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(54) **ROTATION EXERCISING BALL STRUCTURE**

(57) A rotation exercising ball structure includes two shells (10) that are combined to construct a hollow ball (1). A mandrel (41) is mounted in the hollow ball. A rotation member (43) has a first end connected with the mandrel. A weight (44) is connected with a second end of the at least one rotation member. The weight and the rotation member are rotated in the hollow ball radially and centrifugally with the mandrel served as an axis. A first housing (51) is mounted in the hollow ball. A Bluetooth transmission device (53) is mounted in the first housing. A Hall sensor (54) is electrically connected with the Bluetooth transmission device. In practice, when the mandrel is rotated, the Hall sensor detects rotation of the mandrel and transmits an information to the Bluetooth transmission device.

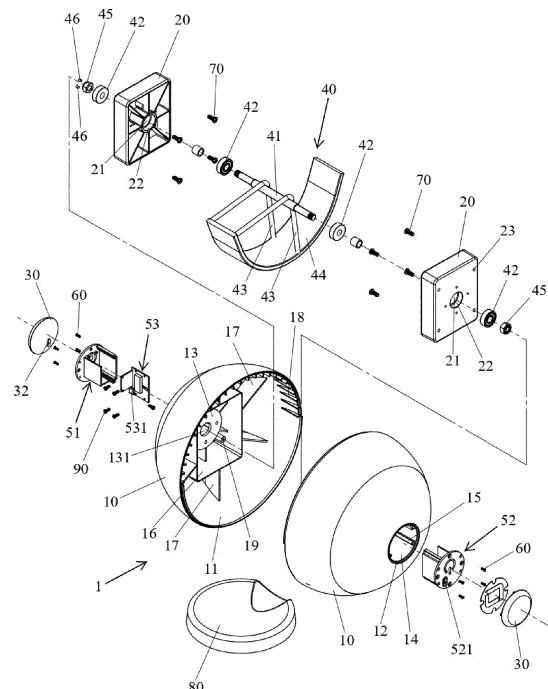


FIG. 2

Description

[0001] The present invention relates to an exercising device and, more particularly, to a rotation (or gyration) exercising ball structure that swings smoothly.

[0002] A conventional rotation structure was disclosed in the U.S. Publication No. 20220193478, and comprises a main body 10, two bearings 34 mounted in the main body 10, a mandrel 30 mounted between the two bearings 34, a rotation member 32 having a first end connected with the mandrel 30, and a weight 36 mounted on a second end of the rotation member 32. The main body 10 includes two shells 20 and 21 combined together. The main body 10 has an exterior provided with two operation portions 14. The main body 10 has an interior provided with a receiving chamber 22 and two mounting recesses 24. The weight 36 is rotatable in the receiving chamber 22. The two bearings 34 are mounted in the two mounting recesses 24. In operation, the user's two hands hold and move the two operation portions 14 so that the main body 10 is rotated, and the rotation member 32 and the weight 36 are pivoted about the mandrel 30 to produce a centrifugal force. At this time, the two operation portions 14 function as a pivot fulcrum. In such a manner, the user's two hands have to overcome the centrifugal force produced by the weight 36 so as to achieve an exercising effect.

[0003] However, the conventional rotation structure has the following disadvantages.

1. The two bearings 34 are mounted in the two mounting recesses 24 respectively and apply a force on the two mounting recesses 24 so that after the main body 10 is rotated is operated during a period of time, the two mounting recesses 24 are easily cracked or broken, and the two bearings 34 will be dropped.

2. The main body 10 is formed by the two shells 20 and 21 juxtaposed to each other so that the connection between the two shells 20 and 21 has a weakened strength. Thus, the main body 10 is easily deformed or broken from the connection of the two shells 20 and 21.

3. The rotation structure cannot provide a corresponding information, such as the time interval, the swinging times, the consumed calories or the like, during rotation of the main body 10, thereby causing inconvenience to the user when wishing to understand the corresponding information.

4. A T-shaped construction is defined between the mandrel 30 and the rotation member 32, and the mandrel 30 is rotated with its two ends served as fulcrums. In such a manner, the two ends of the mandrel 30 and the weight 36 form a triangular structure, so that when a force is applied on the main body 10,

the force has to swing the mandrel 30, the rotation member 32, and the weight 36. Thus, the mandrel 30 applies a larger resistance so that the user cannot swing the main body 10 smoothly.

5. The two ends of the mandrel 30 are disposed in the two shells 20 and 21. Thus, when the two shells 20 and 21 are not assembled exactly, the two ends of the mandrel 30, the two bearings 34, and the two mounting recesses 24 are not located at the same central line, so that the mandrel 30 is not rotated smoothly.

6. The manufacturer has to assemble the two shells 20 and 21 carefully to keep the two ends of the mandrel 30, the two bearings 34, and the two mounting recesses 24 at the same central line, thereby prolonging the time of assembly, and thereby increasing the cost.

7. The conventional rotation structure has many parts with complicated procedures of assembly, thereby increasing the cost of fabrication and production.

[0004] The primary objective of the present invention is to provide a rotation exercising ball structure that achieves an exercising effect by a centrifugal rotating motion.

[0005] In accordance with a first embodiment of the present invention, there is provided a rotation exercising ball structure comprising two shells, two pivot seats, two holding members, a weight unit, a first housing, a second housing, a Bluetooth transmission device, and a Hall sensor. The two shells are combined to construct a hollow ball. Each of the two shells has an interior provided with a space. The space has a bottom provided with a fixing hole. The fixing hole is located at a center of the space and penetrates each of the two shells. The fixing hole is formed with an inner wall. The bottom of the space is provided with a positioning seat directed toward an opening of each of the two shells. The positioning seat is formed with a through hole. The through hole penetrates the positioning seat and is connected to the fixing hole. The two pivot seats are combined with the positioning seats of the two shells respectively. Each of the two pivot seats is provided with a perforation. The perforation penetrates each of the two pivot seats and aligns with the through hole of the positioning seat. The two holding members are mounted on the two shells respectively and cover the fixing holes of the two shells respectively. Each of the two holding members has an inner side and an outer side. The weight unit includes a mandrel, two magnets, at least one rotation member, and a weight. The mandrel has two ends pivotally connected with the hollow ball. Each of the two ends of the mandrel is pivotally mounted in the perforation of one of the two pivot seats and the through hole of the positioning seat of one of the

two shells. Each of the two ends of the mandrel is pivotally connected with at least one bearing which is received in the perforation of one of the two pivot seats. The two magnets are secured to one of the two ends of the mandrel. The at least one rotation member has a first end connected with the mandrel. The at least one rotation member extends radially from a center of the mandrel. The weight is connected with a second end of the at least one rotation member. The weight is a radial curved plate. The weight is rotated in the hollow ball radially and centrifugally with the mandrel served as an axis. The mandrel is rotated by the at least one rotation member. The first housing and the second housing are mounted on the inner sides of the two holding members respectively. The first housing and the second housing are inserted into the fixing holes of the two shells and locked on the inner walls of the two shells. The Bluetooth transmission device is mounted in the first housing. The Hall sensor is electrically connected with the Bluetooth transmission device. The Hall sensor is close to and aligns with the two magnets. In practice, when the mandrel is rotated, the Hall sensor detects rotation of the two magnets and transmits an information of rotation of the two magnets to the Bluetooth transmission device.

[0006] In accordance with a second embodiment of the present invention, there is provided a rotation exercising ball structure comprising two shells, two pivot seats, two holding members, a weight unit, a housing, a Bluetooth transmission device, a Hall sensor, and two handle protecting members. The two shells are combined together to construct a hollow ball. Each of the two shells has an interior provided with a space. The space has a bottom provided with a fixing hole. The fixing hole is located at a center of the bottom of the space and penetrates each of the two shells. Each of the two pivot seats is formed on the bottom of the space and directed toward an opening of one of the two shells. Each of the two pivot seats is provided with a pivot pillar. The pivot pillar has a center provided with a through hole. The through hole penetrates each of the two pivot seats and extends to the fixing hole. The two holding members are mounted on the two shells respectively. Each of the two holding members covers the fixing hole of one of the two shells. Each of the two holding members has an inner side and an outer side. The weight unit includes a mandrel, a rotation member, two bearings, a weight, at least one auxiliary weight, and two magnets. The mandrel has two ends each of which extends through the through hole of one of the two pivot seats. Each of the two ends of the mandrel is secured in the through hole of one of the two pivot seats. The rotation member has a first end provided with a mounting hole. The two bearings are mounted in the mounting hole of the rotation member. The rotation member is radially mounted on a central position of the mandrel through the mounting hole. The weight connects a second end of the rotation member and is located opposite to the mandrel. The rotation member and the weight are rotated in the hollow ball radially and centrifugally

with the mandrel served as an axis. The at least one auxiliary weight is removably mounted on the weight. The two magnets are mounted on the rotation member. The two magnets are arranged at a periphery of the mounting hole of the rotation member. The housing is mounted on and combined with the inner side of one of the two holding members. The housing is inserted into the fixing hole of one of the two shells. The Bluetooth transmission device is mounted in the housing. The Bluetooth transmission device is electrically connected with the Hall sensor. The Hall sensor is mounted on the mandrel. The Hall sensor is close to the mounting hole of the rotation member and aligns with the two magnets. In practice, when the rotation member is rotated, the Hall sensor detects rotation of the two magnets and sends information or data of rotation of the two magnets to the Bluetooth transmission device. The two handle protecting members are mounted on the two shells of the hollow ball respectively and align with the two holding members respectively.

[0007] Further benefits and advantages of the present invention will become apparent after a careful reading of the detailed description with appropriate reference to the accompanying drawings.

[0008] In the drawings:

FIG. 1 is a perspective view of a rotation exercising ball structure in accordance with the first preferred embodiment of the present invention.

FIG. 2 is an exploded perspective view of the rotation exercising ball structure in accordance with the first preferred embodiment of the present invention.

FIG. 3 is a partial exploded perspective view of the rotation exercising ball structure in accordance with the first preferred embodiment of the present invention.

FIG. 4 is a partial perspective assembly view of the rotation exercising ball structure in accordance with the first preferred embodiment of the present invention.

FIG. 5 is a side cross-sectional view of the rotation exercising ball structure in accordance with the first preferred embodiment of the present invention.

FIG. 6 is another side cross-sectional view of the rotation exercising ball structure in accordance with the first preferred embodiment of the present invention.

FIG. 7 is another side cross-sectional view of the rotation exercising ball structure in accordance with the first preferred embodiment of the present invention.

FIG. 8 is a partial perspective assembly view of the

rotation exercising ball structure in accordance with the first preferred embodiment of the present invention.

FIG. 9 is an exploded perspective view of the rotation exercising ball structure as shown in FIG. 8.

FIG. 10 is a partial exploded perspective view of the rotation exercising ball structure in accordance with the first preferred embodiment of the present invention.

FIG. 11 is a schematic side view of a weight of the rotation exercising ball structure in accordance with another preferred embodiment of the present invention.

FIG. 12 is a schematic operational view of the rotation exercising ball structure in accordance with the first preferred embodiment of the present invention.

FIG. 13 is a perspective view of a rotation exercising ball structure in accordance with the second preferred embodiment of the present invention.

FIG. 14 is an exploded perspective view of the rotation exercising ball structure in accordance with the second preferred embodiment of the present invention.

FIG. 15 is a partial exploded perspective view of the rotation exercising ball structure in accordance with the second preferred embodiment of the present invention.

FIG. 16 is a partial perspective assembly view of the rotation exercising ball structure in accordance with the second preferred embodiment of the present invention.

FIG. 17 is a side cross-sectional view of the rotation exercising ball structure as shown in FIG. 13.

FIG. 18 is another side cross-sectional view of the rotation exercising ball structure as shown in FIG. 13.

FIG. 19 is a further side cross-sectional view of the rotation exercising ball structure as shown in FIG. 13.

FIG. 20 is an exploded perspective view of a weight of the rotation exercising ball structure in accordance with another preferred embodiment of the present invention.

FIG. 21 is a partial exploded perspective view of the rotation exercising ball structure using the weight in accordance with another preferred embodiment of the present invention.

[0009] Referring to FIGS. 1-12, a rotation exercising ball structure in accordance with the first preferred embodiment of the present invention comprises two shells 10, two pivot seats (or mounting seats) 20, two holding members 30, a weight unit 40, a first housing 51, a second housing 52, a Bluetooth transmission device 53, and a Hall sensor 54.

[0010] The two shells 10 are combined together to construct a hollow ball 1. Each of the two shells 10 has an interior provided with a space 11. The space 11 has a bottom provided with a fixing hole (or securing hole) 12. The fixing hole 12 is located at a center of the space 11 and penetrates each of the two shells 10. The fixing hole 12 is formed with an inner wall 14. The bottom of the space 11 is provided with a positioning seat 13 directed toward an opening of each of the two shells 10. The positioning seat 13 is formed with a through hole 131. The through hole 131 penetrates the positioning seat 13 and is connected to the fixing hole 12.

[0011] The two pivot seats 20 are combined with the positioning seats 13 of the two shells 10 respectively. Each of the two pivot seats 20 is provided with a perforation 21. The perforation 21 penetrates each of the two pivot seats 20 and aligns with the through hole 131 of the positioning seat 13.

[0012] The two holding members 30 are mounted on the two shells 10 respectively and cover the fixing holes 12 of the two shells 10 respectively. Each of the two holding members 30 has an inner side and an outer side.

[0013] The weight unit 40 includes a mandrel 41, two magnets 46, at least one rotation member 43, and a weight 44. The mandrel 41 has two ends pivotally connected with the hollow ball 1. Each of the two ends of the mandrel 41 is pivotally mounted in the perforation 21 of one of the two pivot seats 20 and the through hole 131 of the positioning seat 13 of one of the two shells 10. Each of the two ends of the mandrel 41 is pivotally connected with at least one bearing 42 (preferably two bearings 42) which is received in the perforation 21 of one of the two pivot seats 20. The two magnets 46 are secured to one of the two ends of the mandrel 41. The at least one rotation member 43 has a first end connected with the mandrel 41. The at least one rotation member 43 extends radially from a center of the mandrel 41. The weight 44 is connected with a second end of the at least one rotation member 43 and located opposite to the mandrel 41. The weight 44 is a radial curved plate. The weight 44 is rotated in the hollow ball 1 radially and centrifugally with the mandrel 41 served as an axis. The mandrel 41 is rotated by the at least one rotation member 43.

[0014] The first housing 51 and the second housing 52 are mounted on the inner sides of the two holding members 30 respectively by multiple screws 60. The first housing 51 and the second housing 52 are inserted into the fixing holes 12 of the two shells 10 and locked on the inner walls 14 of the two shells 10. The Bluetooth transmission device 53 is mounted in the first housing 51. The Hall sensor 54 is electrically connected with the Bluetooth

transmission device 53. The Hall sensor 54 is close to and aligns with the two magnets 46.

[0015] In practice, when the mandrel 41 is rotated, the Hall sensor 54 detects rotation of the two magnets 46 and transmits an information of rotation of the two magnets 46 to the Bluetooth transmission device 53.

[0016] In the preferred embodiment of the present invention, the bottom of the space 11 is provided with a receiving recess 16. The positioning seat 13 is located in the receiving recess 16. Each of the two shells 10 has an interior provided with multiple first reinforcing ribs 17 formed between a periphery of the receiving recess 16 and an inside of each of the two shells 10. The opening of each of the two shells 10 has a periphery provided with multiple second reinforcing ribs 18 which are arranged and distributed evenly.

[0017] In the preferred embodiment of the present invention, the inner wall 14 of each of the two shells 10 is provided with multiple positioning rails 15, and the first housing 51 and the second housing 52 are positioned and locked on the positioning rails 15 of the two shells 10 respectively.

[0018] In the preferred embodiment of the present invention, the perforation 21 of each of the two pivot seats 20 has two ends each provided with an enlarged mounting face 22, and the at least one bearing 42 is mounted on the mounting face 22 of the perforation 21.

[0019] In the preferred embodiment of the present invention, a power supply switch 31 is mounted on one of the two holding members 30. The power supply switch 31 is electrically connected with the Hall sensor 54 and the Bluetooth transmission device 53 to electrically control an electric power of the Hall sensor 54 and the Bluetooth transmission device 53.

[0020] In the preferred embodiment of the present invention, the first housing 51 is provided with a passage 511. The second housing 52 is provided with a passage 521. The Bluetooth transmission device 53 is provided with a transmission slot 531 connected to the passage 511 of the first housing 51. One of the two holding members 30 is provided with an entrance 32 connected to the passage 511 of the first housing 51.

[0021] In the preferred embodiment of the present invention, each of the two shells 10 is provided with multiple threaded positioning members 19 arranged between the receiving recess 16 and the positioning seat 13. Each of the two pivot seats 20 has a periphery provided with multiple positioning holes 23 aligning with the positioning members 19 of one of the two shells 10. Multiple screws 70 extend through the positioning holes 23 and are screwed into the positioning members 19 to secure the two pivot seats 20 to the positioning seats 13 of the two shells 10 respectively.

[0022] In the preferred embodiment of the present invention, two nuts 45 are screwed onto the two ends of the mandrel 41, and the two magnets 46 are secured to one of the two nuts 45 and located adjacent to the Hall sensor 54.

[0023] In the preferred embodiment of the present invention, the hollow ball 1 is mounted on a base 80.

[0024] In the preferred embodiment of the present invention, each of the two shells 10 is made of plastic material.

[0025] In the preferred embodiment of the present invention, the outer side of each of the two holding members 30 is made of silicone or silica gel.

[0026] In the preferred embodiment of the present invention, the weight 44 made of iron has a determined weight and has a radial curved shape.

[0027] In the preferred embodiment of the present invention, the second end of the at least one rotation member 43 is located at an eccentric position of the weight 44 as shown in FIG. 5. Alternatively, the second end of the at least one rotation member 43 is located at a middle or central position of the weight 44 as shown in FIG. 11.

[0028] In the preferred embodiment of the present invention, the at least one rotation member 43 is a bending rod and has a bent section secured on the mandrel 41 and two distal ends secured to the weight 44.

[0029] In the preferred embodiment of the present invention, the perforation 21 is located at a center of each of the two pivot seats 20.

[0030] In operation, referring to FIG. 12 with reference to FIGS. 1-10, a user's two hands hold the two holding members 30 to rotate the hollow ball 1. At this time, the linear distance between the user's two palms is served as a fulcrum of the revolving shaft. In such a manner, when the hollow ball 1 is rotated, the weight 44 is revolved in the hollow ball 1 and produces a centrifugal force so that the user has to apply a resistant force to counteract the centrifugal force, thereby achieving an exercising effect. At the same time, when the mandrel 41 is rotated, the two magnets 46 are also rotated with the mandrel 41. Thus, when the two magnets 46 are rotated, the Hall sensor 54 detects information (or data) during rotation of the two magnets 46 and sends the information of rotation of the two magnets 46 to the Bluetooth transmission device 53. Finally, the Bluetooth transmission device 53 wirelessly transmits the information to an external portable electronic device, such as a smart phone or a tablet computer.

[0031] Alternatively, the Bluetooth transmission device 53 includes a chargeable lithium battery. Thus, when the Bluetooth transmission device 53 and the Hall sensor 54 lose power, an adapter, such as a USB connector or the like, in turn extends through the entrance 32 of one of the two holding members 30 and the passage 511 of the first housing 51, and is inserted into the transmission slot 531 of the Bluetooth transmission device 53 to charge the Bluetooth transmission device 53 and the Hall sensor 54.

[0032] Accordingly, the rotation exercising ball structure has the following advantages.

1. The bearings 42 are pivotally mounted on the two ends of the mandrel 41 so that the mandrel 41 is

rotated quietly to prevent from producing noise during rotation. Thus, the user can exercise at any time.

2. Each of the two shells 10 is provided with the second reinforcing ribs 18 to increase the structural strength of the hollow ball 1 when the two shells 10 are combined, so that the hollow ball 1 will not be worn or broken after falling.

3. When the two shells 10 are combined, the two holding members 30 cover the fixing holes 12 of the two shells 10 respectively so that the screws 60, 70, and 90 are hidden to enhance the outer appearance of the hollow ball 1.

4. After the two shells 10 are combined, the two ends of the mandrel 41 mounted on the mounting faces 22 of the perforations 21 of the two pivot seats 20 by the bearings 42, and the two pivot seats 20 are secured to the positioning seats 13 of the two shells 10 and located in the receiving recesses 16 of the two shells 10. In addition, each of the two shells 10 is provided with the first reinforcing ribs 17 located between the receiving recess 16 and each of the two shells 10. Thus, the mandrel 41 is rotated steadily and stably, while the at least one rotation member 43 and the weight 44 swing quickly and successively without producing deflection. Further, the mandrel 41, the at least one rotation member 43, and the weight 44 are operated smoothly and will not be worn easily to enhance the lifetime.

5. The weight 44 made of iron has a determined weight and has a radial curved shape so that the weight 44 radially drives and rotates the at least one rotation member 43 easily. In addition, when a force is applied to radially rotate the at least one rotation member 43 successively, the weight 44 produce an enlarged centrifugal force. It is appreciated that, when the length of the weight 44 is a little less than a half of the perimeter of the hollow ball 1, the weight 44 has the optimum centrifugal effect.

6. The inner wall 14 of each of the two shells 10 is provided with the positioning rails 15, and the first housing 51 and the second housing 52 are inserted into the fixing holes 12 of the two shells 10 by guidance of the positioning rails 15 of the two shells 10 respectively so that the first housing 51 and the second housing 52 are assembled with the two shells 10 easily and quickly, thereby saving the assembly time.

7. The first housing 51 and the second housing 52 are secured to the two holding members 30 respectively by the screws 60, so that when the user rocks the hollow ball 1, the first housing 51 and the second housing 52 are supported steadily and stably without

vibration.

8. When the two magnets 46 are rotated with the mandrel 41, the Hall sensor 54 detects an information, such as the time interval, the swinging times, the consumed calories or the like, during rotation of the two magnets 46 and sends the information to the Bluetooth transmission device 53 which wirelessly transmits the information to an external portable electronic device, such as a smart phone or a tablet computer.

9. When the electric power supplied to the Hall sensor 54 and the Bluetooth transmission device 53 is exhausted, the USB connector in turn passes through the entrance 32 of one of the two holding members 30 and the passage 511 of the first housing 51, and is inserted into the transmission slot 531 of the Bluetooth transmission device 53 to charge the chargeable lithium battery of the Bluetooth transmission device 53.

10. The hollow ball 1 is placed on the base 80 when not in use to prevent the hollow ball 1 from rolling freely and to facilitate the user storing the hollow ball 1.

[0033] Referring to the drawings and initially to FIGS. 13-19, a rotation exercising ball structure in accordance with the second preferred embodiment of the present invention comprises two shells 10, two pivot seats (or mounting seats) 20, two holding members 30, a weight unit 40, a housing 51, a Bluetooth transmission device 53, a Hall sensor (or transducer) 54, and two handle protecting members 100.

[0034] The two shells 10 are combined together to construct a hollow ball 1. Each of the two shells 10 has an interior provided with a space 11. The space 11 has a bottom provided with a fixing hole (or securing hole) 12. The fixing hole 12 is located at a center of the bottom of the space 11 and penetrates each of the two shells 10.

[0035] Each of the two pivot seats 20 is formed on the bottom of the space 11 and directed toward an opening of one of the two shells 10. Each of the two pivot seats 20 is provided with a pivot pillar 22 protruding outward therefrom. The pivot pillar 22 has a center provided with a through hole 21. The through hole 21 penetrates each of the two pivot seats 20 and extends to the fixing hole 12.

[0036] The two holding members 30 are mounted on the two shells 10 respectively. Each of the two holding members 30 covers the fixing hole 12 of one of the two shells 10. Each of the two holding members 30 has an inner side and an outer side.

[0037] The weight unit 40 includes a mandrel 41, a rotation member 43, two bearings 42, a weight 44, at least one auxiliary weight 441, and two magnets 46. The mandrel 41 has two ends each of which extends through the through hole 21 of one of the two pivot seats 20. Each

of the two ends of the mandrel 41 is secured in the through hole 21 of one of the two pivot seats 20. The rotation member 43 has a first end provided with a mounting hole 47. The two bearings 42 are mounted in the mounting hole 47 of the rotation member 43 and rotatably disposed between the rotation member 43 and the mandrel 41. The rotation member 43 is radially mounted on a central position of the mandrel 41 through the mounting hole 47. The weight 44 connects a second end of the rotation member 43 and is located opposite to the mandrel 41. The rotation member 43 and the weight 44 are rotated in the hollow ball 1 radially and centrifugally with the mandrel 41 served as an axis. The at least one auxiliary weight 441 is removably mounted on the weight 44. The two magnets 46 are mounted on the rotation member 43. The two magnets 46 are arranged at a periphery of the mounting hole 47 of the rotation member 43.

[0038] The housing 51 is mounted on and combined with the inner side of one of the two holding members 30. The housing 51 is inserted into the fixing hole 12 of one of the two shells 10. The Bluetooth transmission device 53 is mounted in the housing 51. The Bluetooth transmission device 53 is electrically connected with the Hall sensor 54. The Hall sensor 54 is mounted on the mandrel 41. The Hall sensor 54 is close to the mounting hole 47 of the rotation member 43 and aligns with the two magnets 46.

[0039] In practice, when the rotation member 43 is rotated, the Hall sensor 54 detects rotation of the two magnets 46 and sends information or data of rotation of the two magnets 46 to the Bluetooth transmission device 53.

[0040] The two handle protecting members 100 are mounted on the two shells 10 of the hollow ball 1 respectively and align with the two holding members 30 respectively.

[0041] In the preferred embodiment of the present invention, the hollow ball 1 is mounted on and supported by a base 80. In addition, multiple first reinforcing ribs 17 are formed between one of the two pivot seats 20 and one of the two shells 10, and multiple second reinforcing ribs 18 are formed between one of the two pivot seats 20 and the pivot pillar 22.

[0042] In the preferred embodiment of the present invention, each of the two holding members 30 is provided with an elastic locking snap 33 and a locking block 34. The elastic locking snap 33 and the locking block 34 are locked in the fixing hole 12 of one of the two shells 10.

[0043] In the preferred embodiment of the present invention, the at least one auxiliary weight 441 is locked onto and combined with a bottom or a top of the weight 44 by screws.

[0044] In the preferred embodiment of the present invention, each of the two shells 10 of the hollow ball 1 is provided with at least one connecting hole 101 located adjacent to one of the two holding members 30, and each of the two handle protecting members 100 is secured on the at least one connecting hole 101 of one of the two shells 10.

[0045] In the preferred embodiment of the present invention, each of the two ends of the mandrel 41 initially extends through the through hole 21 of one of the two pivot seats 20, and then one of two nuts 45 is screwed onto each of the two ends of the mandrel 41 and locked onto one of the two pivot seats 20, so that each of the two ends of the mandrel 41 is secured in the through hole 21 of one of the two pivot seats 20.

[0046] In the preferred embodiment of the present invention, each of the two bearings 42 is a rolling bearing or a sliding bearing.

[0047] In operation, a user's two hands hold the outer sides of the two holding members 30 to rotate and swing the hollow ball 1 reciprocally. At this time, the linear distance between the user's two palms is served as a fulcrum of the revolving shaft. In such a manner, when the hollow ball 1 is rotated, the weight 44 is revolved in the hollow ball 1 and produces an inertia centrifugal force (or a non-linear inertia G force) so that the user has to apply a resistant force to counteract the centrifugal force, thereby achieving an exercising effect.

[0048] The most important feature is in that, the mandrel 41 is fixed without rotation, and the rotation member 43 is rotated about the mandrel 41 radially and centrifugally. At the same time, when the rotation member 43 is rotated, the two magnets 46 arranged on the mounting hole 47 of the rotation member 43 are also rotated in concert with the rotation member 43. Thus, when the two magnets 46 are rotated, the Hall sensor 54 mounted on the mandrel 41 will detect the information (or data) during rotation of the two magnets 46 (or the rotation member 43) and transmits the information to the Bluetooth transmission device 53. Finally, the Bluetooth transmission device 53 wirelessly transmits the information to an external portable electronic device, such as a smart phone or a tablet computer.

[0049] Referring to FIGS. 20 and 21 with reference to FIGS. 13-19, the weight 44 is provided with multiple receiving grooves 48. Each of the receiving grooves 48 transversely penetrates the weight 44. The weight unit 40 includes multiple auxiliary weights 441 mounted in the receiving grooves 48. Thus, the number of the auxiliary weights 441 is adjusted according to the user's requirement to increase or decrease the swinging centrifugal force of the weight 44.

[0050] Accordingly, the rotation exercising ball structure has the following advantages.

1. The two bearings 42 are mounted in the mounting hole 47 of the rotation member 43 so that the rotation member 43 is rotated on the mandrel 41 quietly without producing sound to prevent from causing noise during rotation. Thus, the user can exercise at any time.

2. The mandrel 41 is fixed without rotation, and only the rotation member 43 is rotated about the mandrel 41 reciprocally, to reduce the resistance when the

rotation member 43 and the weight 44 are rotated centrifugally, so that the user operates and swings the hollow ball 1 easily and smoothly.

3. Each of the two ends of the mandrel 41 is secured in the through hole 21 of one of the two pivot seats 20 so that the mandrel 41 is fixed without rotation. Thus, when the two shells 10 are assembled, the mandrel 41 and the two pivot seats 20 are connected easily and conveniently, without having to align the mandrel 41 with the through hole 21 of each of the two pivot seats 20.

4. The number of the auxiliary weights 441 on the weight 44 is adjusted according to the user's requirement to increase or decrease the centrifugal force of the weight 44 during rotation of the rotation member 43.

5. When the rotation member 43 is rotated, the two magnets 46 arranged on the mounting hole 47 of the rotation member 43 are also rotated with the rotation member 43. Then, the Hall sensor 54 mounted on the mandrel 41 will detect the information during rotation of the rotation member 43 and sends the information to the Bluetooth transmission device 53 which wirelessly transmits the information to an external portable electronic device. Thus, the information, such as the time interval, the swinging times, the calories consumed by the human body or the like, is transmitted to and recorded by the external portable electronic device.

6. The rotation exercising ball structure has fewer parts to reduce the cost of fabrication, and is assembled easily and quickly to decrease the expense, time, and manual work in assembly.

7. The two handle protecting members 100 are mounted on the two shells 10 of the hollow ball 1 respectively and align with the two holding members 30 respectively. Thus, when the user's two hands hold the two holding members 30 and apply a force to rotate and swing the hollow ball 1, the user's two hands are restricted by the two handle protecting members 100, to prevent the hollow ball 1 from being released from the user's two hands, and to prevent the hollow ball 1 from hurting other people.

[0051] The difference between the first embodiment and the second embodiment of the present invention is described as follows.

[0052] In the first embodiment, the mandrel 41, the at least one rotation member 43, and the weight 44 are rotated simultaneously to produce an inertia centrifugal force. In addition, when the mandrel 41 is rotated, the two magnets 46 are rotated with the mandrel 41. Thus, the Hall sensor 54 detects rotation of the two magnets

46 and transmits an information of rotation of the two magnets 46 and the mandrel 41 to the Bluetooth transmission device 53.

[0053] In the second embodiment, the mandrel 41 is fixed without rotation, and only the rotation member 43 and the weight 44 are rotated simultaneously to produce an inertia centrifugal force. In addition, when the rotation member 43 is rotated, the two magnets 46 arranged on the mounting hole 47 of the rotation member 43 are also rotated in concert with the rotation member 43. Thus, when the two magnets 46 are rotated, the Hall sensor 54 mounted on the mandrel 41 will detect the information during rotation of the two magnets 46 and transmits the information to the Bluetooth transmission device 53.

[0054] Although the invention has been explained in relation to its preferred embodiment(s) as mentioned above, it is to be understood that many other possible modifications and variations can be made without departing from the scope of the present invention. It is, therefore, contemplated that the appended claim or claims will cover such modifications and variations that fall within the scope of the invention.

Claims

1. A rotation exercising ball structure comprising:

two shells (10), two pivot seats (20), two holding members (30), a weight unit (40), a first housing (51), a second housing (52), a Bluetooth transmission device (53), and a Hall sensor (54); wherein:

the two shells are combined to construct a hollow ball;
each of the two shells has an interior provided with a space (11);
the space has a bottom provided with a fixing hole (12);
the fixing hole is located at a center of the space and penetrates each of the two shells;
the fixing hole is formed with an inner wall (14);
the bottom of the space is provided with a positioning seat (13) directed toward an opening of each of the two shells;
the positioning seat is formed with a through hole (131);
the through hole penetrates the positioning seat and is connected to the fixing hole;
the two pivot seats are combined with the positioning seats of the two shells respectively;
each of the two pivot seats is provided with a perforation (21);
the perforation penetrates each of the two

- pivot seats and aligns with the through hole of the positioning seat;
the two holding members are mounted on the two shells respectively and cover the fixing holes of the two shells respectively;
each of the two holding members has an inner side and an outer side;
the weight unit includes a mandrel (41), two magnets (46), at least one rotation member (43), and a weight (44);
the mandrel has two ends pivotally connected with the hollow ball;
each of the two ends of the mandrel is pivotally mounted in the perforation of one of the two pivot seats and the through hole of the positioning seat of one of the two shells;
each of the two ends of the mandrel is pivotally connected with at least one bearing (42) which is received in the perforation of one of the two pivot seats;
the two magnets are secured to one of the two ends of the mandrel;
the at least one rotation member has a first end connected with the mandrel;
the at least one rotation member extends radially from a center of the mandrel;
the weight is connected with a second end of the at least one rotation member;
the weight is a radial curved plate;
the weight is rotated in the hollow ball radially and centrifugally with the mandrel served as an axis;
the mandrel is rotated by the at least one rotation member;
the first housing and the second housing are mounted on the inner sides of the two holding members respectively;
the first housing and the second housing are inserted into the fixing holes of the two shells and locked on the inner walls of the two shells;
the Bluetooth transmission device is mounted in the first housing;
the Hall sensor is electrically connected with the Bluetooth transmission device;
the Hall sensor is close to and aligns with the two magnets;
when the mandrel is rotated, the Hall sensor detects rotation of the two magnets and transmits an information of rotation of the two magnets to the Bluetooth transmission device.
2. The rotation exercising ball structure as claimed in claim 1, wherein:
- the bottom of the space is provided with a receiving recess (16);

the positioning seat is located in the receiving recess;
each of the two shells has an interior provided with multiple first reinforcing ribs (17) formed between a periphery of the receiving recess and each of the two shells; and
the opening of each of the two shells has a periphery provided with multiple second reinforcing ribs (18) which are arranged and distributed evenly.

3. The rotation exercising ball structure as claimed in claim 1, wherein the inner wall of each of the two shells is provided with multiple positioning rails (15), and the first housing and the second housing are positioned and locked on the positioning rails of the two shells respectively.
4. The rotation exercising ball structure as claimed in claim 1, wherein the perforation of each of the two pivot seats has two ends each provided with an enlarged mounting face (22), and the at least one bearing is mounted on the mounting face of the perforation.
5. The rotation exercising ball structure as claimed in claim 1, wherein a power supply switch (31) is mounted on one of the two holding members and electrically connected with the Hall sensor and the Bluetooth transmission device.
6. The rotation exercising ball structure as claimed in claim 1, wherein:
- the first housing is provided with a passage (511);
the second housing is provided with a passage (521);
the Bluetooth transmission device is provided with a transmission slot (531 connected to the passage of the first housing; and
one of the two holding members is provided with an entrance (32) connected to the passage of the first housing.
7. The rotation exercising ball structure as claimed in claim 1, wherein:

each of the two shells is provided with multiple positioning members;
each of the two pivot seats has a periphery provided with multiple positioning holes (23) aligning with the positioning members of one of the two shells; and
multiple screws (70) extend through the positioning holes and are screwed into the positioning members to secure the two pivot seats to the positioning seats of the two shells respectively.

tively.

8. The rotation exercising ball structure as claimed in claim 1, wherein two nuts (45) are screwed onto the two ends of the mandrel, and the two magnets are secured to one of the two nuts and located adjacent to the Hall sensor. 5
9. The rotation exercising ball structure as claimed in claim 1, wherein the hollow ball is mounted on a base (80). 10
10. A rotation exercising ball structure comprising:
 - two shells (10), two pivot seats (20), two holding members (30), a weight unit (40), a housing (51), a Bluetooth transmission device (53), a Hall sensor (54), and two handle protecting members (100); 15
 - wherein: 20
 - the two shells are combined together to construct a hollow ball (1);
 - each of the two shells has an interior provided with a space (11); 25
 - the space has a bottom provided with a fixing hole (12);
 - the fixing hole is located at a center of the bottom of the space and penetrates each of the two shells; 30
 - each of the two pivot seats is formed on the bottom of the space and directed toward an opening of one of the two shells;
 - each of the two pivot seats is provided with a pivot pillar (22); 35
 - the pivot pillar has a center provided with a through hole (21);
 - the through hole penetrates each of the two pivot seats and extends to the fixing hole;
 - the two holding members are mounted on the two shells respectively; 40
 - each of the two holding members covers the fixing hole of one of the two shells;
 - each of the two holding members has an inner side and an outer side; 45
 - the weight unit includes a mandrel (41), a rotation member (43), two bearings (42), a weight (44), at least one auxiliary weight (441), and two magnets (46);
 - the mandrel has two ends each of which extends through the through hole of one of the two pivot seats; 50
 - each of the two ends of the mandrel is secured in the through hole of one of the two pivot seats; 55
 - the rotation member has a first end provided with a mounting hole (47);
 - the two bearings are mounted in the mount-

ing hole of the rotation member;

the rotation member is radially mounted on a central position of the mandrel through the mounting hole;

the weight connects a second end of the rotation member and is located opposite to the mandrel;

the rotation member and the weight are rotated in the hollow ball radially and centrifugally with the mandrel served as an axis;

the at least one auxiliary weight is removably mounted on the weight;

the two magnets are mounted on the rotation member;

the two magnets are arranged at a periphery of the mounting hole of the rotation member;

the housing is mounted on and combined with the inner side of one of the two holding members;

the housing is inserted into the fixing hole of one of the two shells;

the Bluetooth transmission device is mounted in the housing;

the Bluetooth transmission device is electrically connected with the Hall sensor;

the Hall sensor is mounted on the mandrel;

the Hall sensor is close to the mounting hole of the rotation member and aligns with the two magnets;

when the rotation member is rotated, the Hall sensor detects rotation of the two magnets and sends information or data of rotation of the two magnets to the Bluetooth transmission device;

the two handle protecting members are mounted on the two shells of the hollow ball respectively and align with the two holding members respectively.

11. The rotation exercising ball structure as claimed in claim 10, wherein:

the hollow ball is mounted on and supported by a base (80);

multiple first reinforcing ribs (17) are formed between one of the two pivot seats and one of the two shells;

multiple second reinforcing ribs (18) are formed between one of the two pivot seats and the pivot pillar.

12. The rotation exercising ball structure as claimed in claim 10, wherein:

each of the two holding members is provided with an elastic locking snap (33) and a locking block (34);

the elastic locking snap and the locking block

are locked in the fixing hole of one of the two shells.

13. The rotation exercising ball structure as claimed in claim 10, wherein the at least one auxiliary weight is locked onto and combined with a bottom or a top of the weight by screws. 5

14. The rotation exercising ball structure as claimed in claim 10, wherein: 10

the weight is provided with multiple receiving grooves (48);
each of the receiving grooves transversely penetrates the weight; 15
the weight unit includes multiple auxiliary weights mounted in the receiving grooves.

15. The rotation exercising ball structure as claimed in claim 10, wherein each of the two shells of the hollow ball is provided with at least one connecting hole (101), and each of the two handle protecting members is secured on the at least one connecting hole of one of the two shells. 20

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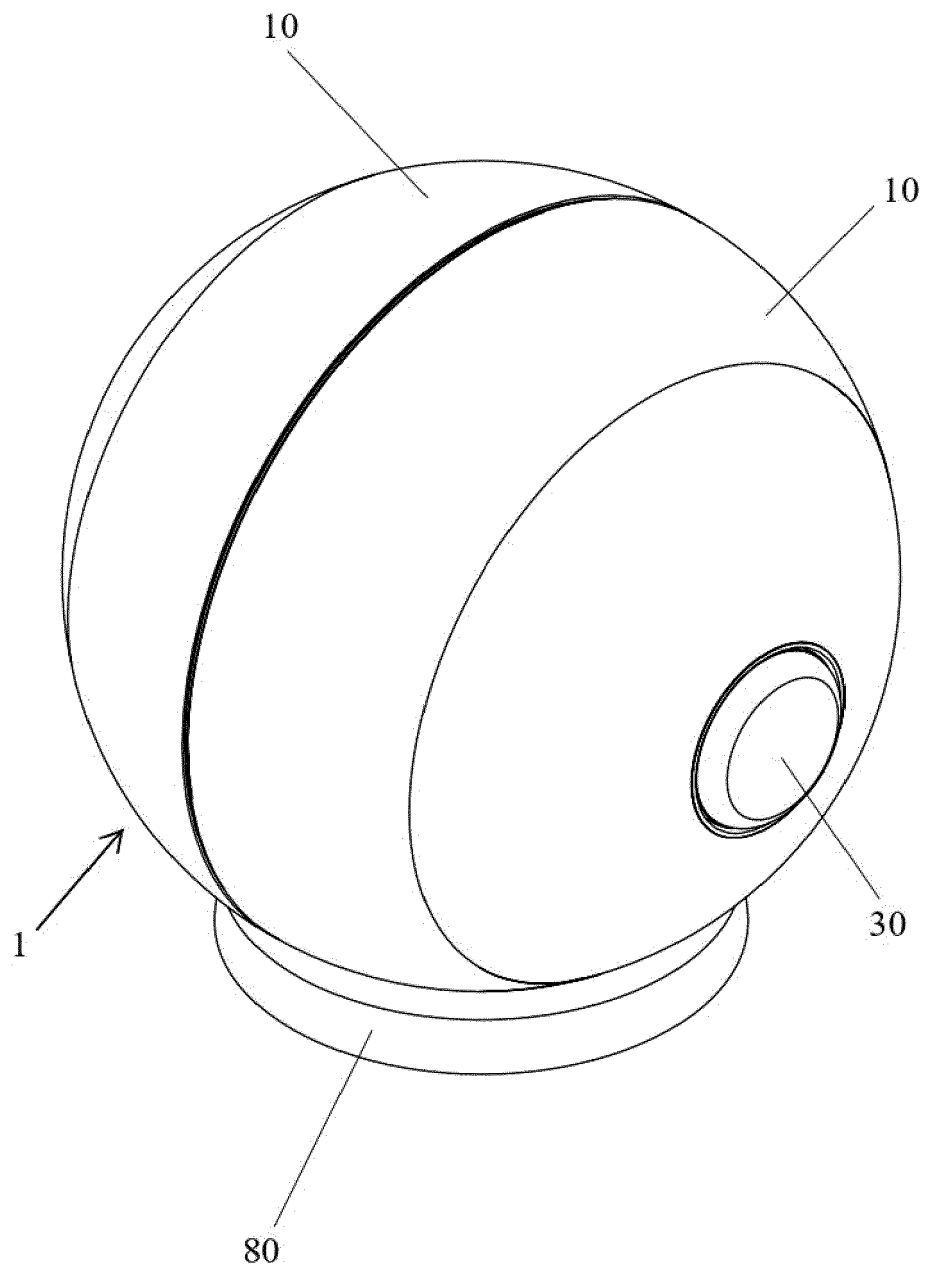


FIG. 1

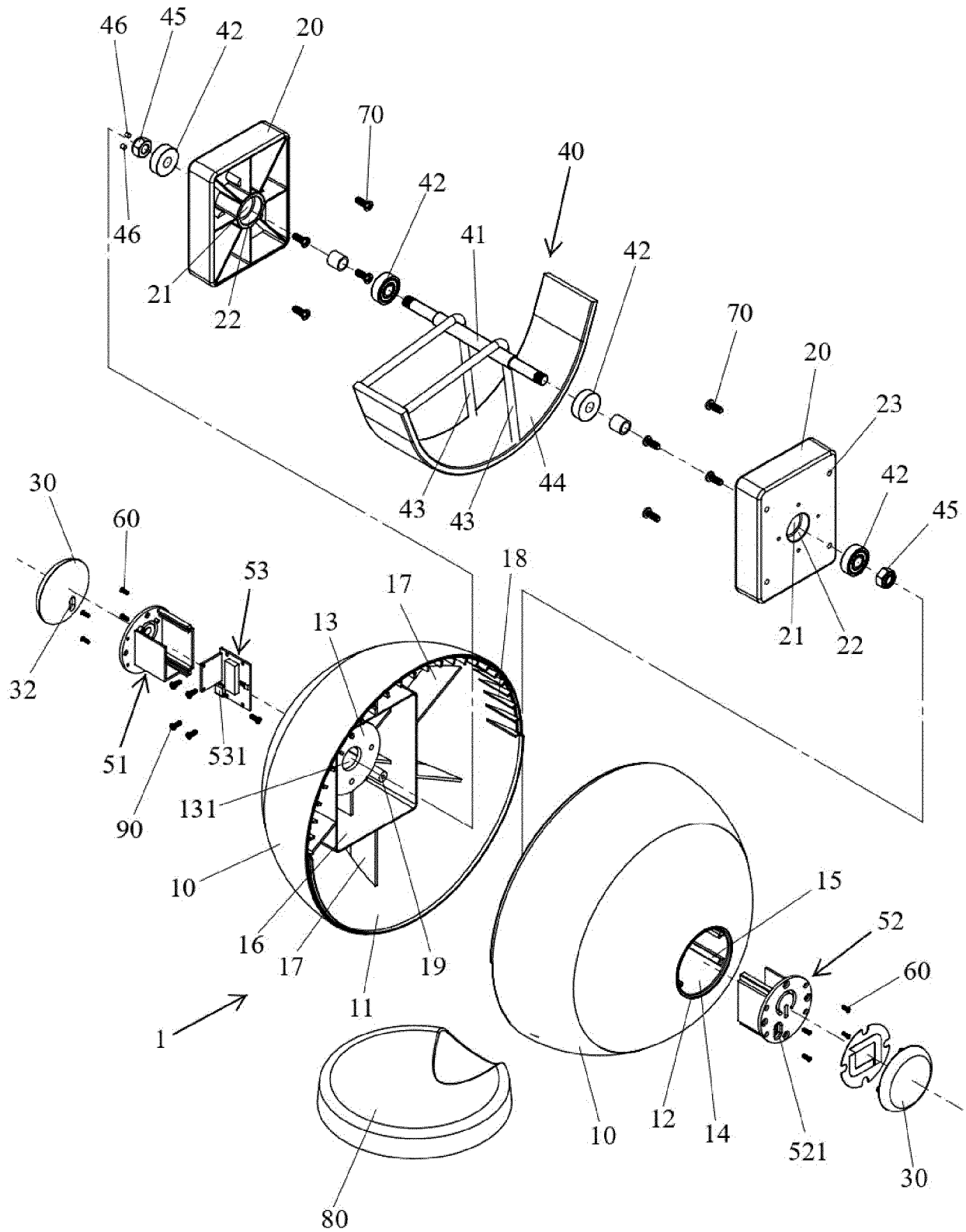


FIG. 2

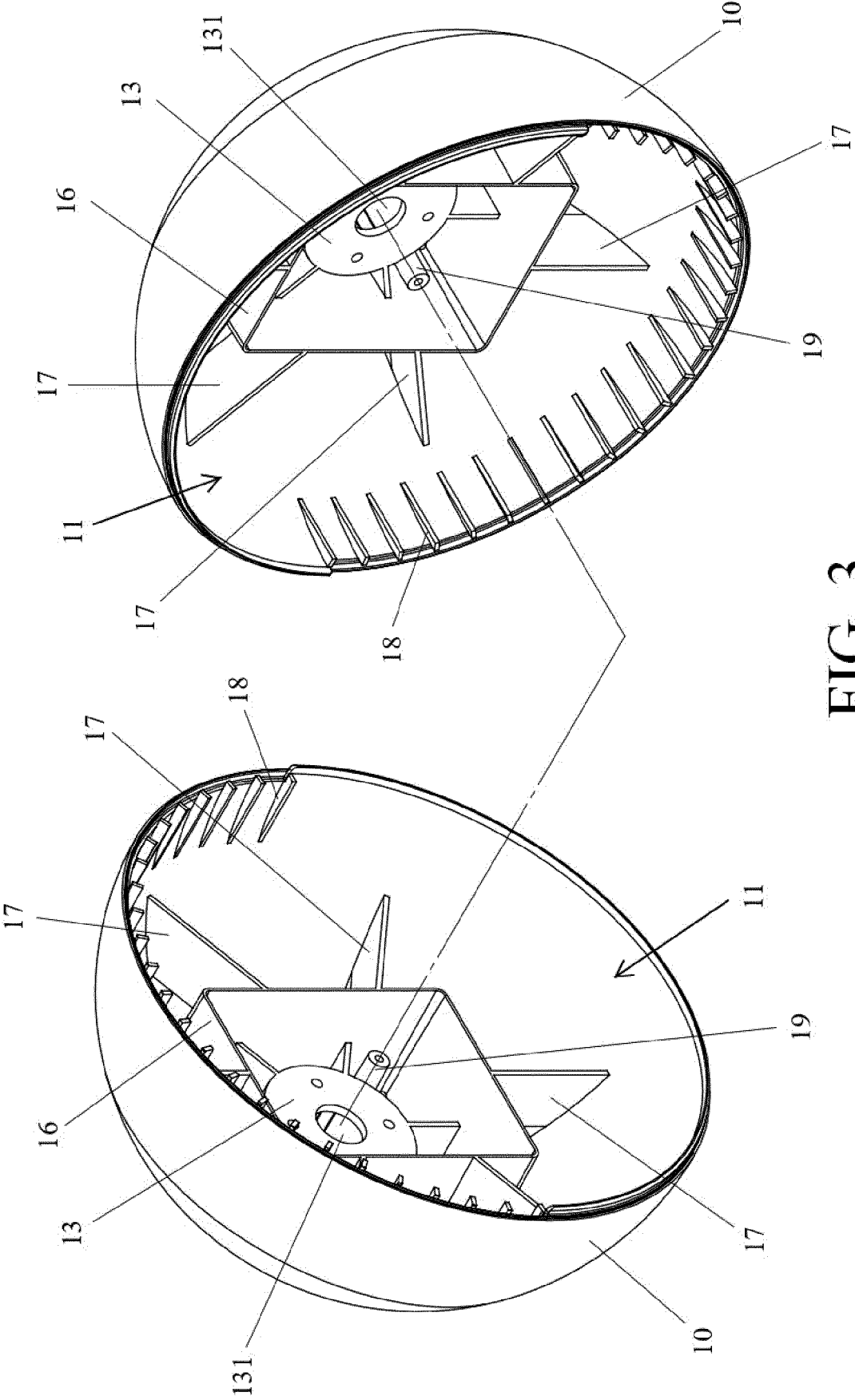


FIG. 3

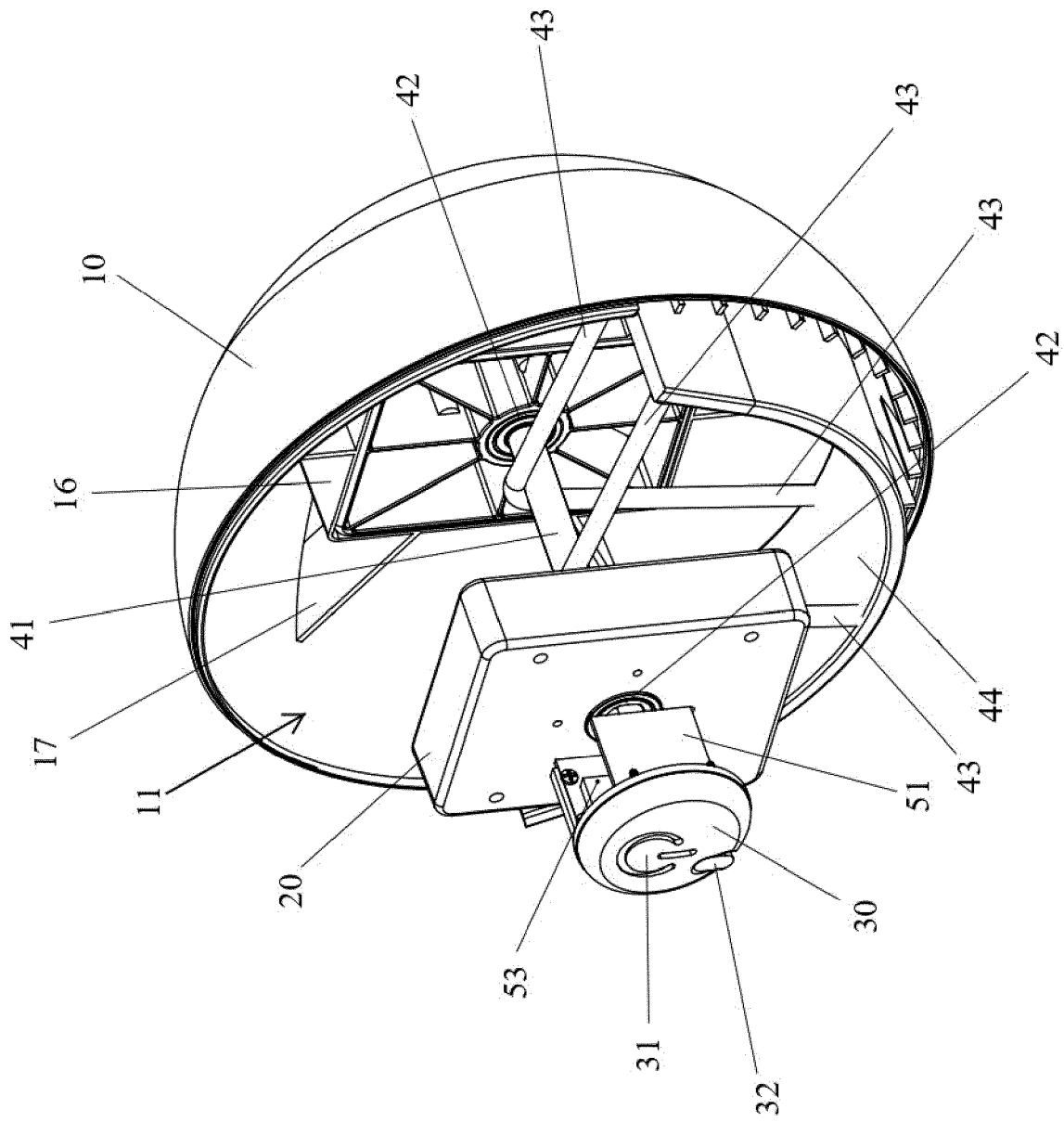


FIG. 4

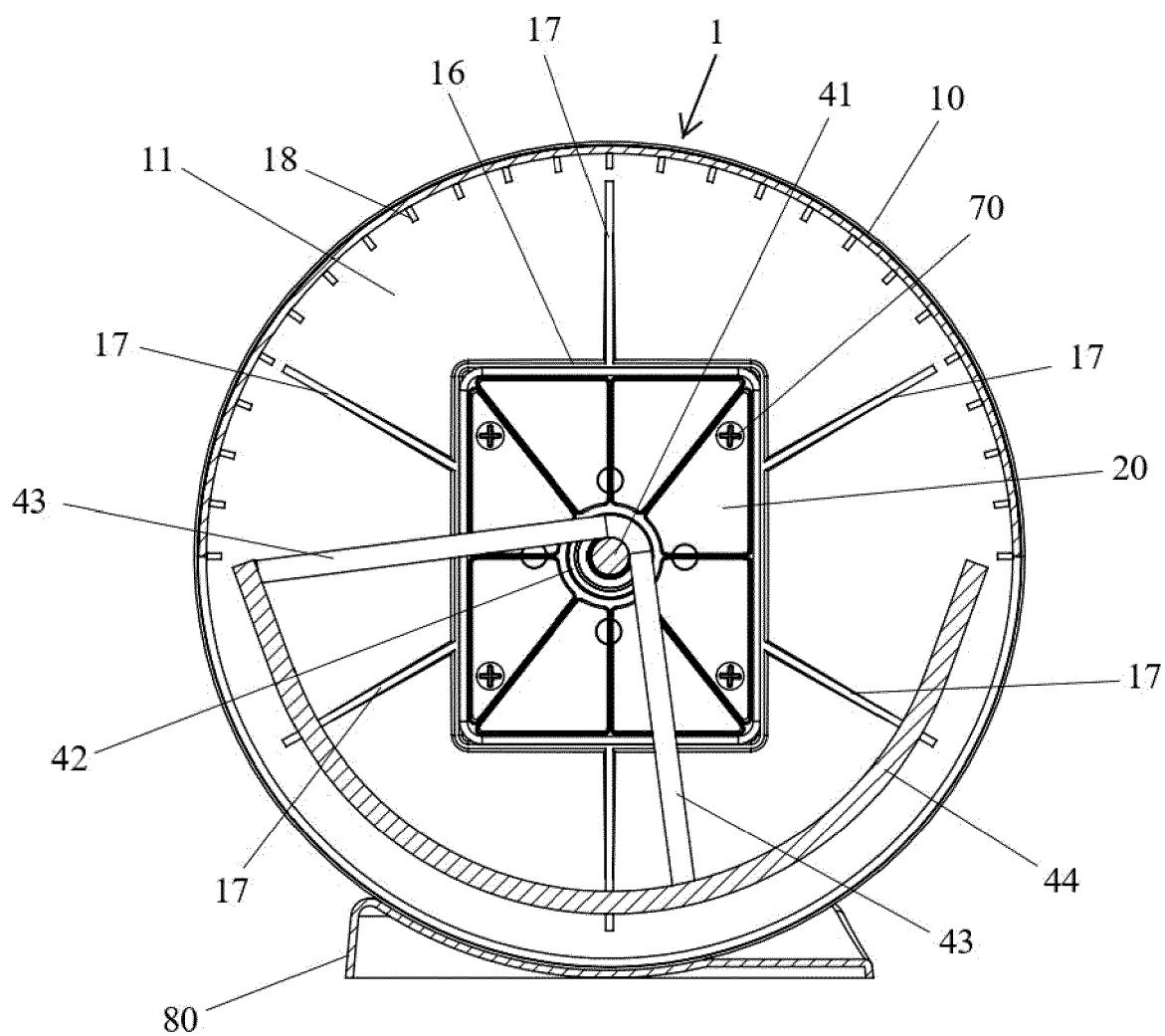


FIG. 5

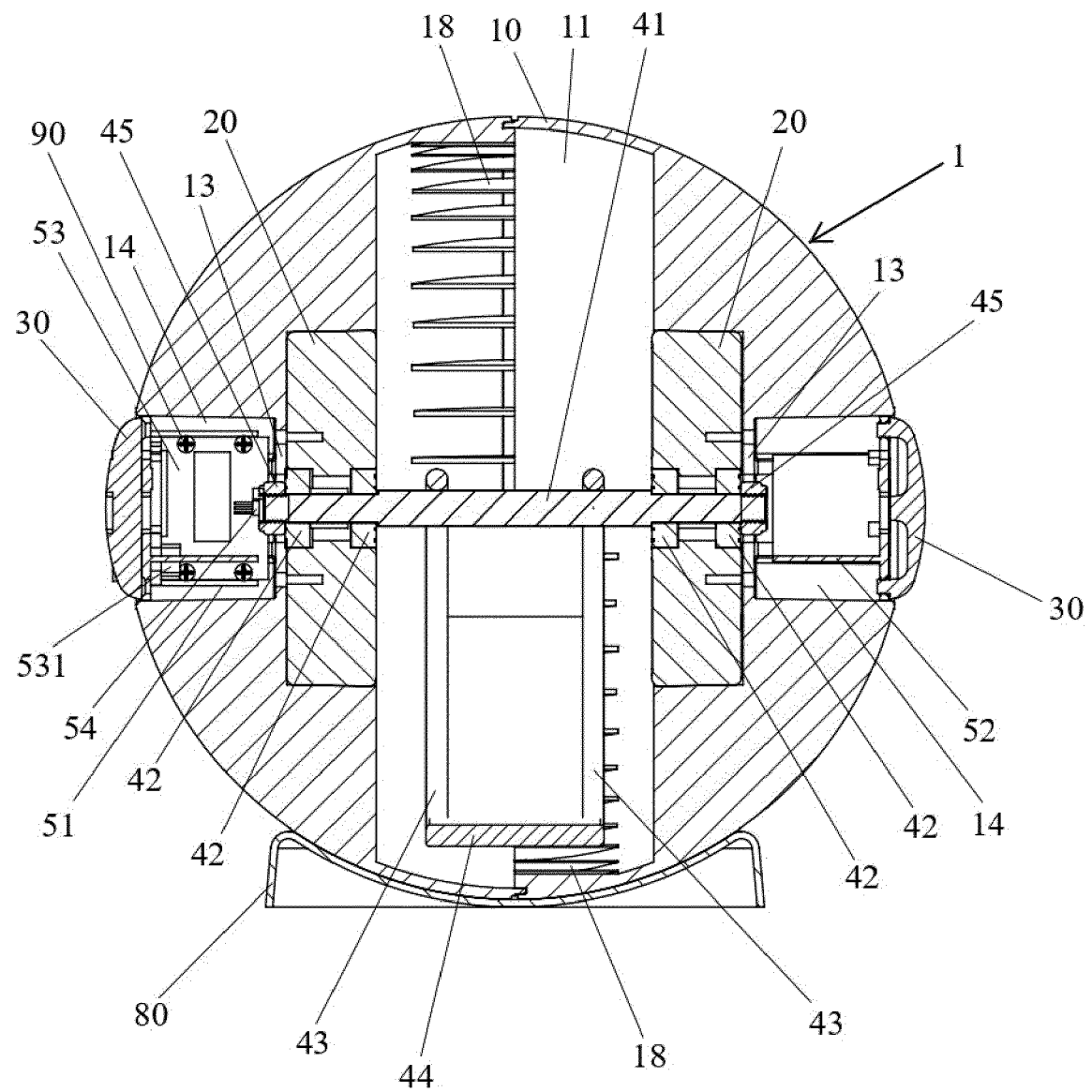


FIG. 6

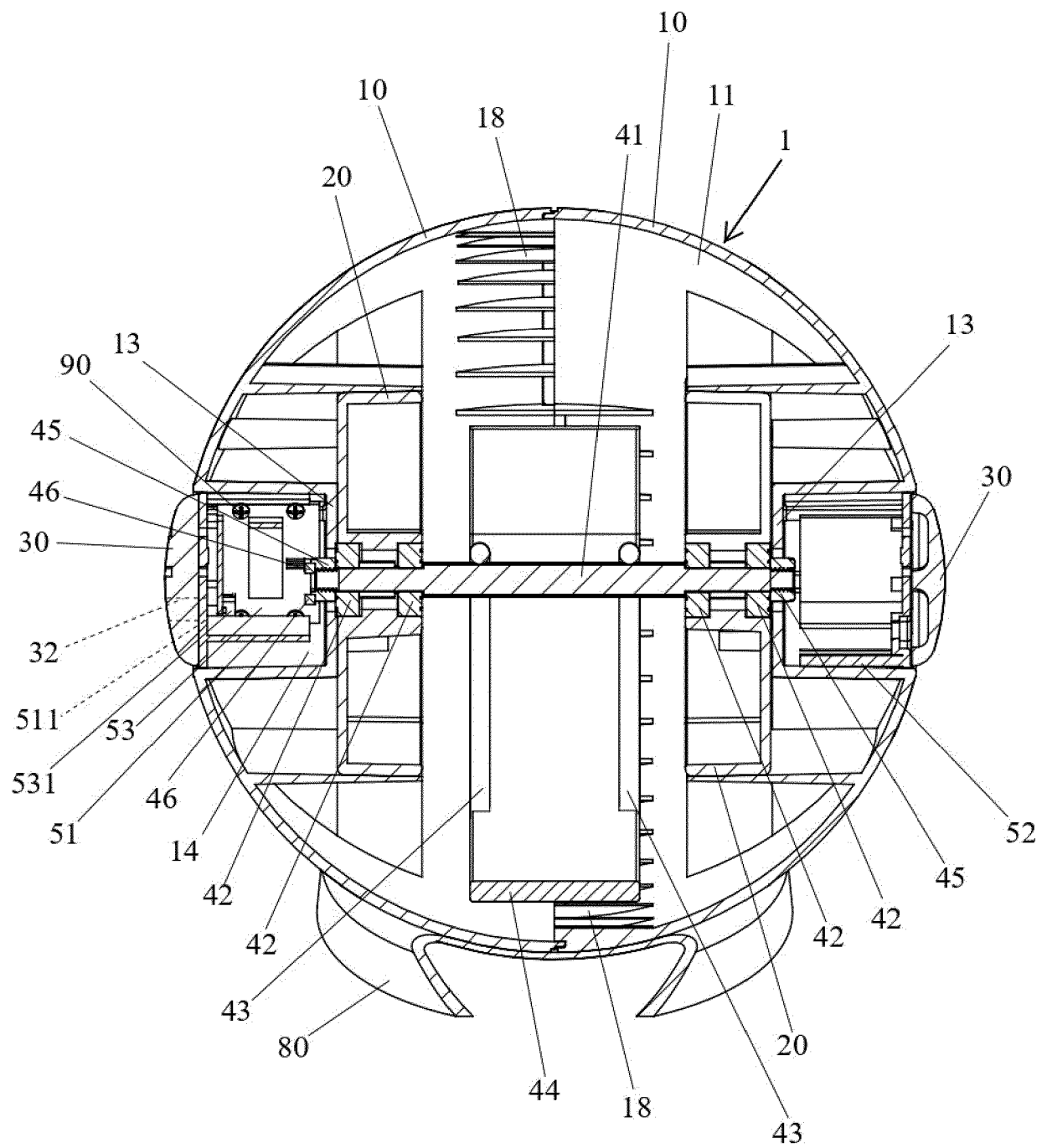


FIG. 7

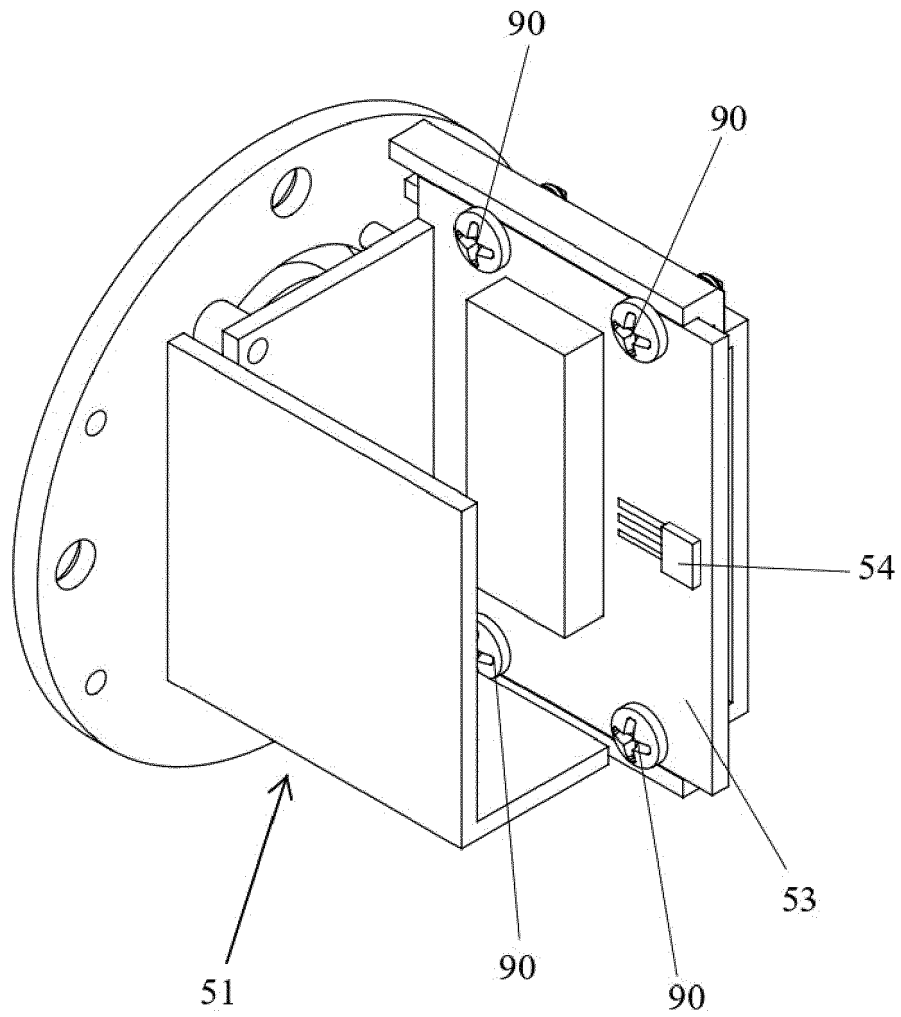


FIG. 8

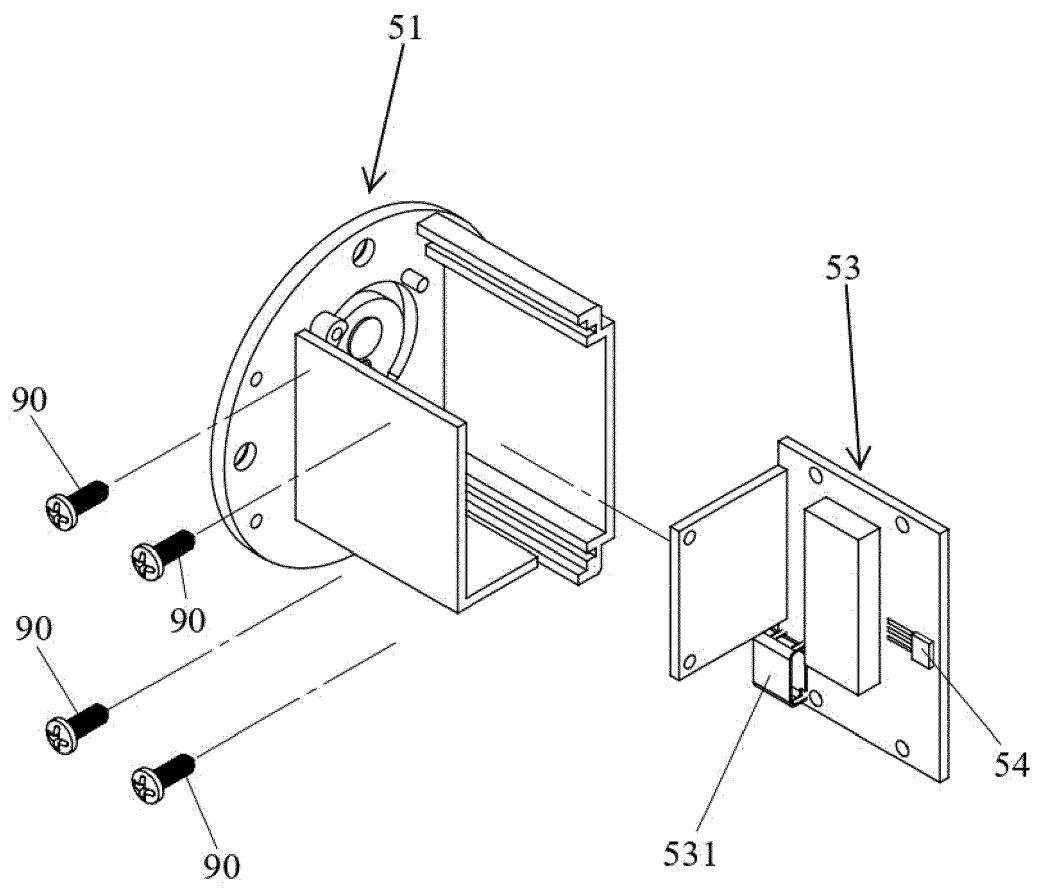


FIG. 9

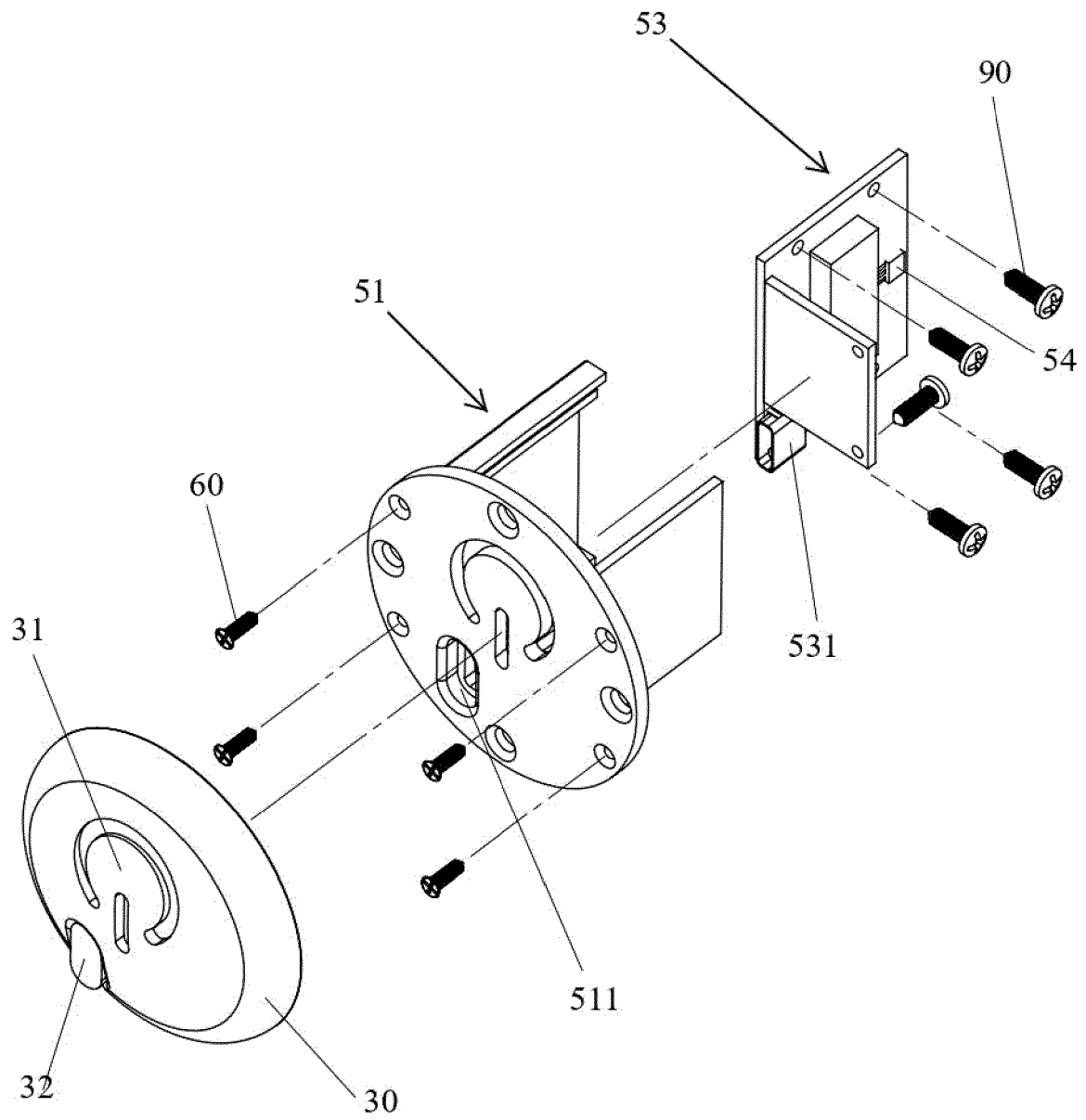


FIG. 10

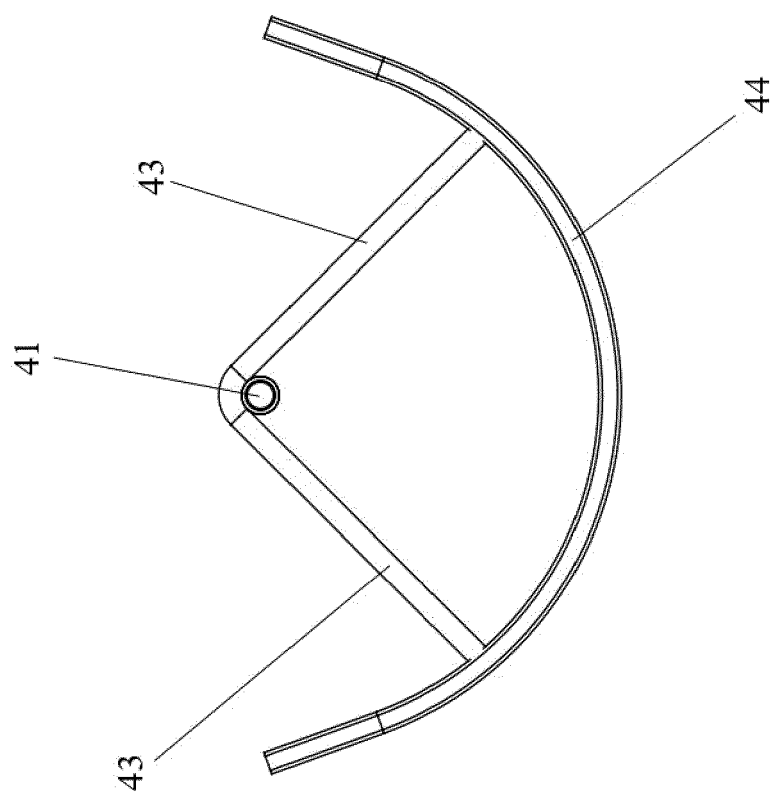


FIG. 11

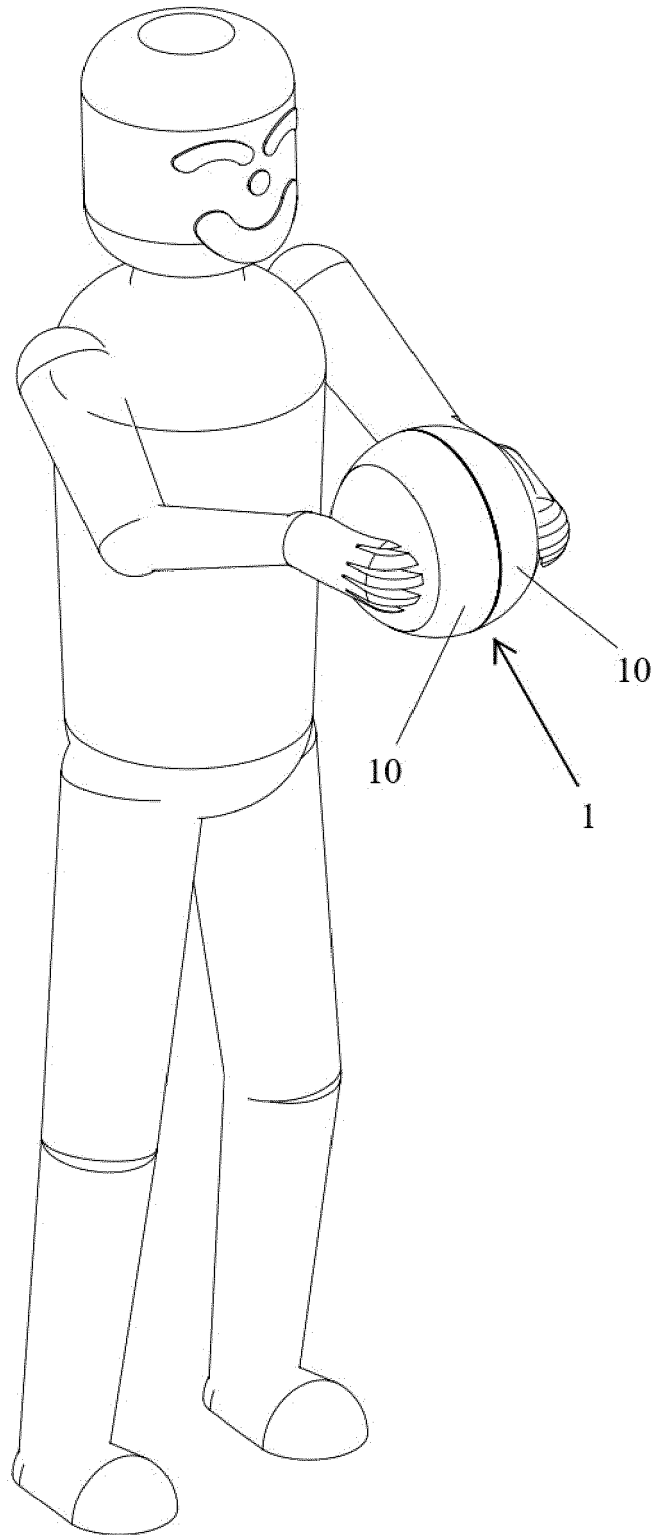


FIG. 12

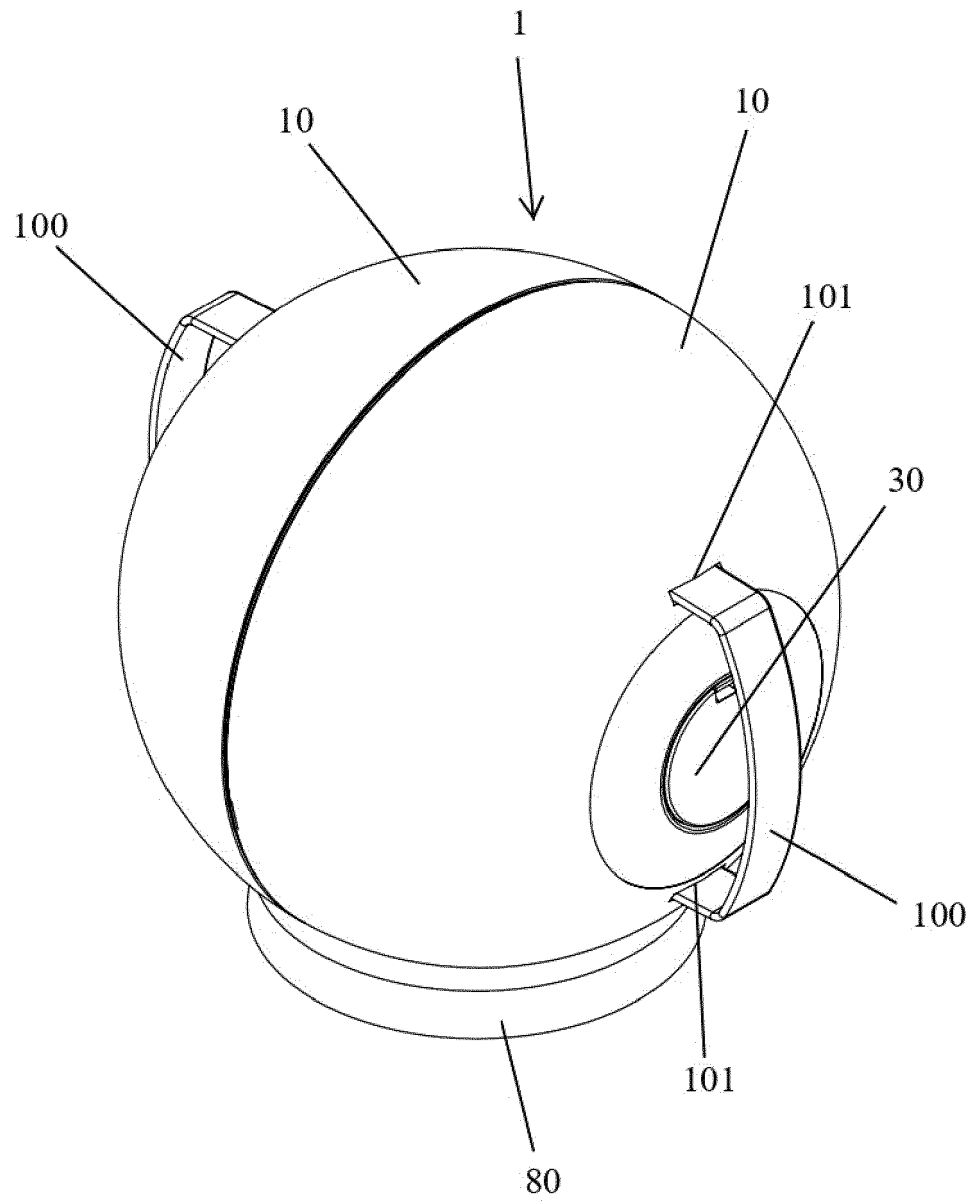


FIG. 13

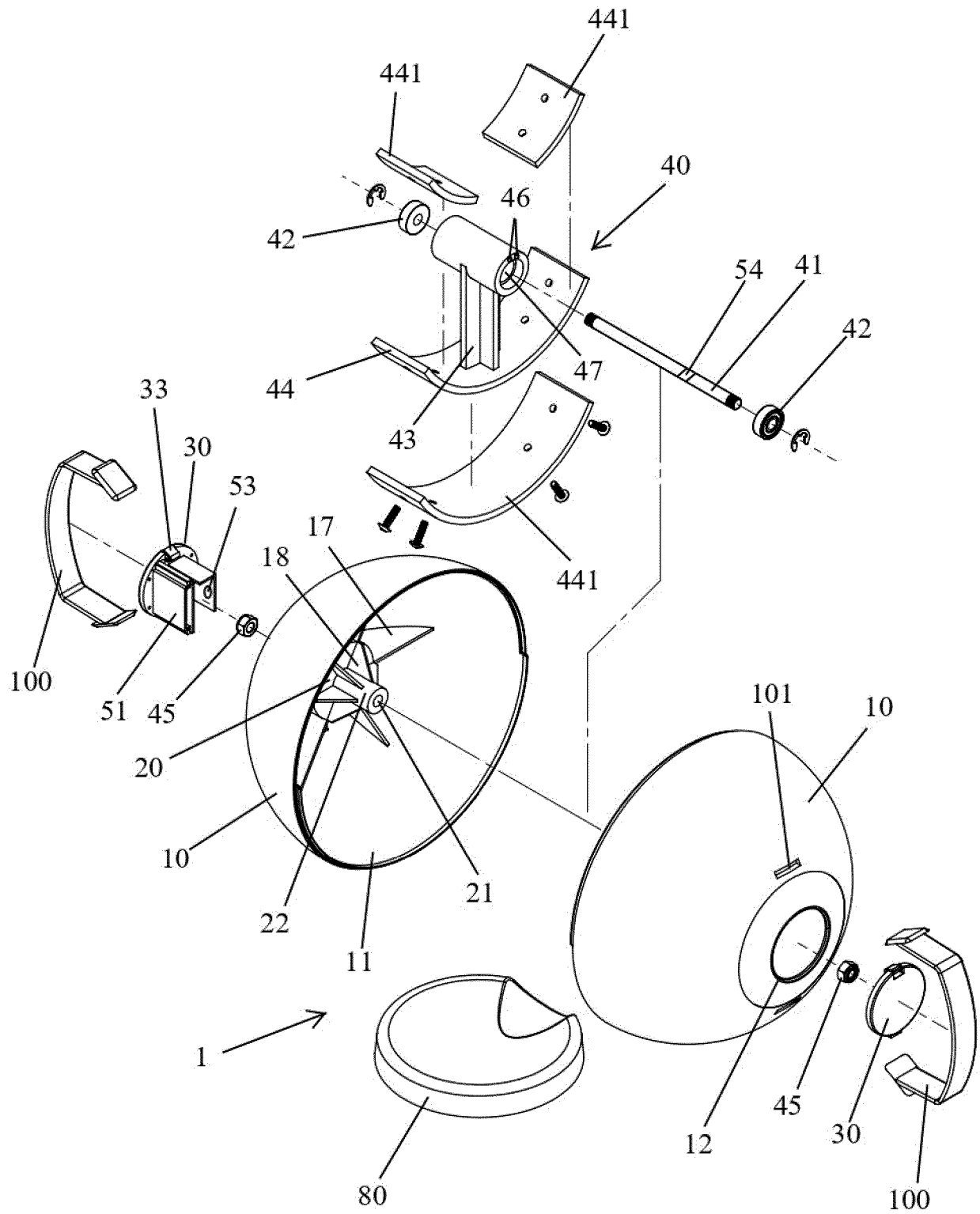


FIG. 14

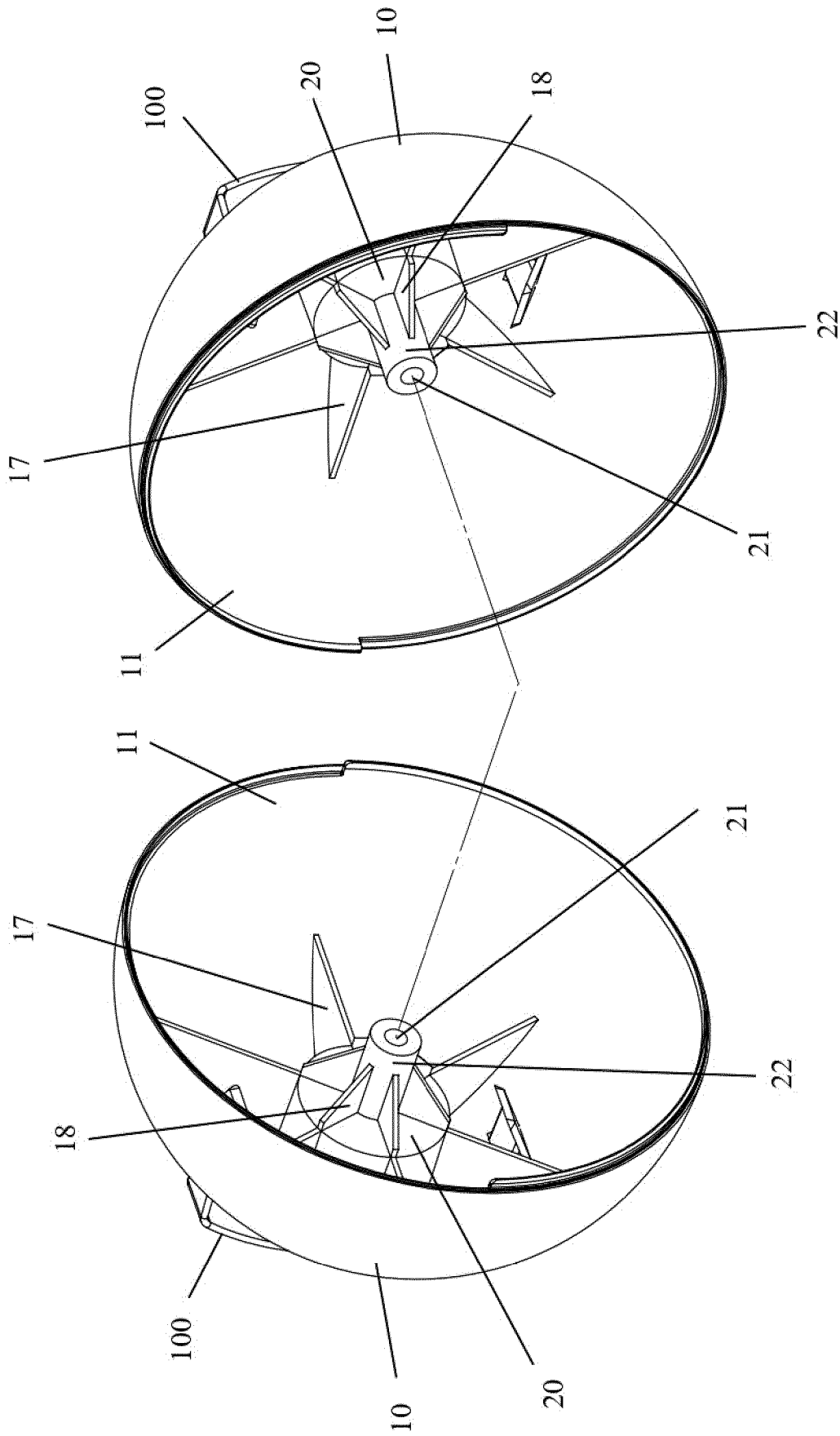


FIG. 15

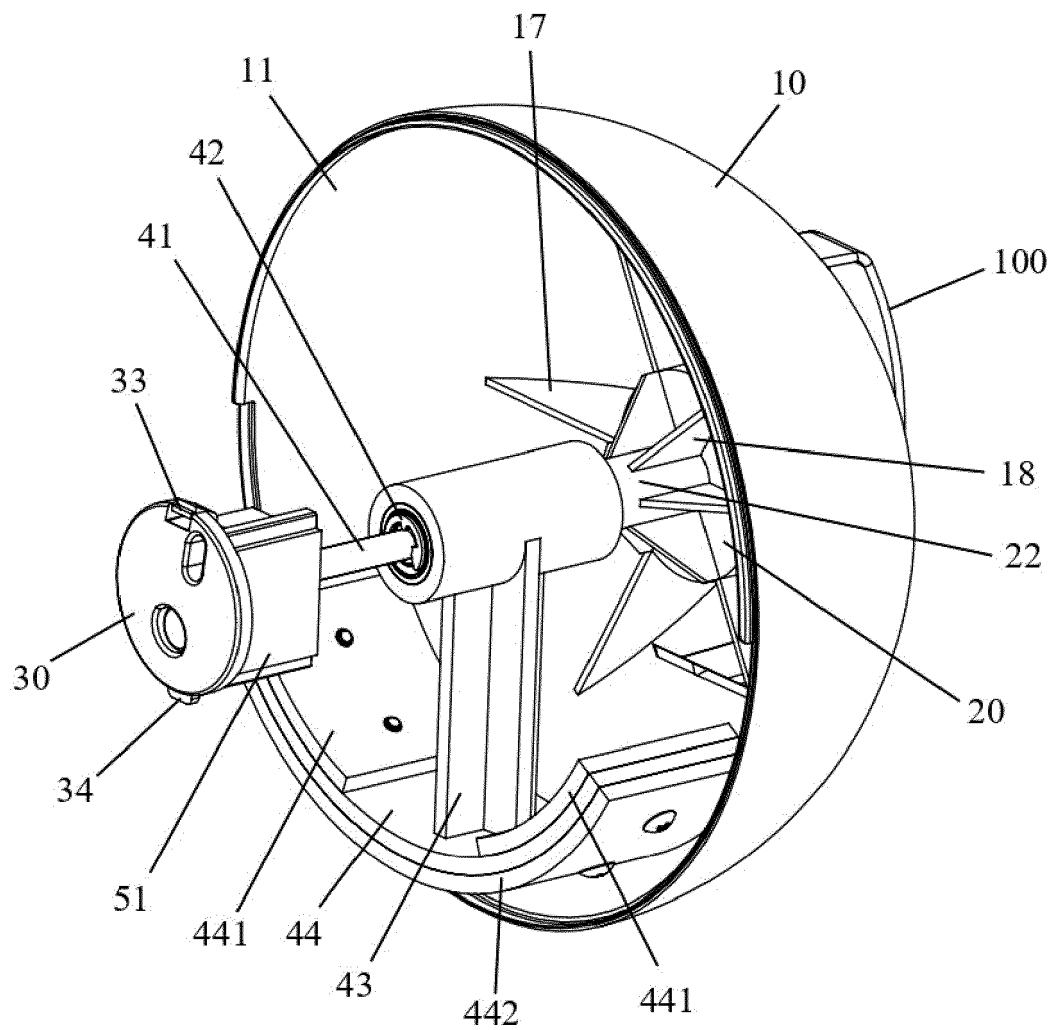


FIG. 16

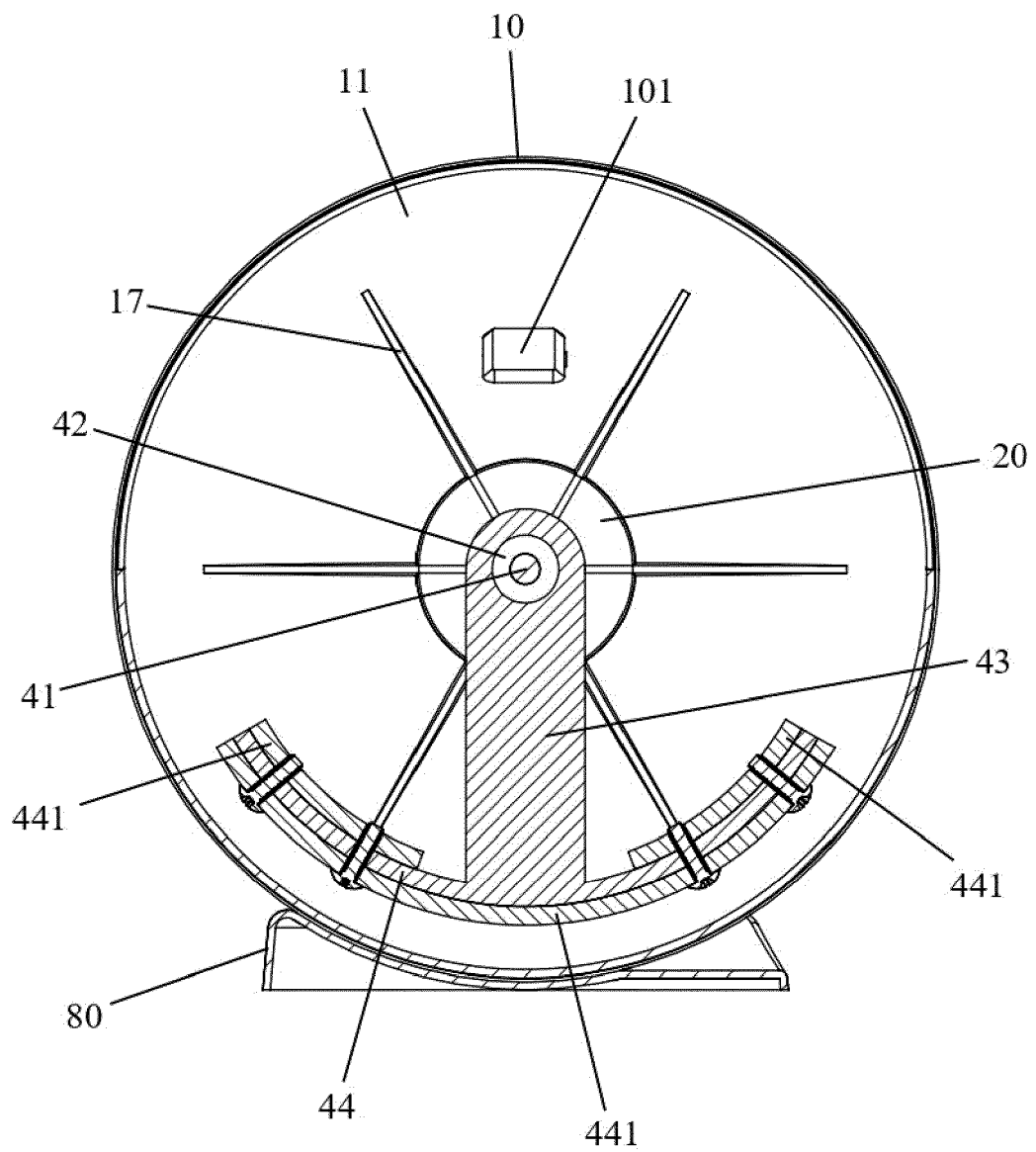


FIG. 17

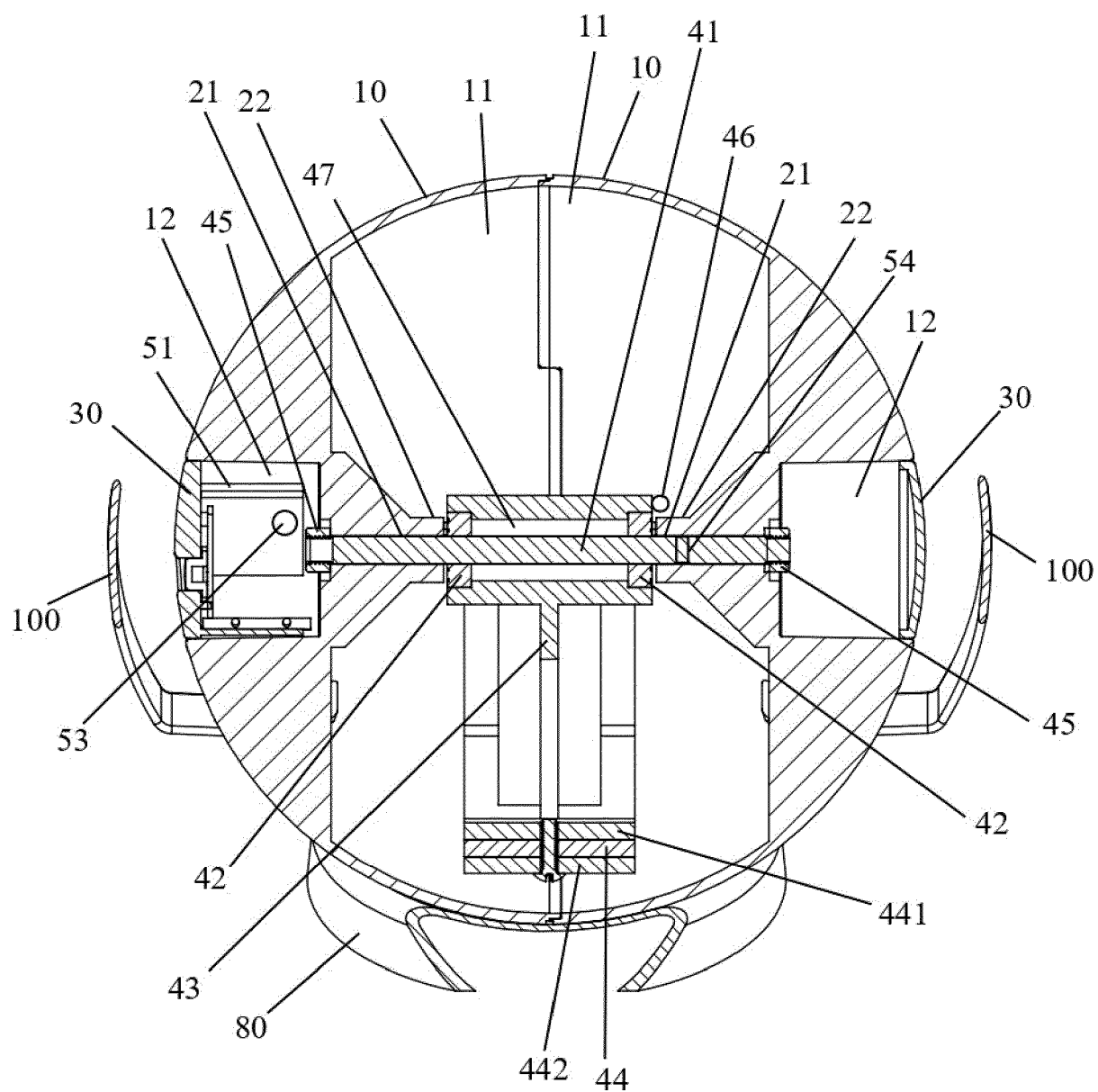


FIG. 18

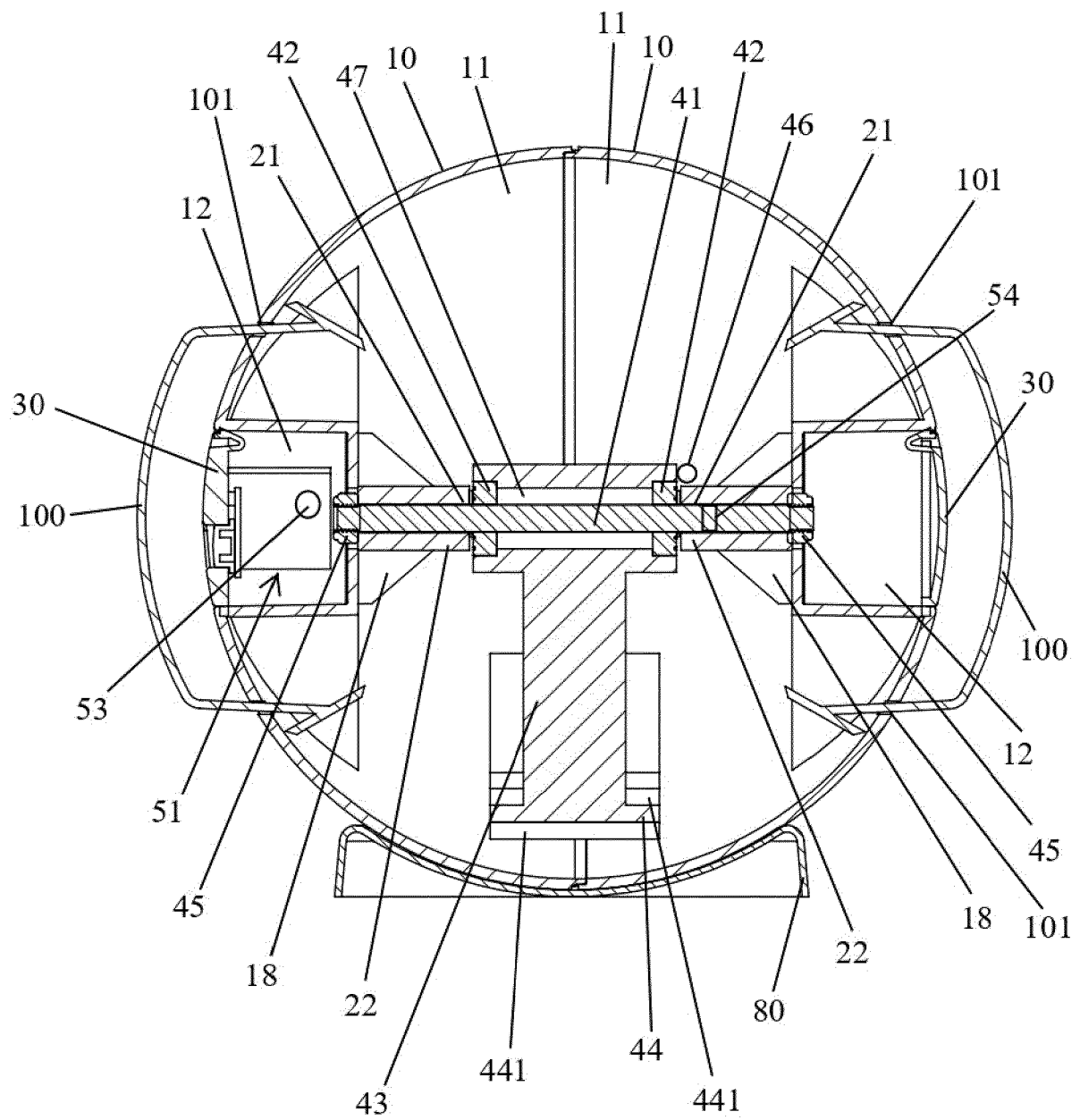


FIG. 19

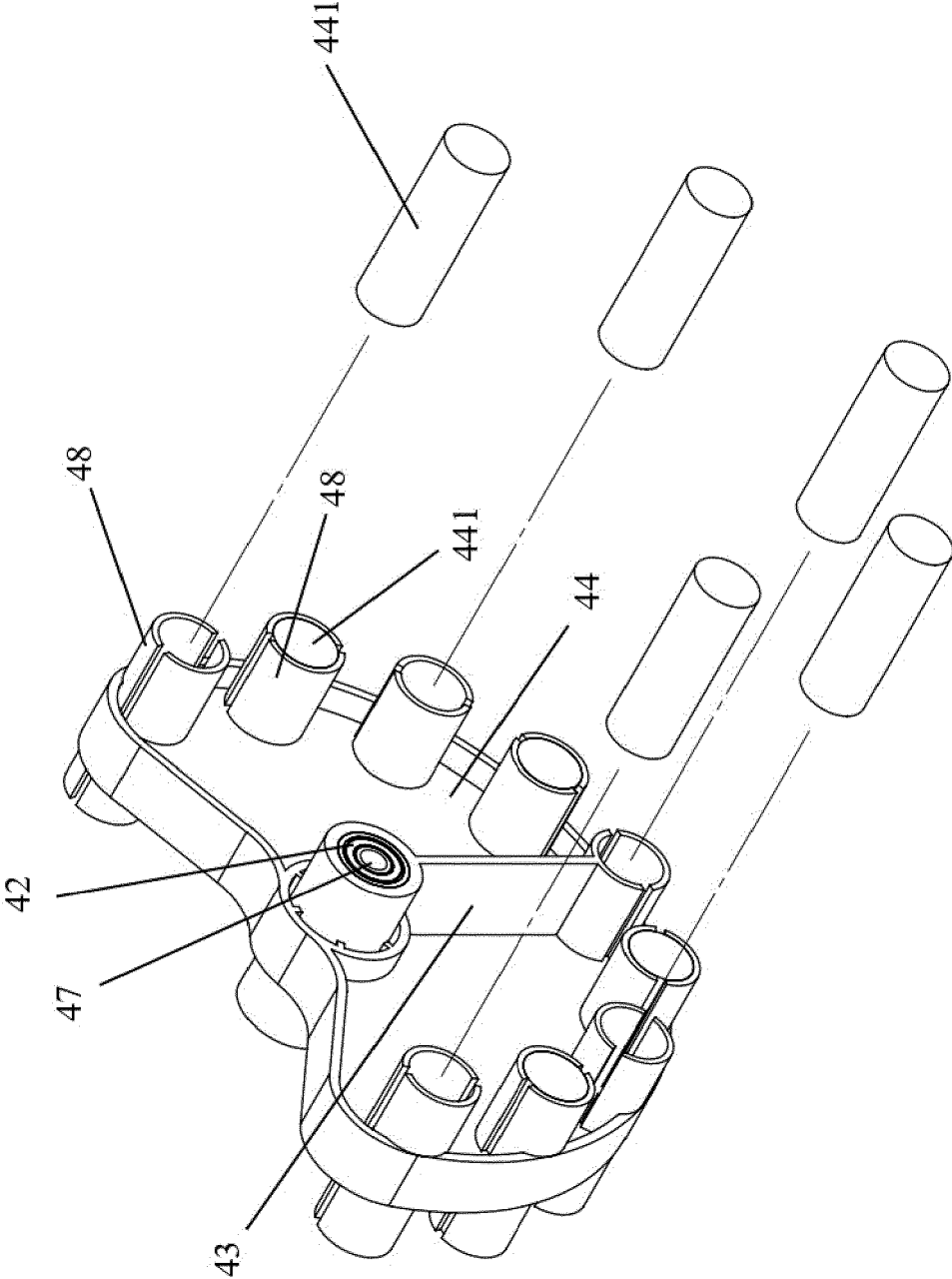


FIG. 20

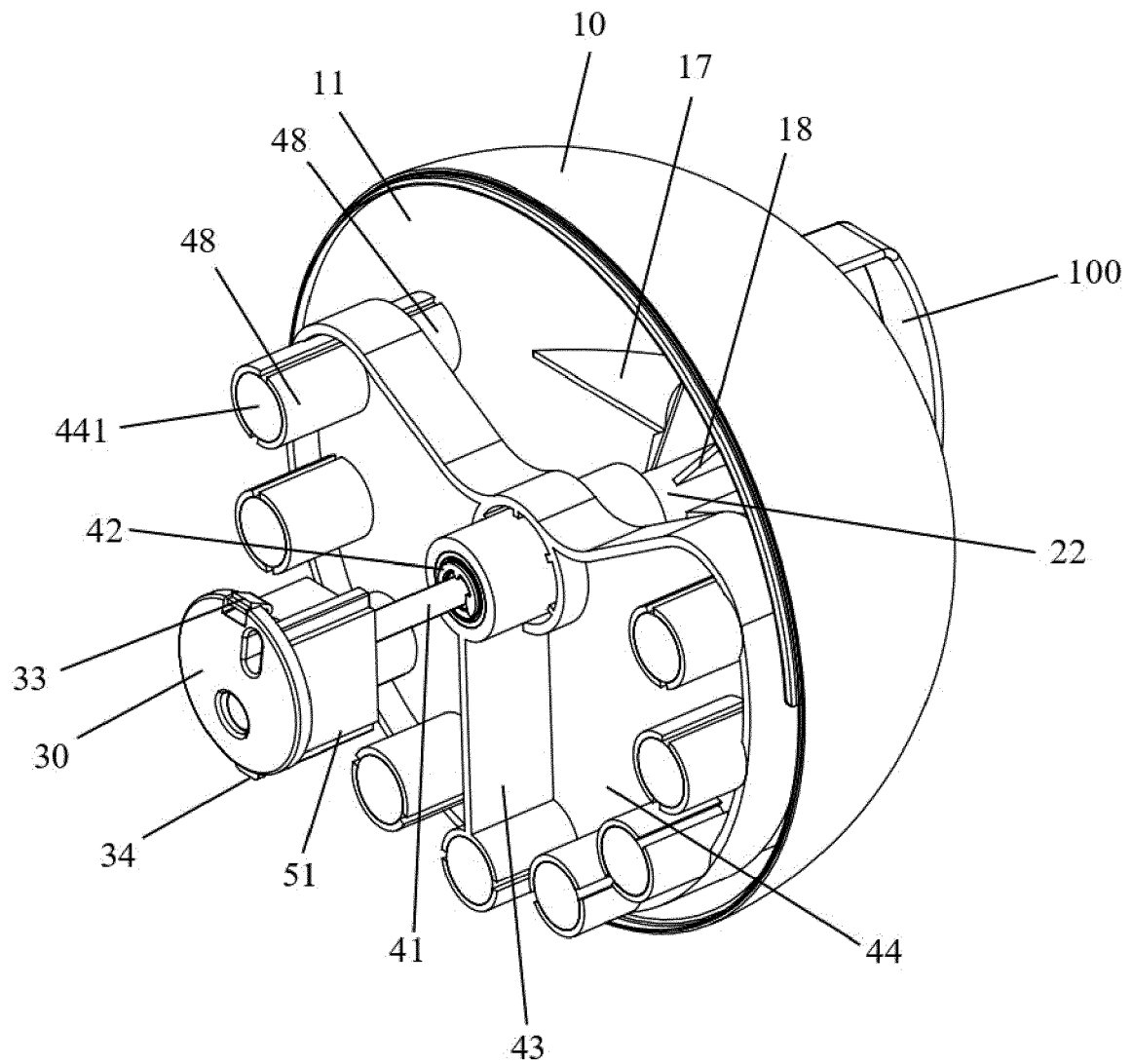


FIG. 21



EUROPEAN SEARCH REPORT

Application Number

EP 23 17 7852

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 4 640 508 A (ESCHER JAMES C [US]) 3 February 1987 (1987-02-03) * column 8 - column 18; figures * -----	1-12, 15	INV. A63B21/00 A63B21/22 A63B23/035
Y	US 2007/207899 A1 (CHUANG YUN Y [TW] ET AL) 6 September 2007 (2007-09-06) * paragraph [0006] - paragraph [0034]; figures * -----	1-10	
Y	US 6 053 846 A (LIN CHIEN-DER [TW]) 25 April 2000 (2000-04-25) * column 2 - column 3; figures * -----	10-12, 15	
Y	US 2016/367852 A1 (CHUANG PEI-SUNG [TW]) 22 December 2016 (2016-12-22) * paragraph [0027] - paragraph [0029]; figures * -----	11, 12	
			TECHNICAL FIELDS SEARCHED (IPC)
			A63B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		25 October 2023	Borrás González, E
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 23 17 7852

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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25-10-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4640508 A	03-02-1987	NONE	
US 2007207899 A1	06-09-2007	NONE	
US 6053846 A	25-04-2000	NONE	
US 2016367852 A1	22-12-2016	DE 102016104954 A1	22-12-2016
		GB 2539519 A	21-12-2016
		JP 3205608 U	04-08-2016
		KR 20160004463 U	27-12-2016
		TW M518101 U	01-03-2016
		US 2016367852 A1	22-12-2016

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 20220193478 A [0002]