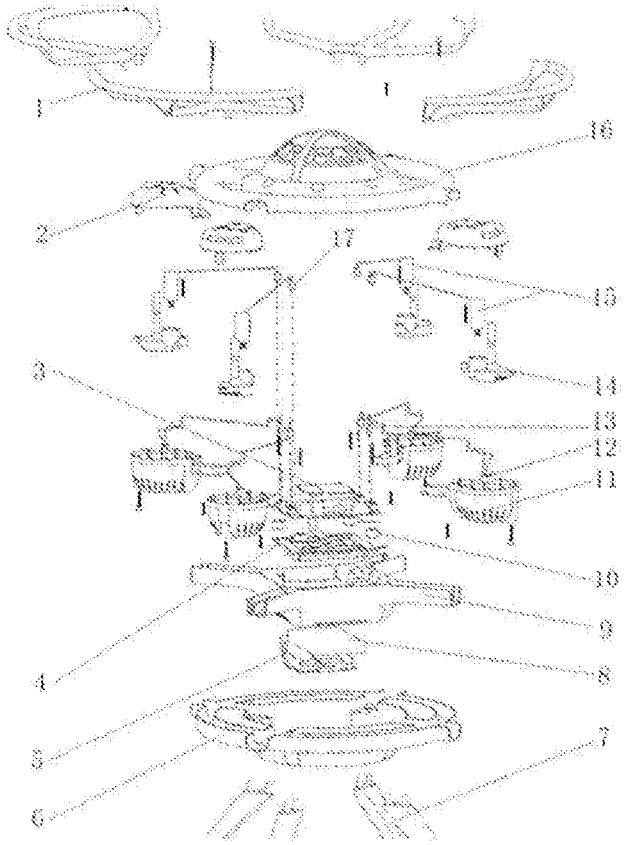


Fig. 1

USER-ASSEMBLED QUADROTOR TOY AND ASSEMBLING METHOD THEREOF

FIELD OF THE INVENTION

[0001] The present invention relates to a quadrotor toy and specifically relates to a user-assembled quadrotor toy and an assembling method thereof.

BACKGROUND OF THE INVENTION

[0002] The development of modern air vehicles is benefited from tremendous leap of science and technology due to the 19-Century Industrial Revolution. In the 19th century, people kept on trying to break through the constraint of air, but failed. With the mention and wide application of the internal-combustion engine, flying in the ah becomes possible gradually. In 1903, Wright brothers from America firstly made an airplane capable of flying and realized their dream of flying. Then, the airplane and the relevant science and technology thereof have been developed rapidly.

[0003] With the increasing development of human civilization, in particular the increasing development of modern science and technology, air vehicles gradually enter the daily life of people and play a decisive role in each industry; as a result, various air vehicle toys emerge as the times require.

[0004] The existing aerial photography air vehicle toys have been assembled by manufacturers, and are expensive and relatively suitable for the adults; with regard to quadrotors, their price is relatively popular; however, the quadrotors are also sold after being assembled by manufacturers; for this reason, users cannot enjoy the fun of assembling.

SUMMARY OF THE INVENTION

[0005] The purpose of the present invention is to provide a user-assembled quadrotor toe and an assembling method thereof to solve the problems proposed in the background art.

[0006] In order to achieve the purpose, the present invention provides the following technical solution:

[0007] A user-assembled quadrotor toy includes motor top covers, a PCB control board, a battery cover, a shell bottom cover, landing gears, a battery, a quadrotor mounting rack, motor bottom covers, motor bracket assemblies, motor assemblies and a shell top cover, wherein the four corners of the quadrotor mounting rack are fixedly connected with the motor bottom covers through supports; the motor bracket assemblies are fixedly connected in the motor bottom cover through screws; each motor assembly is fixedly connected to the corresponding motor bracket assembly; each motor assembly is composed of a motor and a pinion fixedly connected to the output shaft of the motor, the pinion of each motor assembly is engaged with a main gear on the corresponding motor bracket assembly, and the main gear is fixedly connected to the bottom end of a rotating shaft; blades are fixedly connected with the top end of each rotating shaft; each motor bottom cover is fixedly connected with the corresponding motor top cover through a screw; the quadrotor mounting rack is fixedly mounted inside a protective shell composed of the shell bottom cover and the shell top cover; a battery groove is formed in the quadrotor mounting rack; and the battery is arranged in the battery groove and is electrically connected with the power supply port of the PCB control board.

[0008] As a further solution of the present invention, a blade protective barrier is fixedly connected to each motor top cover through a screw and the blades are arranged in the blade protective barrier.

[0009] As a further solution of the present invention, the landing gears are arranged at the four corners of the bottom of the shell bottom cover.

[0010] As a further solution of the present invention, the battery cover is movably mounted on the shell bottom cover.

[0011] As a further solution of the present invention, the PCB control board is arranged in the middle of the quadrotor mounting rack; the motor wiring terminal of each motor assembly is connected with a motor plug through a lead, and the motor plug is plugged in a corresponding power supply jack on the PCB control board to realize power supply to the motor.

[0012] As a further solution of the present invention, an LED lamp is arranged in each motor bottom cover; the LED lamp is connected with an LED lamp plug through a lead and the LED lamp plug is plugged in the corresponding power supply jack on the PCB control board.

[0013] As a further solution of the present invention, a rubber bracket is arranged at the bottom of the PCB control board; spongy cushions are arranged at four corners between the PCB control board and the rubber bracket; screws orderly pass through the PCB control board, the spongy cushions and the rubber bracket and are in threaded connection with threaded holes firmed in the quadrotor mounting rack.

[0014] As a further solution of the present invention, an assembling method of the user-assembled quadrotor toy includes the following specific steps: (1) arranging four motor assemblies and four motor bracket assemblies, and mounting each motor assembly in the corresponding motor bracket assembly, so that the pinion of the motor assembly is engaged with the main gear on the motor bracket assembly to form a motor base; (2) arranging four LED lamps and mounting the LED lamps in the motor bottom covers, and then mounting the motor bases in the motor bottom covers and fastening the motor bases in the motor bottom covers by use of screws; (3) mounting the rubber bracket in the middle of the quadrotor mounting rack, putting four small spongy cushions on the rubber bracket, and then orderly putting the screws through the PCB control board, the spongy cushions and the rubber bracket and enabling the screws to be in threaded connection with the threaded holes formed in the quadrotor mounting rack; (4) plugging the LED lamp plugs of the LED lamps in the corresponding power supply plugs of the PCB control board; (5) fixedly connecting four motor bottom covers to the four corners of the quadrotor mounting rack through screws and then fixedly connecting each motor top cover to the corresponding motor bottom cover; (6) mounting the blades on the rotating shafts at the tops of the motor top covers; (7) mounting the blade protective barriers on the motor top covers and then fastening the same by using screws; (8) mounting the shell bottom cover at the bottom of the quadrotor mounting rack and then mounting the four landing gears at the bottom of the shell bottom cover and fastening the same by using screws; (9) fastening the shell top cover to the shell bottom cover, thereby finishing assembling; and (10) pasting a decorative sticker to an appropriate position of the body of the assembled quadrotor toy to obtain the body of the user-assembled quadrotor toy.

[0015] Compared with the prior art, the user-assembled quadrotor toy is simple in structure and strong in interestingness, and is capable of enabling a user to either have the fun of playing a user-assembled model or enjoy the excitement brought by playing a remotely piloted vehicle. The user assembles the small parts one by one according to the instruction of the description, and when the finished work is displayed in front of the user, the user will definitely be full of the feeling of success and satisfaction. Besides, the thinking and assembling abilities can be trained in the assembling process; it even can enlighten the user to become interested in science and technology; in short, it provides a very good learning opportunity.

[0016] If the assembling process is finished by family members together, it is an opportunity to well communicate with the family members and actually is a good parents-child campaign. The user can paste the decorative plaster after finishing assembling to make his own finished work unique. Then, the user can just enjoy the fun of piloting the air vehicle and develop the various different unique skills and functions of the air vehicle to give a fabulous show of skills and techniques in front of audiences, including the unique skills of a one-key height setting function and a one-key 360-degree rotation. There are still some other basic flight functions, such as front-and-back flight, left-and-right flight, rising and falling, and left-and-right rotation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] FIG. **1** is a structural exploded view of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0018] The technical solutions of the embodiments of the present invention are described clearly and completely below in combination with the accompanying drawings in the embodiments of the present invention. Obviously, the described embodiments are merely part of the embodiments of the present invention, not all of the embodiments.

[0019] Based on the embodiments in the present invention, all the other embodiments obtained by an ordinary person skilled in the art without inventive labor shall fall into the protection scope of the present invention.

[0020] With reference to FIG. **1**, in an embodiment of the present invention, a user-assembled quadrotor toy includes blade protective barriers **1**, motor top covers **2**, a PCB control board **3**, a rubber bracket **4**, a battery cover **5**, a shell bottom cover **6**, landing gears **7**, a battery **8**, a quadrotor mounting rack **9**, spongy cushions **10**, motor bottom covers **11**, LED lamps **12**, LED lamp plugs **13**, motor bracket assemblies **14**, motor assemblies **15**, a shell top cover **16** and motor plugs **17**; the four corners of the quadrotor mounting rack **9** are fixedly connected with the motor bottom covers **11** through supports; each motor bracket assembly **14** is fixedly connected in the corresponding motor bottom cover **11** through a screw; each motor assembly **15** is fixedly connected to the corresponding motor bracket assembly **14**; each motor assembly **15** is composed of a motor and a pinion fixedly connected to the output shaft of the motor; the pinion of each motor assembly **15** is engaged with a main gear on the corresponding motor bracket assembly **14**, and the main gear is fixedly connected to the bottom end of a rotating shaft; due to the accelerator gear structures composed of the pinions and the main gears, power output is realized.

[0021] Each motor bottom cover **11** is fixedly connected with the corresponding motor top cover **2** through a screw; each blade protective barrier **1** is fixedly connected to the corresponding motor top cover **2** through a screw, blades (not illustrated in the figure) are arranged in the blade protective barrier **1** and connected with the top end of the corresponding rotating shaft; the blades are driven to rotate by power output by each motor, assembly **15**, thereby generating a pushing airflow to drive the body of the quadrotor toy to rise.

[0022] The quadrotor mounting rack **9** is fixedly mounted inside a protective shell composed of the shell bottom cover **6** and the shell bottom cover **16**; the landing gears **7** are arranged at the four corners of the bottom of the shell bottom cover **6** and used for buffering an impact force produced by landing; a battery groove is formed in the quadrotor mounting rack **9** and the battery **8** is arranged in the battery groove; besides, the battery cover **5** is movably mounted on the shell bottom cover **6** to facilitate the installation and removal of the battery; the battery **8** is electrically connected with the power supply port of the PCB control board **3**.

[0023] The PCB control board **3** is arranged in the middle of the quadrotor mounting rack **9**; besides, the motor wiring terminal of each motor assembly **15** is connected with the corresponding motor plug **17** through a lead, and the motor plug **17** is plugged in a corresponding power supply jack on the PCB control board **3** to realize power supply to the corresponding motor; each LED lamp **12** is arranged in the corresponding motor bottom cover **11** and connected with the corresponding LED lamp plug **13** through a lead, and the LED lamp plug **13** is also plugged in the corresponding power supply jack on the PCB control board **3**, and therefore, the body of the quadrotor toy is enabled to have a lighting effect.

[0024] The rubber bracket **4** is arranged at the bottom of the PCB control board **3**; besides, the spongy cushions **10** are arranged at four corners between the PCB control board **3** and the rubber bracket **4**, and screws orderly pass through the PCB control board **3**, the spongy cushions **10** and the rubber bracket **4** and are in threaded connection with threaded holes formed in the quadrotor mounting racks **9**; the spongy cushions **10** and the rubber bracket **4** are used for protecting the PCB control board **3**, so as to avoid system damage due to the damage of the impact force to the internal circuit structure.

[0025] The assembling method of the user-assembled quadrotor toy includes the following specific steps: (1) arranging tour motor assemblies **15** and four motor bracket assemblies **14**, and mounting each motor assembly **15** in the corresponding motor bracket assembly **14**, so that the pinion of the motor assembly **15** is engaged with the main gear on the motor bracket assembly **14** to form a motor base, (2) arranging four LED lamps **12** and mounting the LED lamps **12** in the motor bottom covers **11**, and then mounting the motor bases in the motor bottom covers and fastening the motor bases in the motor bottom covers **11** by use of screws; (3) mounting the rubber bracket **4** in the middle of the quadrotor mounting rack **9**, putting four small spongy cushions on the rubber bracket **4**, and then orderly putting the screws through the PCB control board **3**, the spongy cushions **10** and the rubber bracket **4** and enabling the screws to be in threaded connection with the threaded holes formed in

the quadrotor mounting rack **9**; (4) plugging the LED lamp plugs **13** of the LED lamps **12** in the corresponding power supply plugs of the PCB control board **3**; (5) fixedly connecting four motor bottom covers **11** to the four corners of the quadrotor mounting rack **9** through screws and then fixedly connecting each motor top cover **2** to the corresponding motor bottom cover **11**; (6) mounting the blades on the rotating shafts at the tops of the motor top covers **2**; (7) mounting the blade protective barriers on the motor top covers **2** and then fastening the same by using screws; (8) mounting the shell bottom cover **6** at the bottom of the quadrotor mounting rack **9** and then mounting the four landing gears **7** at the bottom of the shell bottom cover **6** and fastening the same by using screws; (9) fastening the shell top cover **16** to the shell bottom cover **6**, thereby finishing assembling; and (10) pasting a decorative sticker to an appropriate position of the body of the assembled quadrotor toy to obtain the body of the user-assembled quadrotor toy.

[0026] It would be obvious for those skilled in the art that the present invention is not limited to the details of the exemplary embodiments and can be implemented in other specific forms without departing from the spirit or the basic features of the present invention.

[0027] Hence, from every point, the embodiments should he considered to be exemplary and unrestrictive; the scope of the present invention is defined by the claims rather than the foregoing descriptions and aims at covering all the variations falling within the implication and the scope of equivalent elements of the claims. Any accompanying drawing sign in the claims should not be regarded as limitation to the involved claims.

[0028] Besides, it should he understood that, although the description is made according to the embodiments, each embodiment does not merely include one independent technical solution, and such a narration manner of the description is merely intended to be clear; those skilled in the art should take the description as a whole; the technical solutions in various embodiments should also be combined appropriately to form other embodiments that those skilled in the art can understand.

1. A user-assembled quadrotor toy, comprising motor top covers, a PCB control board, a battery cover, a shell bottom cover, landing gears, a battery a quadrotor mounting rack, motor bottom covers, motor bracket assemblies, motor assemblies and a shell top cover, wherein the four corners of the quadrotor mounting rack are fixedly connected with the motor bottom covers through supports; the motor bracket assemblies are fixedly connected in the motor bottom cover through screws; each motor assembly is fixedly connected to the corresponding motor bracket assembly; each motor assembly is composed of a motor and a pinion fixedly connected to the output shaft of the motor; the pinion of each motor assembly is engaged with a main gear on the corresponding motor bracket assembly, and the main gear is fixedly connected to the bottom end of a rotating shaft; blades are fixedly connected with the top end of each rotating shaft; each motor bottom envier is fixedly connected with the corresponding motor top cover through a screw; the quadrotor mounting rack is fixedly mounted inside a protective shell composed of the shell bottom cover and the shell top cover; a battery groove is formed in the quadrotor mounting rack; and the battery is arranged in the battery groove and is electrically connected with the power supply port of the PCB control board.

2. The user-assembled quadrotor toy oh claim **1**, wherein a blade protective barrier is fixedly connected to each motor top cover through a screw and the blades are arranged in the blade protective barrier.

3. The user-assembled quadrotor toy of claim **1**, wherein the landing gears are arranged at the four corners of the bottom of the shell bottom cover.

4. The user-assembled quadrotor toy of claim **3**, wherein the battery cover is movably mounted on the shell bottom cover.

5. The user-assembled quadrotor toy of claim **1**, wherein the PCB control board is arranged in the middle of the quadrotor mounting rack; the motor wiring terminal of each motor assembly is connected with a motor plug through a lead, and the motor plug is plugged in a corresponding power supply jack on the PCB control board to realize power supply to the motor.

6. The user-assembled quadrotor toy of claim **1**, wherein an LED lamp is arranged in each motor bottom cover; the LED lamp is connected With an LED lamp plug through a lead and the LED lamp plug is plugged in the corresponding power supply jack on the PCB control board.

7. The user-assembled quadrotor toy of claim **1** or **5**, wherein a rubber bracket is arranged at the bottom of the PCB control board; spongy cushions are arranged at four corners between the PCB control board and the rubber bracket; screws orderly pass through the PCB control board, the spongy cushions and the rubber bracket and are in threaded connection with threaded holes formed in the quadrotor mounting rack.

8. An assembling method of the user-assembled quadrotor toy of claim **1**, comprising the following specific steps; (1) arranging four motor assemblies and four motor bracket assemblies, and mounting each motor assembly in the corresponding motor bracket assembly, so that the pinion of the motor assembly is engaged with the main gear on the motor bracket assembly to form a motor base; (2) arranging four LED lamps and mounting the LED lamps in the motor bottom covers, and then mounting the motor bases in the motor bottom covers and fastening the motor bases in the metro bottom covers by use of screws; (3) mounting the rubber bracket in the middle of the quadrotor mounting rack, putting four small spongy cushions On the rubber bracket, and then orderly putting the screws through the PCB control board, the spongy cushions and the rubber bracket and enabling the screws to be in threaded connection with the threaded holes formed in the quadrotor mounting rack; (4) plugging the LED lamp plugs of the LED lamps in the corresponding power supply plugs of the PCB control board; (5) fixedly connecting four motor bottom covers to the four corners of the quadrotor mounting rack through screws and then fixedly connecting each motor top cover to the corresponding motor bottom cover; (6) mounting the blades on the rotating shafts at the tops of the motor top covers; (7) mounting the blade protective barriers on the motor top covers and then fastening the same by using screws; (8) mounting the shell bottom cover at the bottom of the quadrotor mounting rack and then mounting the four landing gears at the bottom of the shell bottom cover and fastening the same by using screws; (9) fastening the shell top cover to the shell bottom cover, thereby finishing assembling; and

(10) pasting a decorative sticker to an appropriate position of the body of the assembled quadrotor toy to obtain the body of the user-assembled quadrotor toy.

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