

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
6 April 2006 (06.04.2006)

PCT

(10) International Publication Number
WO 2006/036660 A2

(51) International Patent Classification:
A44C 15/00 (2006.01)

(21) International Application Number:
PCT/US2005/033652

(22) International Filing Date:
19 September 2005 (19.09.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/613,272 27 September 2004 (27.09.2004) US

(71) Applicants and

(72) Inventors: **COOK, Roger** [US/US]; 119 Grand Canyon Drive, Los Alamos, NM 87544 (US). **MOLCHANOVA, Olha** [UA/US]; 119 Grand Canyon Drive, Los Alamos, NM 87544 (US).

CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— of inventorship (Rule 4.17(iv))

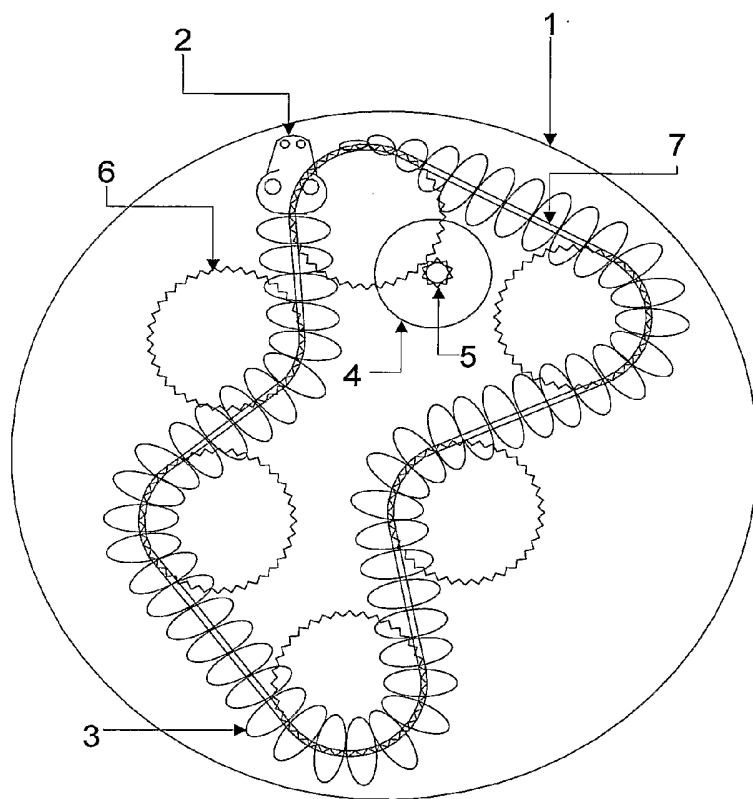
Published:

— without international search report and to be republished upon receipt of that report

[Continued on next page]

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,

(54) Title: MOVING ORNAMENTAL DESIGN ELEMENT



(57) Abstract: An automatically moving design element assembly for articles of jewelry and accessories comprising a micro motor powered by an electrical power source; and at least one ornamental design element mounted on the moving or stationary parts of the assembly; characterized in that movement from the motor is transmitted to the design element(s) through intermediate element(s). An optional microelectronic controller controls and optionally monitors movement of the design element and may respond to input from sensors of light, sound, touch, position, movement or acceleration to provide an enhanced aesthetically pleasing appearance of the article of jewelry or accessory.



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

MOVING ORNAMENTAL DESIGN ELEMENT

TECHNICAL FIELD

Automatically moving design elements.

BACKGROUND ART

Various jewelry items such as pins, pendants, brooches, necklaces, rings, watches and similar jewelry are typically worn to aesthetically enhance a wearer's appearance. Prior art for conventional jewelry items includes movable design elements to further enhance the aesthetic effect and novelty thereof. However, with conventional devices, the jewels or stones are moved manually or with gravitational forces or the effect of inertia. Such drive means are limited in the duration, speed and variety of movements that can be implemented.

Various jewelry items having movable design elements exist in the prior art. For example, U.S. Pat. No. 4,977,757 issued to Mesica et al relates to a ring having rotatably mounted and removable ornamental elements. The base of the ring includes a pair of ears for supporting a spindle with the elements threaded thereto allowing the various elements to be disassembled and reorganized.

U.S. Pat. No. 4,270,366 issued to Green relates to a necklace comprising a journal having an axial shank rotatably extending therethrough. A gem stone is mounted on a first end of the shank with the second end having a radially, outwardly extending lever structure that frictionally engages underlying clothing or skin of the wearer to effect angular displacement of the shank member relative to the journal.

U.S. Pat. No. 4,187,697 issued to Castelo relates to a jewel mounting structure comprising a stone secured to mounting sleeves which slidably moves along a curved guide surface having a predetermined radius of curvature. A connector depends radially inwardly from the sleeve and is journaled about a shaft at the center of curvature of the guide surface. Attached to the journaling element is a weighted enclosure

which causes the sleeve to rotate about the shaft until gravity maintains the enclosure at the lowest point of its circular arc.

U.S. Pat. No. 3,247,683 issued to Dankner relates to a rocking charm having a figurine thereon such as a horse which reciprocally rocks with an internally disposed wind up motor.

U.S. Pat. No. 2,190,778 issued to Fernandez relates to a moving mechanism for pins, brooches, etc. comprising a circular body having a centrally located aperture with a spring motor therein. Extending from the spring motor is a stem allowing the spring motor to be periodically wound. The spring motor rotates a covered picture support structure.

U.S. Pat. No. 1,025,447 issued to Blume relates to a jewelry article comprising a casing having a spiral spring therein. An end of the spring is attached to the casing with the other end secured to a shaft. The spring, when wound, rotates a design element.

U.S. Pat. No. 831,033 issued to Boismaure relates to a jewel mounting such as a hat pin having a hollow bowl with a collar secured thereto. A pin is secured to the collar and includes a hub concentrically received within a tube with a pair of spiral springs therein. One end of each spring is secured to the pin with the other end protruding from a slot on the tube for maintaining the ball in a constant state of vibration regardless of the pin position.

U.S. Pat. No. 6,408,647 issued to Koll relates to a battery powered micro motor automatically rotating a housing relative to a casing to enhance the aesthetic effect of a jewelry item such as a gemstone.

Although various jewelry items having movable design elements exist in the prior art, including one that uses an electrical motor for automatically rotating a design element for a desired duration none use an

electrical motor to obtain more interesting and complicated movements beyond simple rotation of an element of the jewelry.

Also there is no prior art showing use of automatically moving design elements for accessories such as glasses, scarves, ties, belts, purses, bags, umbrellas, footwear, headwear, and hair accessories.

DISCLOSURE OF INVENTION

The main objective of the invention is to provide an enhanced, aesthetically pleasing appearance to articles of jewelry or accessories through movement.

The main advantage of the invention is that it enhances the aesthetic appearance of jewelry and accessories through:

1. Taking advantage of the instinctive movement of the eye's gaze toward a moving object to enhance the attention attracting aspect of jewelry or accessories has been disclosed in prior art. This invention is more effective in taking advantage of this because of its ability to create more complex movements.
2. Complex movement of design elements containing one or more gems thereby enhancing the reflections from the gems more effectively than reflection from a rotating gem as disclosed in the prior art.
3. Producing a dynamically changing pattern in an article of jewelry or accessory to which it is applied which was not disclosed in the prior art.
4. Enabling a design element that assumes certain defined shapes at different times which was not disclosed in the prior art.
5. Movement of the article of jewelry or accessory which is made to resemble an entity that would normally be expected to move hence giving it a more lifelike appearance. In the prior art this was achieved through free movement under gravitation, inertia or by use of springs. In this invention the movement is produced by use of a microelectronic controller, motor and one or more transmission elements enabling more convincing lifelike movements.

6. Allowing the production of new types of design elements that were not disclosed previously.

BRIEF DESCRIPTION OF DRAWINGS

For a fuller understanding of the nature and advantages of the present invention, as well as the preferred mode of use, reference should be made to the following detailed description read in conjunction with the accompanying drawings.

Figures 1, 2, 3, 4, 5 and 6 are diagrams of examples of jewelry implementing the transmission of motion from one element to another illustrating three possible embodiments.

MODES FOR CARRYING OUT THE INVENTION

In the following description, numerous details are set forth to provide an understanding of the present invention. However, it will be understood by those skilled in the art that the present invention may be practiced without these details and that numerous variations or modifications from the described embodiments may be possible.

- 1) Preferred Embodiment (Figs 1 and 2) "Brooch with a Snake":
 - a) An electric power source such as a battery.
 - b) A switch.
 - c) One circular back plate 1.
 - d) One electric micro motor 4 with one small gear 5.
 - e) Six larger gears 6 arranged in a plane.
 - f) A chain 7 similar to a miniature bicycle chain which engages the larger gears 6.
 - g) Design elements 2 (head) and 3 (body segments) attached to the chain to create the appearance of a snake. The head and body segment design elements are not shown in figure 2.

h) The micro motor 4 is located on the undersurface of the jewelry and has a small gear 5 on its shaft. The small gear 5 engages one of the series of larger gears 6. The six larger gears 6 are arranged as shown in the drawing and the chain 7 goes around the gears 6 in an irregular path.

i) Microelectronic controller.

j) Optional sensor(s) for light, sound, touch, movement or acceleration.

2) Operation – Preferred Implementation (Figs 1 and 2) “Brooch with a Snake”:

When the switch is closed the current flows through the micro motor 4. The small gear 5 engages one of the larger gears 6 causing it to turn more slowly and with greater torque. The larger gear 6 engages the chain 7 which is then moved. The chain 7 engages all the large gears 6 along its path and causes all the large gears 6 to turn. The design elements 2 and 3 attached to the chain are carried along the same path as the chain 7 as it moves around its path. Together the design elements 2 and 3 form the appearance of a snake that is winding slowly around a path on the front surface of the jewelry. The microelectronic controller is used to make the snake move intermittently.

Optionally sensor(s) for light, sound, touch, acceleration or movement will serve as inputs to the microelectronic controller.

3) Additional Embodiment #1 (page 2, Figs 3 and 4) “Butterfly”:

a) An electric power source such as a battery.

b) A switch.

c) One electric micro motor 9 with a reduction gearbox 14 and one cam 10 on the output shaft of the gearbox 14.

d) Design elements of the shape of butterfly wings 8 are hinged 13 near the outside of the motor case and control arms 11 extend down to engage the cam 10 on each side.

e) Springs 12 are wound about each hinge point 13, anchored at one end on the motor casing and the free end of the spring 12 engages the lower control arm 11 of the butterfly wings 8 on each side.

f) Microelectronic controller.

g) Optional sensor(s) for light, sound, touch, movement or acceleration.

4) Operation – Additional Embodiment #1 (page 2, Figs 3 and 4) “Butterfly”:

When the switch is closed current flows through the micro motor 9. The micro motor 9 turns the gearbox 14 which reduces the speed of the output shaft and increases the torque. The output shaft turns the cam 10 which engages the control arms 11 of the butterfly wings 8. Springs 12 hold the control arms 11 against the cam 10. As the cam 10 rotates the control arms 11 are moved symmetrically toward or away from the motor shaft. As the control arms 11 move away from the motor shaft the wings 8 move up and closer together. As the control arms 11 move toward the motor shaft the butterfly wings 8 move down and apart. The microelectronic controller is used to make the butterfly move intermittently and simulate the occasional movements of a real butterfly at rest. Optionally sensor(s) for light, sound, touch, movement, acceleration and position of design elements will serve as inputs to the microelectronic controller.

5) Additional Embodiment #2 (page 3, Figs 5 and 6) “Spider”:

- a) An electric power source such as a battery.
- b) A switch.
- c) One electric micro motor 15 and one cam 18 on the output shaft 20 of the micro motor 15.
- d) Four design elements made to appear like spider legs 17 are hinged 16 on each side of the micro motor 15 with the part of the leg 17 extending closer to the shaft 20 thereby comprising the control arm 19 for each leg 17.
- e) Springs 21 hold the control arms 19 against the cam 18.
- f) Microelectronic controller.
- g) Optional sensor(s) for light, sound, touch, movement or acceleration.

6) Operation – Additional Embodiment #2 (page 3, Figs 5 and 6) “Spider”:

When the switch is closed current flows through the micro motor 15. The micro motor 15 turns the cam 18. The cam 18 turns causing the eight control arms 19 to move alternately closer and further away from the shaft 20. Springs 21 keep the control arms 19 tightly against the cam 18. As the control arms 19 are moved by the cam 18 the control arms 19 pivot about the hinges 16 causing the

spider legs 17 to move to resemble the movement of a real spider. The microelectronic controller is used to make the spider move intermittently and simulate the occasional movements of a real spider. Optionally sensor(s) for light, sound, touch, movement or acceleration will serve as inputs to the microelectronic controller.

7) Other Additional Embodiments:

There are a vast number of possible embodiments of this invention. Some promising embodiments are described below.

- An electric power source such as a battery or photovoltaic cell.
- A switch which may be optional.
- One or more electric micro motors.
- One or more ornamental design elements can be mounted on any of the moving or stationary components including gears, pulleys, wheels, chains, wires and belts.
- Reciprocating linear or curved movement can be produced for example by one of the following assemblies:
 - i) an active rotating element having a gear, wheel or pulley and moving along a straight track or chain.
 - ii) an active rotating element having a gear, wheel or pulley and moving a chain, belt or wire along a shaped track.
 - iii) an active rotating element having a pin to which is attached a connecting rod. The other end of the connecting rod moves along a linear (or curved) track.
 - iv) an active rotating element having a pinion gear which engages a rack gear moving in a linear (or curved) track.
 - v) an active rotating element having a cam which engages an element which then moves in a linear or curved track.
 - vi) an active rotating element having a cam which engages an element which then pivots about an axis.

- Movement along a shaped track can be produced for example by one of the following assemblies:
 - i) An active rotating element having a gear, wheel or pulley and moving along a shaped track.
 - ii) An active rotating element having a gear, wheel or pulley and moving a chain, belt or wire along a shaped track.
- Reciprocating angular movement through part of an arc can be produced for example by an active rotating eccentric element or an active rotating element with an eccentrically attached component which in turn is connected to the element to be moved.
- Series of elements connected by one or more transmission elements such as a series of gears, wheels or pulleys connected by a chain, belt or wire in which one of the elements is the active element driving the rest of the mechanism.
- Series of two or more gear or wheel elements transmitting motion by direct contact with one another.
- Rotating elements operating as cams.
- An active rotating element with an eccentrically attached component which in turn is connected to one or more wires. The wires run internally or externally to points of attachment on another element of the jewelry causing interposed solid elements to flex or hinged elements to move.
- An active rotating element with an eccentrically attached component which in turn is connected to one or more wires. The wires run internally or externally to points of attachment on another element of the jewelry causing interposed solid elements to change alignment as each wire in sequence is pulled straight.
- Combination of two or more active elements to create more complex regular movements.
- Combination of two or more active elements to create more complex chaotic movements.
- Combinations of two or more of the above assemblies to create more complex motions.
- Many of the movements above can be implemented in one, two or three dimensions simultaneously with the planes of movement having any desired orientation.

- The optional microelectronic controller controls and optionally monitors the movement of the design element(s).
- One or more sensors for light, sound, touch, movement or acceleration can serve as inputs to the microelectronic controller.

2) Operation – Other Additional Embodiments:

When the switch (if used) is closed current flows through the micro motor(s). The output shaft(s) turn the gear, cam, wheel or pulley, which in turn transmits movement to another design element(s) of the jewelry or accessory by direct contact or through one or more intermediate transmission elements.

Control of the motor(s) may optionally be by means of a microelectronic controller. Optionally sensors detect changes in light, sound, movement, acceleration, touch and position of design elements and convey a signal(s) to the microelectronic controller which controls the motor(s). Optionally the microelectronic controller (if used) monitors the movement of design element(s) to create complex controlled movements.

While the invention has been disclosed with respect to a limited number of embodiments, those skilled in the art will appreciate numerous modifications and variations thereof. It is intended that the appended claims cover such modifications and variations as fall within the true spirit and scope of the invention.

The inventors hereby state their intent to rely on the Doctrine of Equivalents to determine and assess the reasonably fair scope of the present invention as pertains to any apparatus not materially departing from but outside the literal scope of the invention as set forth in the following claims.

CLAIMS

We claim:

- 1) An automatically moving design element assembly for articles of jewelry and accessories comprising
 - a. at least one electrical power source,
 - b. at least one micro motor,
 - c. at least one ornamental design element mounted on at least one moving or stationary part of said design element assembly;
 - d. characterized in that movement from said micro motor is transmitted through at least one intermediate transmission element to at least one said ornamental design elementwhereby said micro motor powers at least one said ornamental design element in a wider variety of movements than is possible with the prior art enabling the more realistic simulation of entities which are normally expected to move.
- 2) An automatically moving design element assembly for articles of jewelry and accessories of claim 1 wherein said articles of jewelry are selected from the group consisting rings, bracelets, pendants, necklaces, brooches, pins, earrings, crowns, diadems, foot bracelets, and chains.
- 3) An automatically moving design element assembly for articles of jewelry and accessories of claim 1 wherein said accessories are selected from the group consisting of belts, scarves, ties, purses, bags, umbrellas, footwear, glasses, headwear, and hair accessories.
- 4) An automatically moving design element assembly for articles of jewelry and accessories of claim 1 wherein said intermediate transmission element is selected from the group consisting of axle, bell crank, belt, cam, chain, clevis, connecting rod, crank arm, crank pin, crank, lever, screw, shaft, swash plate, tappet, gear, pulley, arbor, wire, cable, wheel, yoke, and rotating element with eccentric pin.

- 5) An automatically moving design element assembly for articles of jewelry and accessories of claim 1 wherein movement transmitted to at least one said ornamental design element results in said ornamental design element moving along a path selected from the group consisting of
- a. reciprocating linear motion
 - b. reciprocating angular motion
 - c. reciprocating spiral motion
 - d. motion along a shaped track
 - e. motion along an element selected from the group consisting of
 - i. a chain
 - ii. a wire
 - iii. a cable
 - iv. a cord
 - v. and a belt
- which travels around a plurality of elements selected from the group consisting of gears, pulleys, and wheels.
- 6) An automatically moving design element assembly for articles of jewelry and accessories of claim 1 wherein movement transmitted to at least one said ornamental design element results in the combination of a plurality of movements selected from the group consisting of
- a. reciprocating linear motion
 - b. reciprocating angular motion
 - c. reciprocating spiral motion
 - d. motion along a shaped track
 - e. motion along an element selected from the group consisting of
 - i. a chain
 - ii. a wire

- iii. a cable
- iv. a cord
- v. and a belt

which travels around a plurality of elements selected from the group consisting of gears, pulleys, and wheels.

- 7) An automatically moving design element assembly for articles of jewelry and accessories of claim 1 wherein said intermediate transmission element comprises a rotating element with an eccentric pin connected to at least one wire which in turn is connected internally to points of attachment on at least one said ornamental design element whereby rotation of said intermediate transmission element causes traction on said wire thereby pulling on said internal point of attachment in turn causing at least one said ornamental design element to flex.
- 8) An automatically moving design element assembly for articles of jewelry and accessories of claim 1 wherein said intermediate transmission element comprises a rotating element with an eccentric pin connected to at least one wire which in turn is connected externally to points of attachment on at least one said ornamental design element whereby rotation of said intermediate transmission element causes traction on said wire thereby pulling on said external point of attachment in turn causing at least one said ornamental design element to flex.
- 9) An automatically moving design element assembly for articles of jewelry and accessories of claim 1 wherein said intermediate transmission element comprises a rotating element with an eccentric pin connected to at least one wire which in turn is connected internally to points of attachment on at least one said ornamental design element whereby rotation of said intermediate transmission element causes traction on said wire thereby pulling on said internal point of attachment in turn causing interposed hinged said ornamental design elements to move.

- 10) An automatically moving design element assembly for articles of jewelry and accessories of claim 1 wherein said intermediate transmission element comprises a rotating element with an eccentric pin connected to at least one wire which in turn is connected externally to points of attachment on at least one said ornamental design element whereby rotation of said intermediate transmission element causes traction on said wire thereby pulling on said external point of attachment in turn causing interposed hinged said ornamental design elements to move.
- 11) An automatically moving design element assembly for articles of jewelry and accessories of claim 1 wherein said intermediate transmission element comprises a rotating element with an eccentric pin connected to a plurality of wires which in turn are connected internally to points of attachment on at least one said ornamental design element whereby rotation of said intermediate transmission element causes traction on said wires thereby pulling on said internal points of attachment in turn causing interposed said ornamental design elements to change alignment as said wires in sequence are pulled straight.
- 12) An automatically moving design element assembly for articles of jewelry and accessories of claim 1 wherein said intermediate transmission element comprises a rotating element with an eccentric pin connected to a plurality of wires which in turn are connected externally to points of attachment on at least one said ornamental design element whereby rotation of said intermediate transmission element causes traction on said wires thereby pulling on said external points of attachment in turn causing interposed said ornamental design elements to change alignment as said wires in sequence are pulled straight.
- 13) An automatically moving design element assembly for articles of jewelry and accessories of claim 1 wherein the movement of said ornamental design element comprises at least one selected from the

group consisting of motion in one dimension, motion in two dimensions and motion in three dimensions.

14) An automatically moving design element assembly for articles of jewelry and accessories of claim 1 further including any combination of any of a plurality of said design element assemblies to create more complex motions.

15) An automatically moving design element assembly for articles of jewelry and accessories of claim 1 further including a microelectronic controller in communication with said power source and said micro motor and controlling the delivery of electrical power from said electrical power source to said micro motor.

16) An automatically moving design element assembly for articles of jewelry and accessories of claim 1 further including a microelectronic controller and at least one sensor selected from the group comprising

- i. light sensors
- ii. sound sensors
- iii. touch sensors
- iv. movement sensors
- v. acceleration sensors
- vi. sensors of position of said ornamental design elements

wherein said microelectronic controller is used to control movement of said ornamental design element in response to inputs from at least one said sensor.

17) An automatically moving design element assembly for articles of jewelry and accessories of claim 15 wherein said microelectronic controller controls movement of one or more design elements to create

motions selected from the group consisting of regular motions, irregular motions and chaotic motions.

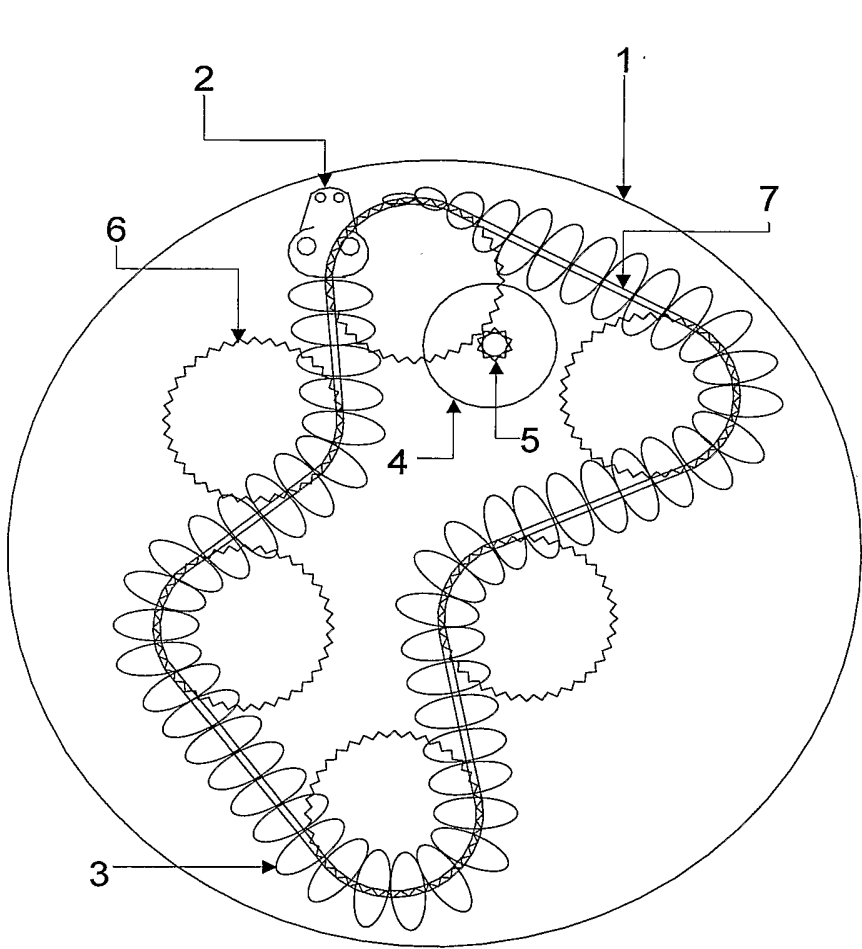


Figure 1

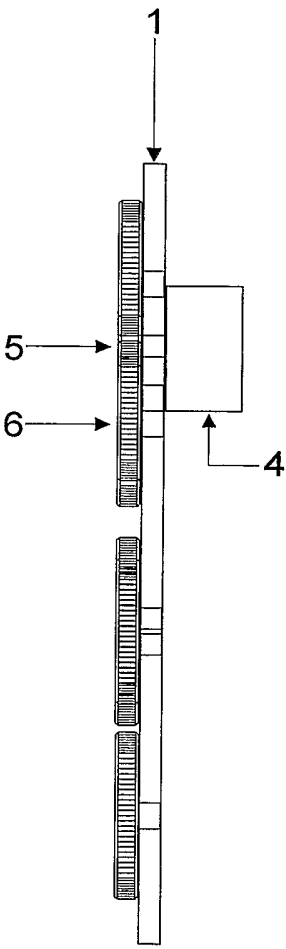
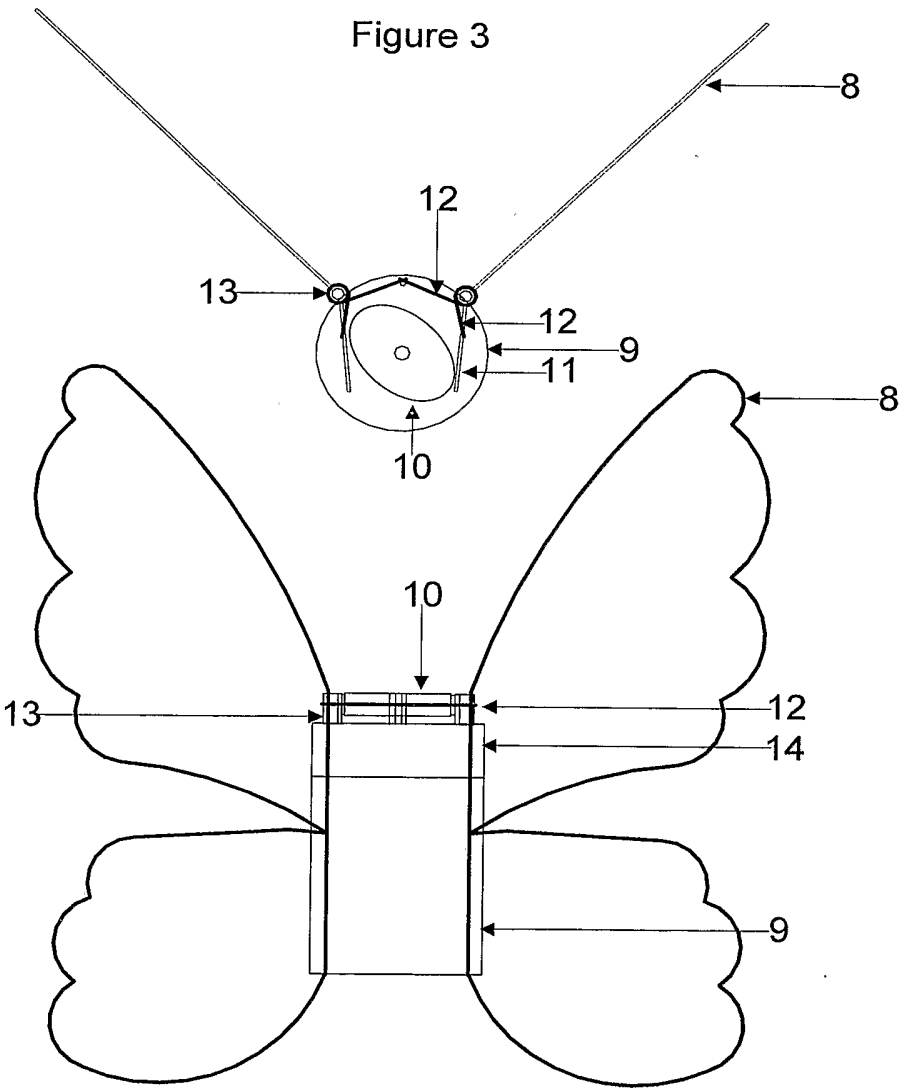


Figure 2



3/3

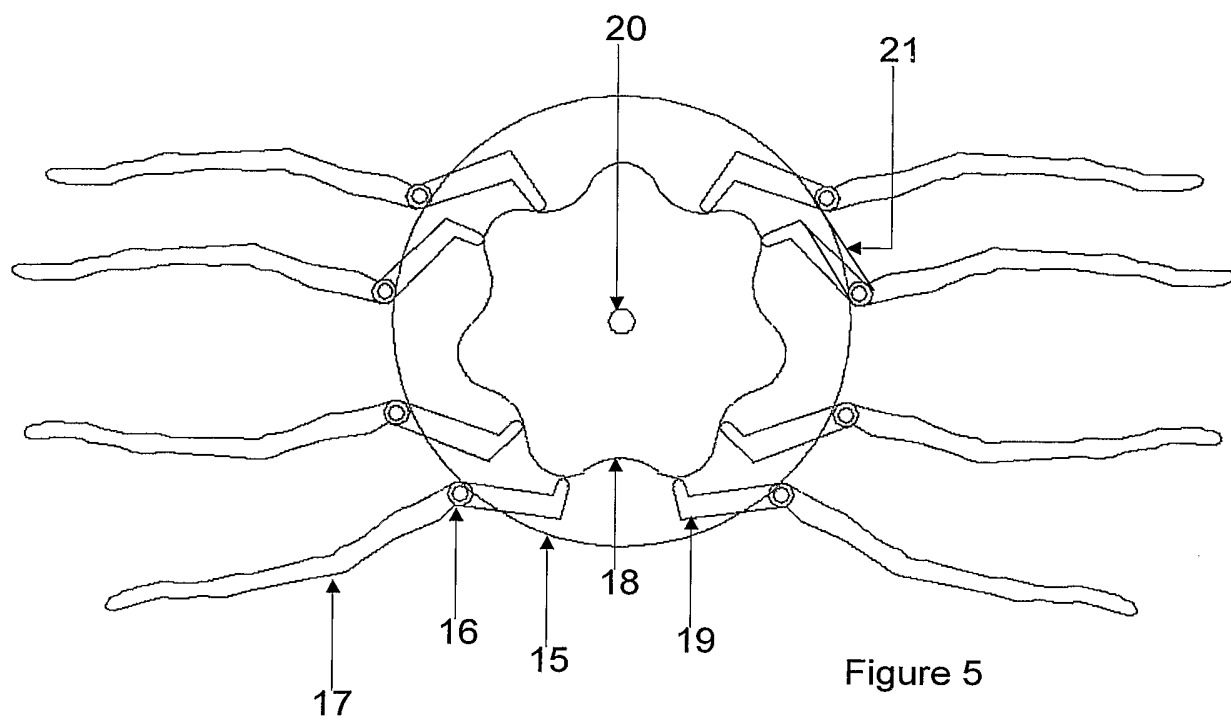


Figure 5

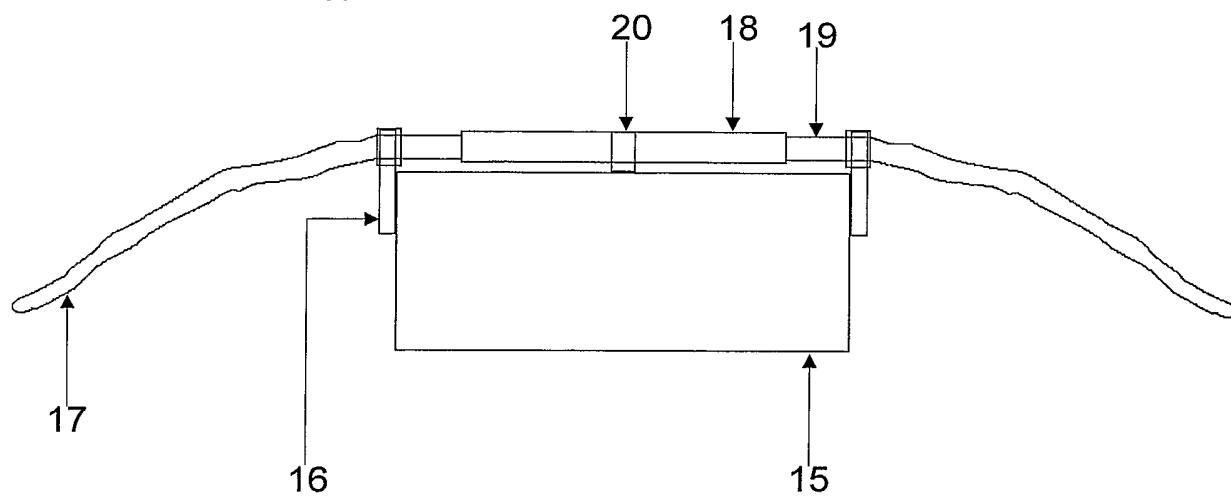


Figure 6