

KINESTHETIC DEVICE WITH DIFFERENT SEATING ORIENTATIONS

BACKGROUND OF THE INVENTION

a) Field of the Invention

5 The present invention relates to a kinesthetic device, and more particularly to a kinesthetic device with different seating orientations.

b) Description of the Prior Art

 There are usually two types of facilities in general amusement parks. One is used for
10 games in reality, such as a roller coaster, which allows the users to experience the speed and G-Force. Another is a virtual kinesthesia facility, which uses sound and visual effect with movement of a dynamic platform to create virtual kinesthesia.

 In general, there is a video player set in front of a dynamic simulation device and play
dynamic movies with an audio equipment. A dynamic simulation device comprises a dynamic
15 platform with seats arranged on top of it, by controlling the actuator in accordance with the movie, the platform and the seats can be moved in multiple degrees of freedom such as surging, heaving, pitching and rolling, and make the users sitting on the platform feel like they were literally inside the movie.

 Referring to FIG. 1, it shows a dynamic simulation device disclosed in a Taiwanese Patent
20 Publication No. M484450, including a base 11, a platform 12 and an actuator assembly 13 disposed between the base 11 and the platform 12. The actuator assembly 13 controls the

position of the platform 12 and swings the platform 12 with respect to the base 11.

Plural seats 14 which accommodate plural users are disposed on top of the platform 12. The orientations of the plural seats 14 are the same, so that the users on the seats 14 can experience the same kinesthesia while receiving the same audiovisual information.

5 Although aforementioned dynamic simulation device can simulate kinesthesia, there are still some defects in practical implementation.

1. Limited installation location

10 The plural seats have its own height, and the height for visitors' entrance should also be maintained. Because the plural seats are disposed on the platform, considering the height of the actuator assembly, the ceiling where the prior art dynamic simulation device is installed is higher, and the installation location cannot be on the common floors.

2. Unable to increase revenue

15 With the same orientation of the plural seats, the users can only experience the same kinesthesia and watch the same movie, and from a consumer's point of view, they tend not to ride on the same facility more than once, thus, the facility is unable to increase revenue.

3. Unreal kinesthesia

20 In early days, the Stewart platform was a device designed to train pilots, and it's used to simulate the kinesthesia of a single person with certain audiovisual information. However, in the amusement park, to increase revenue, plural seats are disposed on the platform to accommodate more people, but due to different positions of the seats, when the platform

is pitched forward by the actuator, the users sit at the front part of the platform will experience leaning forward kinesthesia while descending, and the users sit at the rear part of the platform will experience leaning forward kinesthesia while ascending, thus, the kinesthesia of the users cannot always be matched with the audiovisual information.

5 How to improve the device to provide better kinesthesia with different audiovisual information in a limited space and create more revenue, are objectives that the relevant professionals need to strive for.

SUMMARY OF THE INVENTION

10 Accordingly, an objective of an embodiment of the present invention is to provide a kinesthetic device with different seating orientations, comprising a base unit, an actuator unit, a platform unit, and a seat unit.

The base unit includes a base seat.

The actuator unit includes an actuator module disposed on the base seat.

15 The platform unit includes a platform body disposed on the actuator module.

The seat unit includes plural seats with different orientations disposed at the edge of the platform body.

Another technique of an embodiment of the present invention is that the aforementioned platform body is circular in shape, and the plural seats are disposed respectively on the tangent
20 line of the circular platform body.

Another technique of an embodiment of the present invention is that the aforementioned

platform body is polygonal in shape, and the plural seats are disposed respectively on the sides of the polygonal platform body.

Another technique of an embodiment of the present invention is that the aforementioned plural seats are adjacent to one another side by side in their length direction at a certain distance.

5 Another technique of an embodiment of the present invention is that the aforementioned actuator module is a six-axis actuator assembly of the Stewart platform

Another technique of an embodiment of the present invention is that the aforementioned kinesthetic device with different seating orientations further comprises a position adjustment unit, which includes plural position adjustment modules disposed between the plural seats and
10 the platform body, to adjust the positions of the plural seats respectively.

Another technique of an embodiment of the present invention is that the aforementioned seat unit further includes a safety component.

Another technique of an embodiment of the present invention is that the aforementioned
15 kinesthetic device with different seating orientations further comprises a control unit, which includes a control module connected electrically to the actuator module, and an audiovisual module connected electrically to the control module.

Another technique of an embodiment of the present invention is that the aforementioned audiovisual module is composed of plural video and audio playback components.

20 Another technique of an embodiment of the present invention is that the aforementioned audiovisual module includes plural memory components to store different audiovisual data, so

that the plural video and audio playback components can play different audiovisual information.

The benefits of the present invention lie in that with the different orientations of the plural seats, the users on the seats can also experience different kinesthesia; with the plural seats disposed at the outer side of the platform body, the height of the kinesthetic device can be reduced; with the audiovisual module providing different audiovisual information, the users on the plural seats can experience kinesthesia with matching audiovisual information

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a schematic view, a dynamic simulation device disclosed in a Taiwanese Patent Publication No. M484450;

FIG. 2 shows a schematic view, illustrating a first preferred embodiment according to the present invention;

FIG. 3 shows a schematic view, illustrating a side view of the first preferred embodiment;

FIG. 4 shows a flowchart, illustrating a control unit of the first preferred embodiment;

FIG. 5 shows a schematic view, illustrating a second preferred embodiment according to the present invention; and

FIG. 6 shows a schematic view, illustrating a top view of a third preferred embodiment according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The features and technical contents of this invention will be clearly presented with detailed descriptions and drawings of the following three preferred embodiments. Before proceeding

with the detailed description, it should be noted that similar elements are labeled with the same reference number.

With reference to FIGs. 2, 3, and 4, a first preferred embodiment according to the present invention is depicted, comprising a base unit 31, an actuator unit 32, a platform unit 33, a seat
5 unit 34, and a control unit 36.

The base unit 31 includes a base seat 311. Preferably, the base seat 311 is a metal structure disposed and fixed on the ground, to support the force and weight of the actuator unit 32, and also provide pivotal connection to the actuator unit 32. In a practical implementation, the base seat 311 can be disposed on a turntable structure or a slide rail structure, and so should not be
10 construed as limiting the invention.

The actuator unit 32 includes an actuator module 321 disposed on the base seat 311. In the first preferred embodiment, a six-axis actuator assembly of the Stewart platform is served as the actuator module 321. It can simulate the kinesthesia by using its six linear actuators to change the deflection angle of the platform unit 33. In a practical implementation, other kinesthesia
15 actuator can be selected to sway or move the platform unit 33, and so should not be construed as limiting the invention.

The platform unit 33 includes a platform body 331 disposed on the actuator module 321. The platform body 331 is a steel structure fixed on the actuator module 321, and the actuator module 321 controls the position of the platform body 331, so that the platform body 331 can
20 sway with respect to the base seat 311.

The platform body 331 is polygonal in shape, in the first preferred embodiment, the shape

of the platform body 331 is an equilateral triangle. The six-axis actuator assembly of the Stewart platform, served as the actuator module 321, and the platform body 331 are pivotally connected at the midpoint of each side of the triangle-shaped platform body 331, so that the actuators can work collaboratively to change the position and movement of the platform body 331. In a practical implementation, the shape of the platform body 331 can be any polygon other than equilateral triangle, and so should not be construed as limiting the invention.

The seat unit 34 includes plural seats 341 disposed with different orientations at the edge of the platform body 331. In the first preferred embodiment, the shape of the platform body 331 is an equilateral triangle, and there are three seats 341 disposed respectively on top of each side of the platform body 331. The plural seats 341 are adjacent to one another side by side in their length direction at a certain distance and with an included angle in between. Precisely speaking, the included angle formed by two adjacent seats 341 will not be less than 60 degrees, so that the plural seats 341 can be combined to form a shape of triangle or other polygons, which can increase the capacity of the device with the same mechanism without losing kinesthetic effect.

The inventor wants to emphasize that because the plural seats 341 are disposed at the edge of the platform body 331, according to the principle of lever, when the actuator module 321 swings the platform body 331, the movement of the plural seats 341 will be more severe than the center of the platform body 331, and the users on the plural seats 341 can experience more intense kinesthesia.

Each of the plural seats 341 is disposed respectively on top of each side of the steel structure of the platform body 331 and each seat 341 accommodates at least one user. In the first

preferred embodiment, the width of each seat 341 is approximately the same as the side length of the platform body 331 and accommodates plural users.

Each seat 341 provides a seat plate and a back plate, and the sitting direction of the users are the same as the orientations of the plural seats 341. In the first preferred embodiment, the plural seats 341 are fixed on top of the equilateral triangular steel structure of the platform body 331, and the orientations of the plural seats 341 are opposite to the center of the platform body 331.

The control unit 36 includes a control module 361 connected electrically to the actuator module 321, and an audiovisual module 362 connected electrically to the control module 361. The audiovisual module 362 is composed of plural video and audio playback components to provide image and sound respectively, and it is provided with plural memory components 363 to store different audiovisual data, so that the plural video and audio playback components can play different audiovisual information.

The inventor wants to emphasize that since the platform body 331 of the first preferred embodiment is equilateral triangular in shape, and the orientations of the plural seats 341 are opposite to the center of the platform body 331, so the line of sight of the users on the plural seats 341 are not the same. Thus, when the actuator module 321 swings the platform body 331, the users on different seats 341 can experience different kinesthesia.

For example, a six-axis Stewart platform can provide kinesthetic effect in six degrees of freedom by pitching, yawing, rolling, surging, heaving, and swaying to the platform body 331, when the users on one of the seats 341 experience forward leaning, the users on other seats 341

may experience backward leaning. The kinesthesia is completely different.

Therefore, the audiovisual module 362 can program an audiovisual data for each of the plural seats 341 and store the data in the plural memory components 363, so that the users on different seats 341 may receive different audiovisual information.

5 It is preferable to set a panoramic screen around the kinesthetic device and use plural video and audio playback components to project the image onto the panoramic screen, so the users on the plural seats 341 can experience kinesthesia with matching audiovisual information. In a practical implementation, the plural video and audio playback components can be plural head-mounted display devices and earphones ,and so should not be construed as limiting the
10 invention.

FIG. 5 shows a second preferred embodiment according to present invention. The second preferred embodiment is generally the same as the first preferred embodiment, and therefore the similarities will not be described in detail herein after. The difference between the two preferred embodiments is that the plural seats 341 of the second preferred embodiment are disposed on
15 the outer sides of the platform body 331, so that the total height for installing the present invention can be reduced.

The second preferred embodiment further comprises a position adjustment unit 35, which includes plural position adjustment modules 351 disposed between the plural seats 341 and the platform body 331, to adjust the positions of the plural seats 341 respectively.

20 Each position adjustment module 351 includes a vertical adjustment component and a horizontal adjustment component. The vertical adjustment component can adjust the vertical

position or the height of the plural seats 341, while the horizontal adjustment component can adjust the distance between the plural seats 341 and the center of the platform body 331. Preferably, a ball screw can be used as the vertical adjustment component, and a linear guide can be used as the horizontal adjustment component. In a practical implementation, types of the adjustment component should not be limited thereto.

As the position adjustment module 351 raises the position of the seats 341, the users' feet will be dangled below while sitting on the plural seats 341; as the position adjustment module 351 lowers the position of the seats, the users can easily sit on or get up from the seats 341. When the position adjustment module 351 shifts the seats 341 outward, the users sitting on the seats 341 will experience more intense kinesthesia according to principle of lever.

The inventor wants to emphasize that the position adjustment module 351 does not participate in the control of kinesthesia, the position adjustment module 351 will stop acting after moving the seats 341 to the right position, while the actuator module 321 is in total charge of the control of kinesthesia.

Besides, in the second preferred embodiment, the plural seats 341 are disposed on the outer side of the platform body 331, when the position adjustment module 351 lowers the position of the seats 341, the height of the plural seats 341 can be the same as the actuator module, so the total height for installing the kinesthetic device can be effectively reduced. Thus, the present invention can be installed directly on the ground, and the users can easily sit on the seats 341 without walking through a ladder stage, and there is no need to modify the building to dispose the actuator module 321 underground.

In addition, when the seat 341 is disposed on the outer side of the platform body 331, both the moving speed and moving distance of the plural seats 341 increase due to principle of lever, and the users on the plural seats 341 can experience more intense kinesthesia as well.

The seat unit 34 also includes a safety component 342 disposed in the seat 341. Preferably,
5 a seat belt can be used as the safety component 342 to hold the user on the seat 341, guaranteeing the user from any physical injury while riding on the kinesthetic device. In a practical implementation, types of the safety component 342 should not be limited thereto.

FIG. 6 shows a third preferred embodiment according to present invention. The third preferred embodiment is generally the same as the second preferred embodiment, and therefore
10 the similarities will not be described in detail herein after. The difference between the two preferred embodiments is that the platform body 331 is circular in shape, and the plural seats 341 are disposed respectively on the tangent line of the platform body 331.

In the third preferred embodiment, the platform body 331 is a circular steel structure fixed on the actuator module 321, and there are twelve seats 341 averagely disposed on the outer side
15 of the platform body 331 with their orientation opposite to the center of the platform body 331, and each seat 341 accommodates one user. In a practical implementation, the number and capacity of the plural seats 341 should not be limited thereto.

The inventor wants to emphasize that the early Stewart platform was mainly used for simulating the kinesthesia of a single person, to provide kinesthetic effect in six degrees of
20 freedom. Later, the platform was used as an amusement facility with multiple seats disposed on it, but the early audio-video playback device can only provide single-screen image, so the seats

must all face the same direction toward the screen, and due to the restriction of the Stewart platform mechanism, the users wouldn't be able to experience the same kinesthesia while watching the same image.

With advances of audio-video playback technology, the panoramic image is widely used in various facilities. In this invention, the plural seats 341 are disposed on the outer side of the platform body 331 and the orientation of the plural seats 341 is opposite to the center of the platform body 331, so the kinesthesia of the users can be matched with the 360-degree panoramic image.

In addition, the height for installing the entire kinesthetic device can be effectively reduced by disposing the plural seats 341 on the outer side of the platform body 331, so that the whole device can fit in a general building's floor and can be directly installed without modifying the building structures.

From aforementioned descriptions, it is known that the present invention is indeed provided with following benefits:

15 1. More intense kinesthesia

Since the seats 341 are disposed at the edge of the platform body 331, when the actuator module 321 swings the platform body 331, both the moving speed and moving distance of the plural seats 341 increased due to the principle of lever, thus, the users on the plural seats 341 can experience more intense kinesthesia.

20 2. Cost saving

Since the plural seats 341 are disposed on the outer side of the platform body 331, the

height for installing the kinesthetic device can be effectively reduced, so that the kinesthetic device can be installed directly on the ground or inside a general building's floor. The users can easily sit on the seats 341 without walking through a ladder stage or modifying the building structure to dispose the actuator module 321 underground, thus, the installation cost can be saved effectively.

3. Dangled feet

According to the aforementioned description, even if the kinesthetic device is installed inside a building's floor, the position adjustment module 351 can still change the vertical position of the seats 341, thus, allow the users' feet to be dangled below, so there is no need to modify the structure of the seat or the building to reach the same effect.

4. Experience different kinesthesia

The orientations of the plural seats 341 are opposite to the center of the platform body 331, so that the line of sights of the users sit on the plural seats 341 are different, and the kinesthetic effects of each seat 341 are also different when the actuator module 321 swings the platform body 331. Thus, in combination with different audiovisual information given by the audiovisual module 362, each user on the plural seats 341 can experience different kinesthesia.

Accordingly, the orientations of the plural seats 341 are opposite to the center of the platform body 331,, so that the plural seats 341 can be disposed at the edge of the platform body 331, and the users the plural seats 341 can experience more intense kinesthesia in combination with different audiovisual information given by the audiovisual module 362. The plural seats

341 disposed on the outer side of the platform body 331 can reduce the total height for installing the kinesthetic device, so the device can be installed inside a general building and save the installation cost. Therefore, the objective of the present invention can be actually achieved.

It is of course to be understood that the embodiments described herein is merely illustrative
5 of the principles of the invention and that a wide variety of modifications thereto may be effected by persons skilled in the art without departing from the spirit and scope of the invention as set forth in the following claims.

Claim

1. A kinesthetic device with different seating orientations, comprising:
 - a base unit which includes a base seat;
 - an actuator unit which includes an actuator module disposed on the base seat,
 - 5 wherein the actuator module is a six-axis actuator assembly of a Stewart platform;
 - a platform unit which includes a platform body disposed on the actuator module; and
 - a seat unit which includes plural seats disposed at an edge of the platform body with different orientations.
- 10 2. The kinesthetic device with different seating orientations as claimed in claim 1, wherein the platform body is circular in shape, and the plural seats are disposed on the tangent line of the platform body.
3. The kinesthetic device with different seating orientations as claimed in claim 1, wherein
 - 15 the platform body is polygonal in shape, and the plural seats are disposed on the side of the platform body.
4. The kinesthetic device with different seating orientations as claimed in claim 1, wherein
 - the plural seats are adjacent to one another side by side in their length direction at a
 - 20 certain distance.
5. The kinesthetic device with different seating orientations as claimed in claim 1, further
 - 25 comprises a position adjustment unit which includes plural position adjustment modules disposed between the plural seats and the platform body, to adjust the position of the plural seats.
6. The kinesthetic device with different seating orientations as claimed in claim 1, wherein
 - 30 the seat unit further includes a safety component disposed in the seat.
7. The kinesthetic device with different seating orientations as claimed in claim 1, further comprises a control unit which includes a control module connected electrically to the

actuator module, and an audiovisual module connected electrically to the control module.

- 5 8. The kinesthetic device with different seating orientations as claimed in claim 7, wherein the audiovisual module is composed of plural video and audio playback components.
- 10 9. The kinesthetic device with different seating orientations as claimed in claim 8, wherein the audiovisual module is provided with plural memory components to store different video and audio data, so that the plural video and audio playback components can play different video and audio information.

ABSTRACT**KINESTHETIC DEVICE WITH DIFFERENT SEATING ORIENTATIONS**

5 A kinesthetic device with different seating orientations comprises a base unit, an actuator
unit, a platform unit, and a seat unit. The base unit includes a base seat. The actuator unit
includes an actuator module disposed on the base seat. The platform unit includes a platform
body disposed on the actuator module. The seat unit includes plural seats disposed at the edge of
the platform body, wherein the orientations of the plural seats are different, so that it can have
10 the plural seats provide with different kinesthesia.

Fig. 2

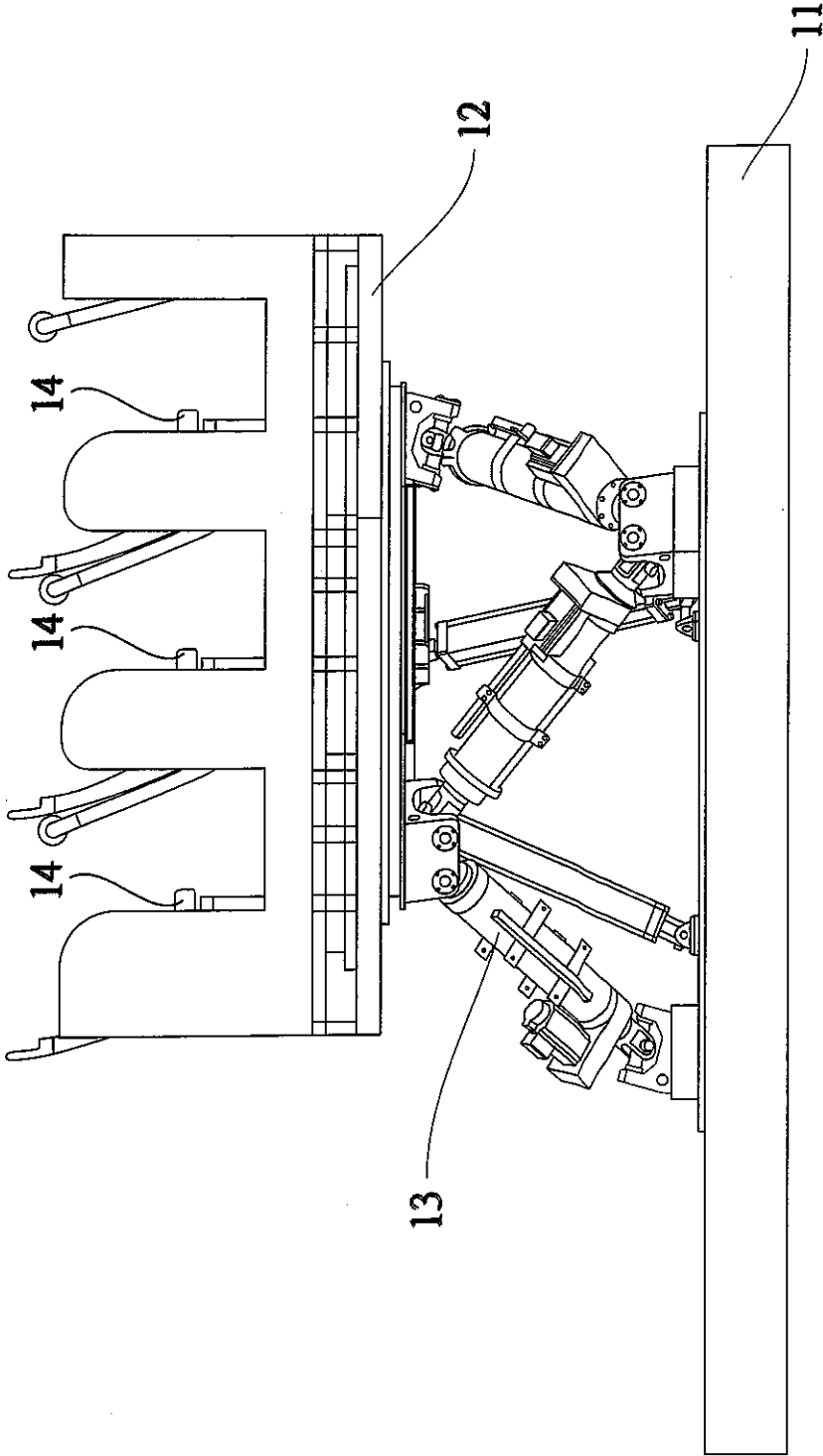


FIG. 1

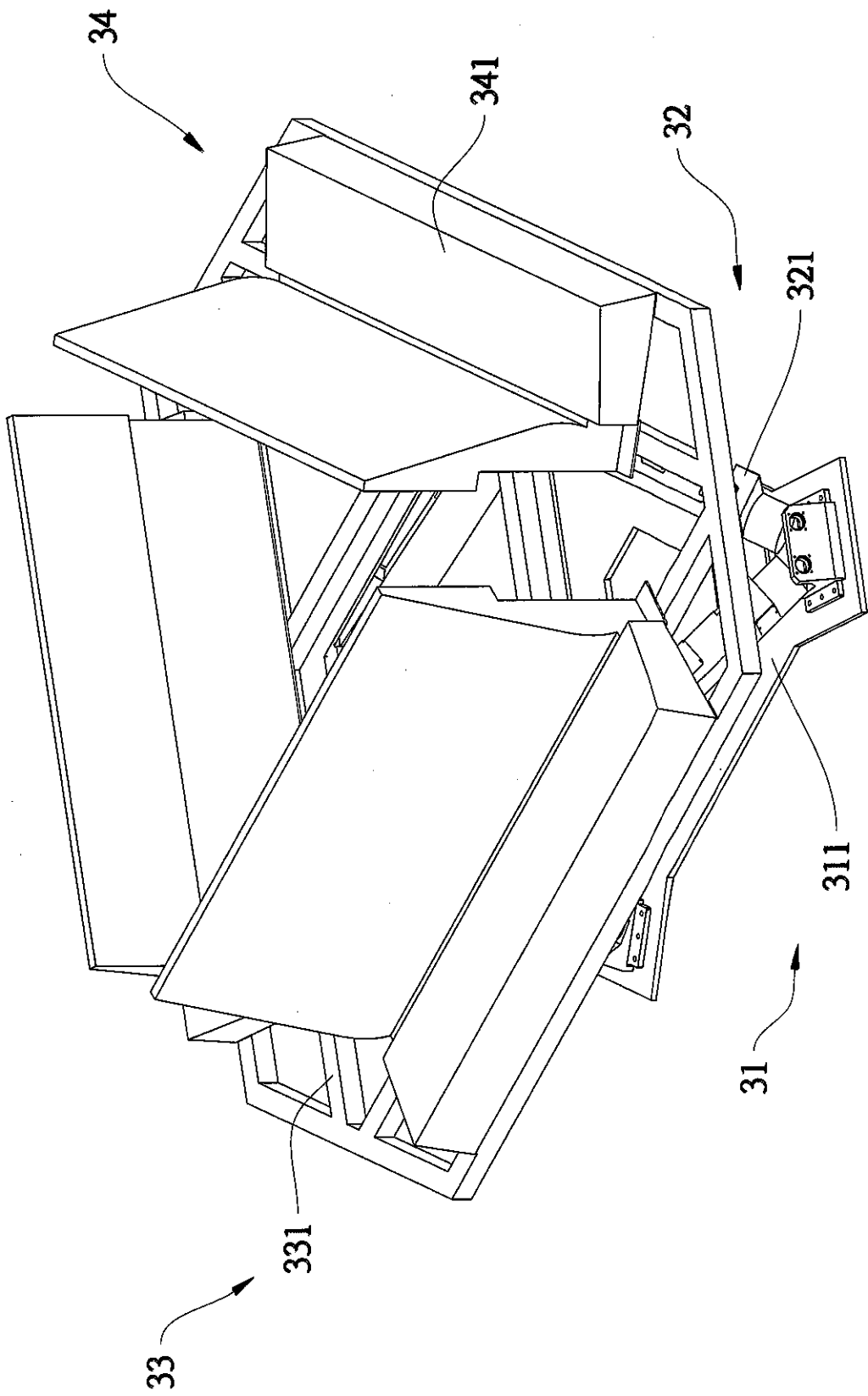


FIG. 2

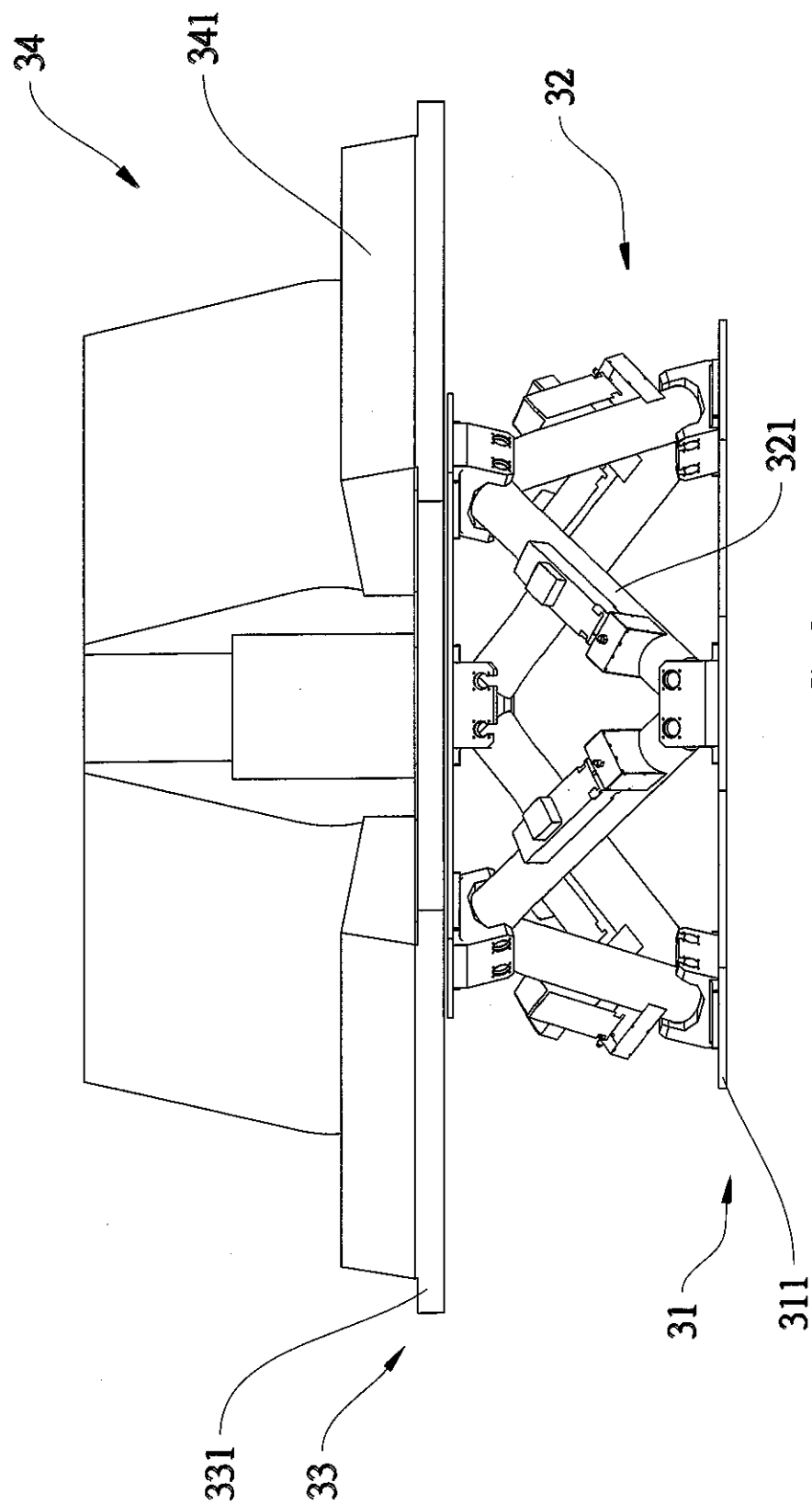


FIG. 3

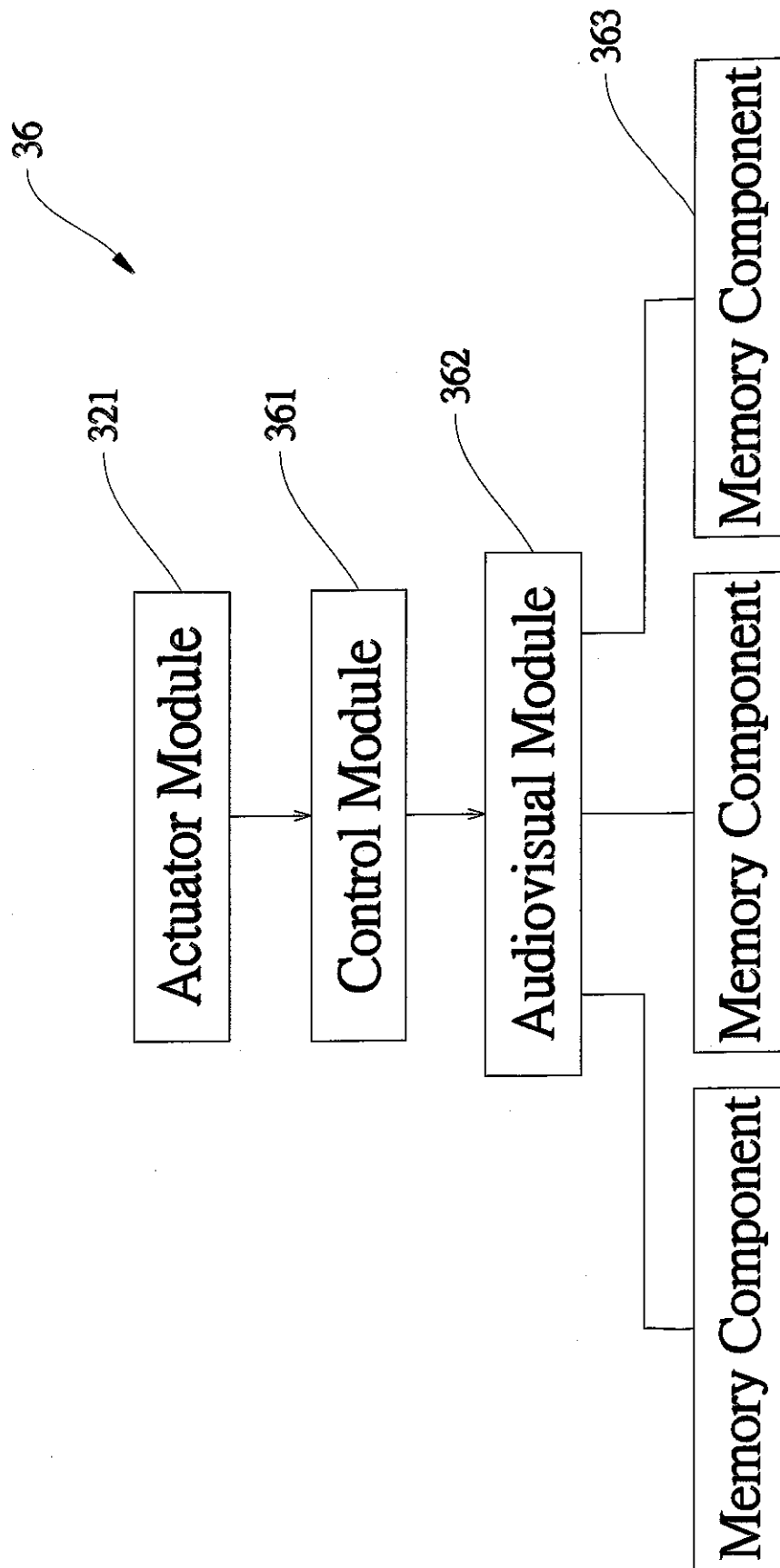


FIG. 4

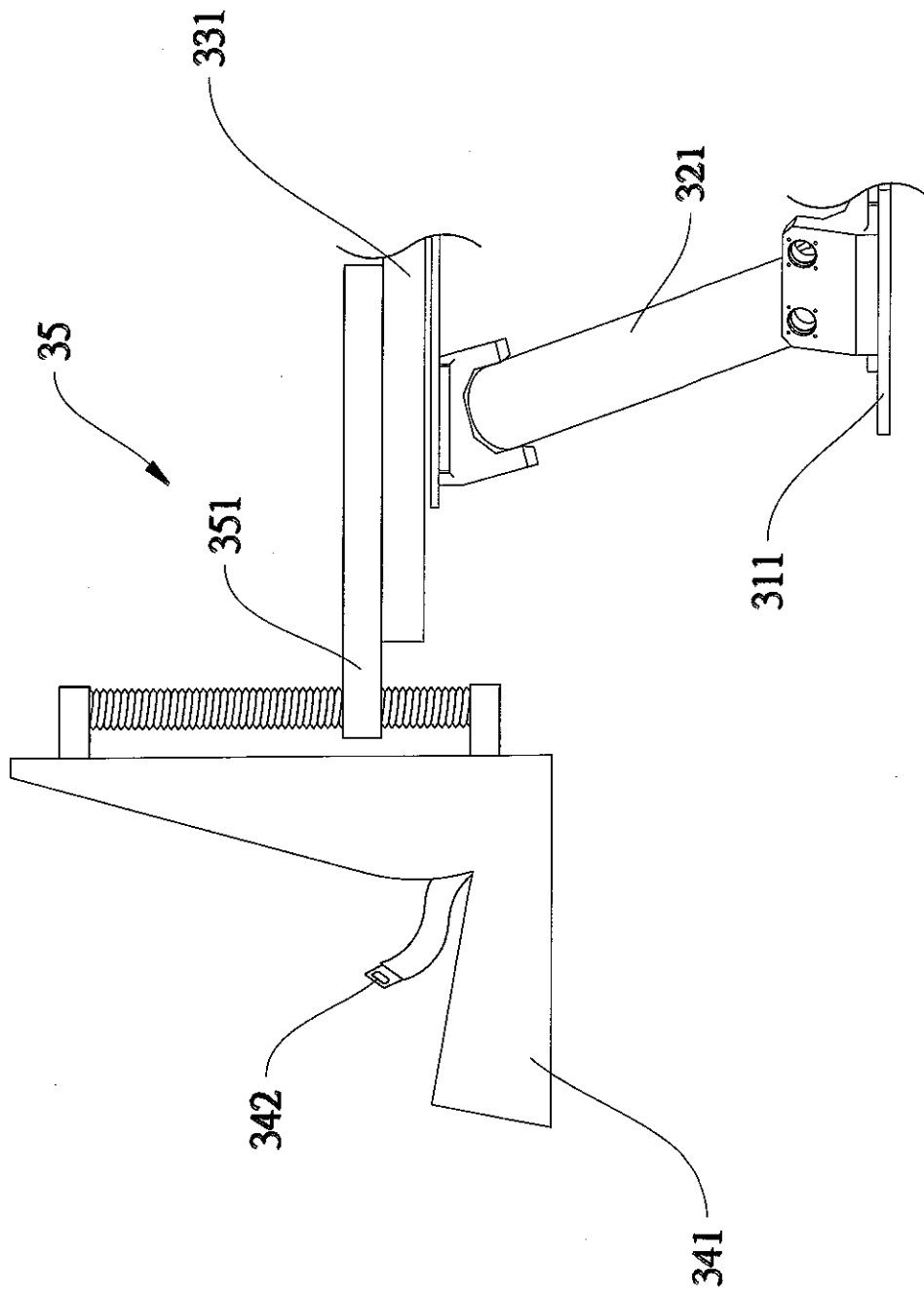


FIG. 5

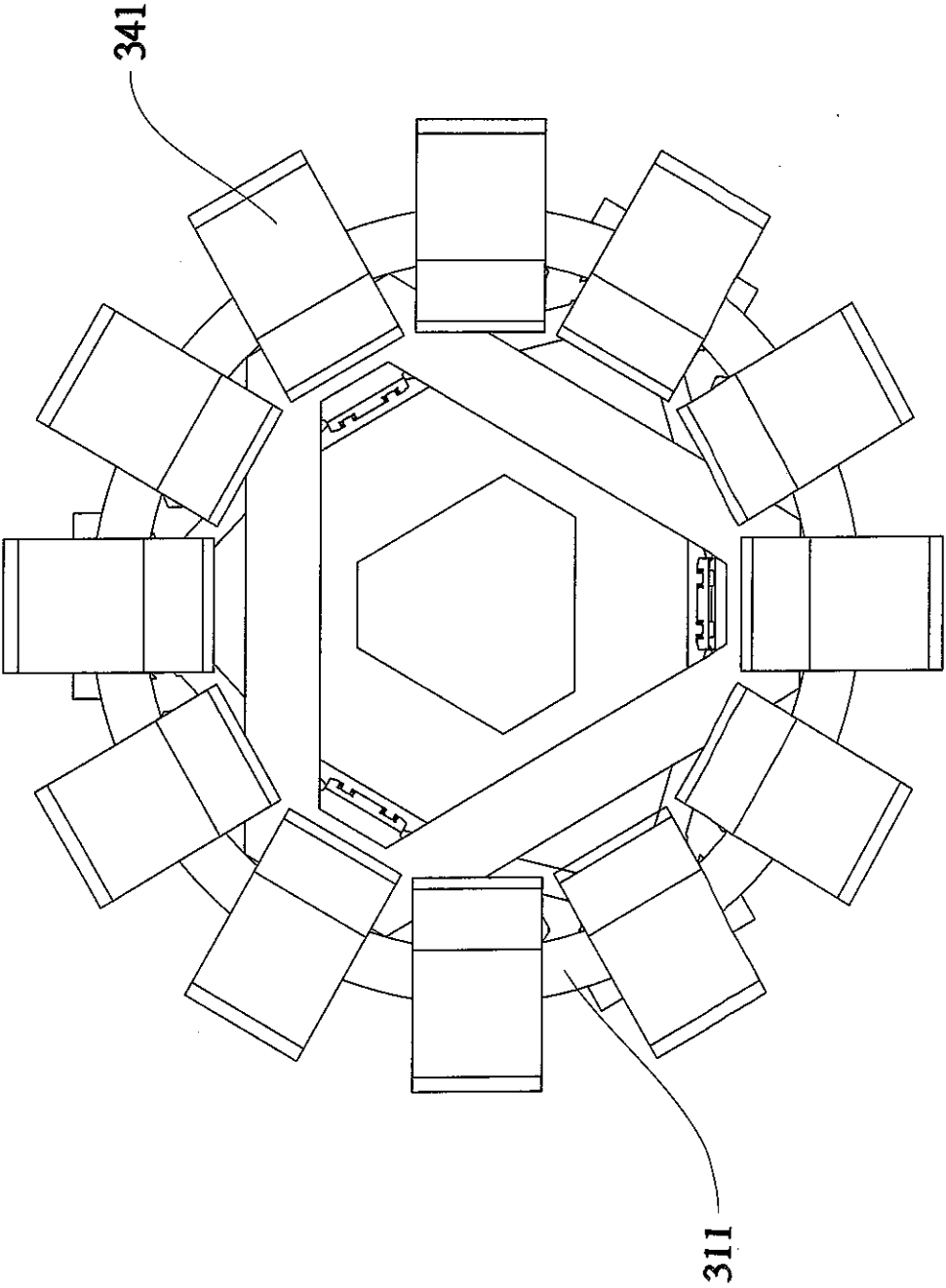


FIG. 6