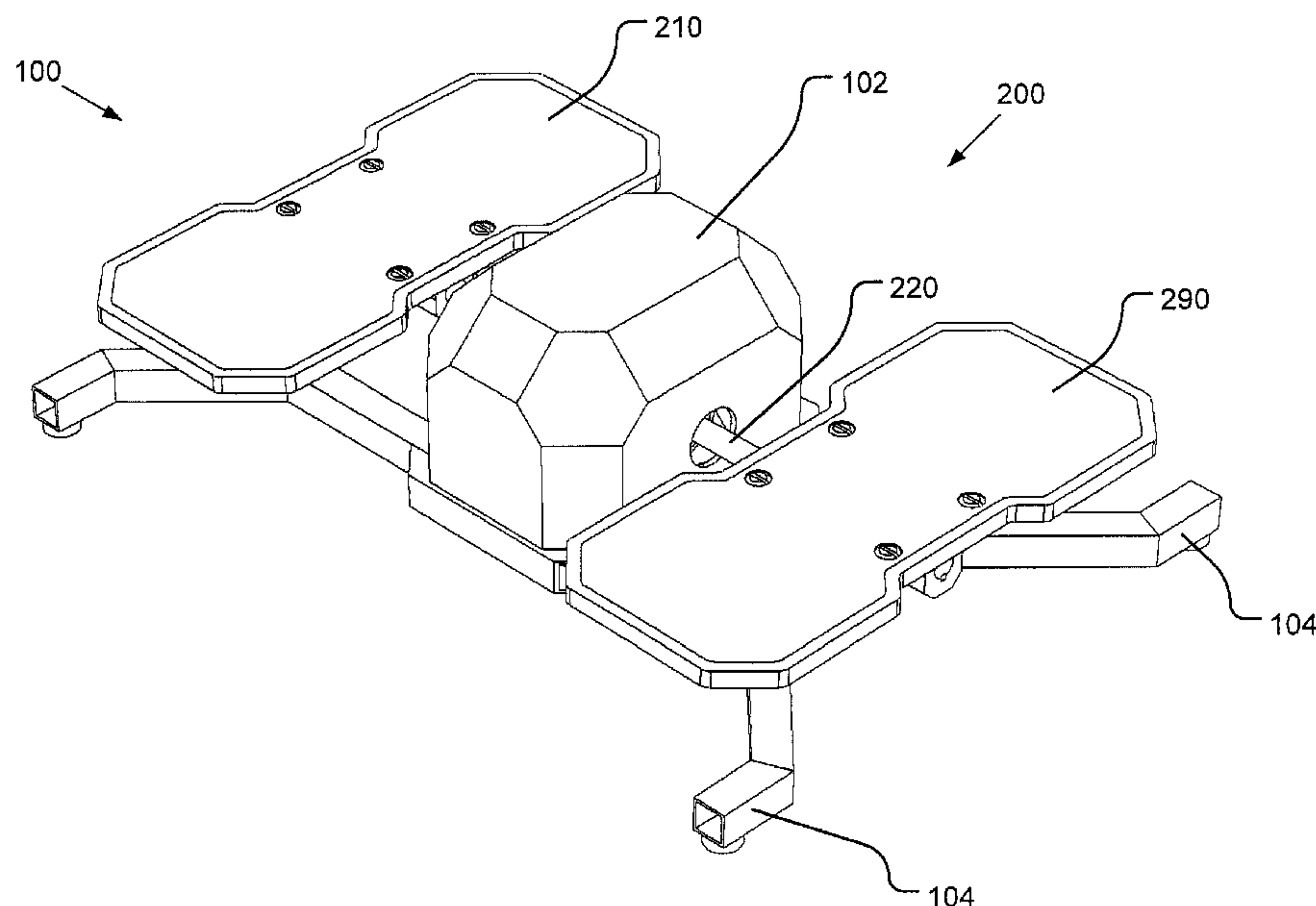




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(54) Titre : DISPOSITIF DE COMMANDE TRIAXIALE AU PIED
(54) Title: TRI-AXIS FOOT CONTROLLER



(57) **Abrégé/Abstract:**

A novel control device for a personal computer which is manipulated by a user's feet. The control device is manipulated by application of the appropriate pressure to the control device. At any one time, the control device may be manipulated such that the control device moves in three distinct directions: the device pivots forwards or backwards, rotates left or right, and dips to the left or to the right. For each movement in a distinct direction, the control device generates an input for a personal computer.



ABSTRACT

A novel control device for a personal computer which is manipulated by a user's feet. The control device is manipulated by application of the appropriate pressure to the control device. At any one time, the control device may be manipulated such that the control device moves in three distinct directions: the device pivots forwards or backwards, rotates left or right, and dips to the left or to the right. For each movement in a distinct direction, the control device generates an input for a personal computer.

TRI-AXIS FOOT CONTROLLER

Field of the Invention

The present invention relates generally to improvements in user interface control devices for personal computers and, more particularly, relates to a new and improved control device wherein a user can control a computer by manipulating foot pedals.

Background

A foot pedal is known as a conventional manipulating member which is operated by a user's foot. A foot pedal is operable in the push-in direction. A device, such as a personal computer, is designed or programmed to carry out a specified operation according to the detected push-in amount of the pedal. In the field of user interface devices for computer game applications, it has been a practice to employ foot pedals as input devices particularly for driving and flight control computer games.

A typical computer game will assign one or more different inputs to a corresponding action within the game. As computer games become more involved and complex, more inputs are required to control the actions within the game. Often players must rely on their keyboards and inconvenient or awkward key layouts to provide the necessary inputs. The repetitive nature of key inputs required by video games amplifies the discomfort experienced from using key layouts not adjusted for the hand ergonomics of an individual game player. Further, it is often not intuitive for a game player to press a key in order to effect game actions, for example, to rotate a virtual soldier surveying a battlefield or to cause a virtual plane to turn in flight.

The use of prior art foot devices has alleviated some of these problems. However, a drawback of the conventional foot pedal is the fact that the foot pedal has only one degree of freedom, namely in the push-in direction. This limits the number of inputs that the foot pedal can generate to control the actions of a computer game and a player using the foot pedal remains largely dependent on a computer keyboard or joystick.

There are foot control devices in the art which expand the functionality of conventional foot controllers. U.S. Patent No. 5,583,407 discloses a foot pedal which produces three inputs. The pedal generates input based on forward and backward movement in a horizontal plane, pivotal movement and rotational movement around a vertical axis.

U.S. Patent No. 5,552,807 discloses a foot pedal assembly with two pedals. The assembly generates three inputs for a computer based on independent pivoting of the pedals and the relative position of the pedals in a horizontal plane.

The above mentioned patents fail to provide an intuitive control interface for a user whereby the user can generate input for a computer by effecting roll, yaw and pitch rotation on a single device.

SUMMARY

To overcome the above problems, there is described herein a novel control device for a personal computer wherein the control device generates input for a personal computer based on manipulation of the control device. The control device, similarly to a computer joystick, can be moved with three degrees of freedom, i.e. the device pivots forwards or backwards (pitches), rotates left or right (yaws), and dips to the left or to the right (rolls). The control device is operable by a user's feet and can communicate with a personal computer or game console through a USB connection. Accordingly, the control

device may be used in conjunction with a keyboard and mouse without adversely affecting the use of the keyboard or mouse.

The control device is manipulated by application of the appropriate pressure to the control device. At any one time, the control device may be manipulated, as a feet-controlled joystick, such that the control device moves in three distinct directions: the control device pitches, rolls and yaws. For each movement in a distinct direction, the control device generates an input for a personal computer. In one embodiment of the invention, the control device comprises two pedals and the pedals are rotatable around one axis or simultaneously around two or three orthogonal axes.

The control device is capable of simultaneously generating three or more inputs for a personal computer. One or more personal computer functions may be assigned to each of the inputs generated by the control device. The function or functions may be configurable by software installed on the computer and selected based upon any criteria. Along these lines, functions may be assigned to optimize game play, productivity or convenience. The function or functions assigned to a particular input may be changed as desired.

In one embodiment of the invention, the control device comprises a pedal assembly with two pedals and three rotatable members, each member rotatable around an axis in a different dimension, i.e., the members rotate around axes in the x, y and z dimensions. The control device is manipulated when a user applies the appropriate pressure with his feet to the pedals of the pedal assembly. At any one time, the control device may be manipulated such that the pedals of the control device move in three distinct directions. For each movement in a distinct direction, one of the three rotatable members is caused to rotate. Detector means are positioned to detect rotation of the rotatable members. When the detector means detects rotation, it generates an electrical signal which the control device associates with a particular

input or inputs for a computer. The input or inputs are then communicated to a computer.

According to the present invention then, there is provided a control device actuated by a user's feet for use with a computer, wherein said control device is movable in one distinct rotational direction or simultaneously in two or three distinct rotational directions, said control device producing a respective signal for each movement of said control device in a distinct direction, and means responsive to each said respective signal to command the computer to execute one or more functions associated with that signal.

According to another aspect of the present invention then, there is also provided a control device for use with a computer comprising two pedals, said pedals being rotatable in concert around one axis or simultaneously around up to three orthogonal axes, and wherein said control device communicates an input or inputs to the computer based on said rotation of said pedals, the computer being responsive to said input or inputs to execute one or more functions correlating to said rotation.

Brief Description of the Drawings

Preferred embodiments of the present invention will now be described in greater detail and will be better understood when read in conjunction with the following drawings in which:

FIG. 1 is a perspective view of a control device according to an embodiment of the invention;

FIG. 2 is an enlarged perspective view of the pedal assembly of the control device of FIG. 1;

FIG. 3 is an enlarged perspective view of the pedal assembly and detector means of the control device of FIG. 1;

FIG. 4 is an enlarged perspective view of one of the detector means of FIG. 3;

FIG. 5 is a perspective view of the rotation limiter of the detector means of FIG. 4;

FIG. 6 is a partial cross-sectional view of the detector means of FIG. 4;

FIG. 7 is an enlarged perspective view of a detector means according to another embodiment of the invention;

FIG. 8 is a perspective view of the actuation collar of the detector means of FIG. 7;

FIG. 9 is a partial cross-sectional view of the detector means of FIG. 7;

FIG. 10 is a schematical view of the wiring of the control device of the present invention;

FIG. 11 is a perspective view of a control device having an integrated incline adjustment means according to another embodiment of the invention.

Detailed Description

With reference to FIGS. 1 and 2, the control device **100** of the present invention generally comprises a pedal assembly **200**. Pedal assembly comprises two foot pedals **210**, **290**; a base assembly comprising third housing **250** and base plate **270**; and three rotatable members comprising first shaft **220**, second shaft **230** and first housing **280**, and third shaft **260** and second housing **240**. The pedal assembly may

be partially enclosed by casing **102**. The pedal assembly may also be provided with support legs **104**.

First pedal **210** and second pedal **290** of pedal assembly **200** are fixedly attached proximate to opposite ends of first shaft **220**. First and second pedals are attached to first shaft **220** at their longitudinal midpoint. In alternate embodiments of the control device **100**, first and second pedals are adjustably attached to the first shaft so that their position along the length of first shaft can be adjusted to maximize the comfort of a user. Further, it will be appreciated that first and second pedals can include slippers or stirrups capable of accommodating the user's feet for a more positive engagement of the pedals. Proximate to its longitudinal midpoint, first shaft **220** is rotatably seated or journaled into first housing **280** such that pedals **210**, **290**, being on either side thereof, and the first shaft can rotate together relative to first housing **220** in both directions indicated by arrow A, such that the two pedals **210**, **290** are as if they were virtually on a same plate.

Second shaft **230** consists of first and second, non-contiguous segments. Both segments lie on the same vertical axis, which is perpendicular to the longitudinal axis of first shaft **220**. The first segment **231** of second shaft **230** extends upwardly from first housing **280** and the second segment (not shown) of second shaft extends downwardly from the first housing. Both segments are fixed attached to first housing **280** and are rotatably seated or journaled in or through the respective upper and lower surfaces of second housing **240**. Accordingly, first housing **280** and both segments of second shaft **230** rotate together relative to second housing **240** in both directions indicated by arrow B.

Third shaft **260** is structurally similar to second shaft **230**. Third shaft **260** consists of first non-contiguous segment **261** and second non-contiguous segment (not shown). Both segments lie on the same horizontal axis, which is perpendicular to the axes of first shaft **220** and second shaft **230**. First segment **261** of the third shaft extends

from one side of second housing **240** and second segment of third shaft **260** extends from the opposite side of the second housing. Both segments are fixedly attached to second housing **240** and are rotatably seated in or journaled through the respective end surfaces of third housing **250** so that the second housing and third shaft **260** rotate together relative to third housing **250** in both directions indicated by arrow C. The base or supporting part of the pedal assembly comprises base plate **270** and third housing **250**. Third housing **250** is fixedly attached to base plate **270** and these two components remain stationary during the manipulation of the pedal assembly **200**.

Applying, rather intuitively, the appropriate pressure to the pedals **210**, **290** can effect rotation of each of the shafts **220**, **230**, **260** around their longitudinal axes, individually or in concert. Applying downward pressure to the front or rear half of a/both pedal(s) causes the pedals to pivot and first shaft **220** to rotate for pitch control. Pushing one pedal forward or backward in a plane parallel to base plate **270**, and the other in the opposite direction in the same plane, causes second shaft **230** to rotate for yaw control. Applying downward pressure evenly to the length of one pedal, while retaining (for control) the even upward movement of the other pedal, causes third shaft **260** to rotate for roll control.

Pedal assembly **200** is equipped with detector means **300** operable to detect rotation of each of the shafts as will now be described. The examples of detector means described below are not meant to limit the control device **100**, and any detector means operable to detect rotation of each of the shafts could replace the below examples.

With reference to FIGS. 3 to 9, in one embodiment of the control device **100**, each shaft of pedal assembly **200** may be equipped with its own detector means **300** for detecting movement of each shaft. Each detector means **300** comprises a bottom plate **330**, a top plate **380**, a rotation limiter **370** (FIG. 5), an actuation collar **360**, and two tension springs, bottom tension spring **390**, and top tension spring **392** seen most

easily in FIG. 5. Best shown in FIG. 5, the bottom plate **330** has rotation stops **332**, **334**, spring attachment means **336**, and an orthogonally extending flange **338**.

The rotation limiter **370** comprises a circular disk having a central shaft-receiving channel or aperture **371** and four stop channels or apertures **376** extending therethrough, and spring attachment means **372**, **374**.

With reference to FIG. 4, actuation collar **360** comprises an actuation arm **368** or a light emitting diode ("LED") **369** (FIG. 8), and a collar flange **361** having rotation stops **362**, **364** (FIG. 6) and spring attachment means **366** extending from the lower surface of the collar flange.

Top plate **380** support sensor means **310** (FIG. 3) for detecting movement. Various sensor means **310** can be used, for example, optical sensors, mechanical switches, potentiometer or resistance sensors, speed transducers and accelerometers, strain gauges and linear displacement sensors.

In FIG. 3, detector means **300** are associated with first shaft **220** as follows. Bottom plate **330** is fixedly attached to an interior or exterior vertical surface of first housing **280** so that first shaft **220**, which extends through the first housing, also extends through a circular hole (not shown) in the centre of the bottom plate.

Best shown in FIG. 5, rotation limiter **370** is positioned adjacent bottom plate **330** such that rotation stops **332**, **334** are received in two of the stop channels **376** and aperture **371** is aligned with the circular hole in the bottom plate to receive first shaft **220** therethrough. Bottom tension spring **390** is attached at one end to spring attachment means **336** of the bottom plate and at the other end to spring attachment means **372** of the rotation limiter.

Best shown in FIG. 6, actuation collar **360** is fixedly attached, such as by means of a spline **365**, to first shaft **220** adjacent the rotation limiter **370** such that rotation stops **362** and **364** are received in stop channels **376**. Actuation arm **368** extends from one side of the collar. Top tension spring **392** is attached at one end to spring attachment means **366** of the actuation collar and at the other end to spring attachment means **374** of the rotation limiter.

With reference to FIG. 4, the top plate **380** is fixedly attached to flange **338** of bottom plate **330** such as by means of threaded fasteners as shown. The sensor means **310** of the top plate comprise opposing switches, a counterclockwise switch **326** and a clockwise switch **320**. The top plate positions the opposing switches on either side of actuation arm **368**. Switches **320**, **326** may comprise mechanical switches or optical switches. In the embodiment shown in FIG. 4, the switches are mechanical switches each comprising a bias arm **321** having a roller **322**, a switch contact **323**, and wiring brackets **324**. The bias arms **321** bias the rollers **322** against the actuation arm **368**. Switches **320** and **326** are connected to the top plate **380** such as by means of threaded fasteners **327**.

In an alternate embodiment, bottom plate **330** can be eliminated, using instead a surface of the first housing **280** to perform the function of the bottom plate.

The operation of detector means **300** will now be described with reference to FIGS. 3 to 6. Tension springs **390**, **392** act as a neutral stop, resisting rotation of actuation collar **360** in either direction around the longitudinal axis of first shaft **220**. In other words, tension springs **390**, **392** bias actuation collar **360** and first shaft **220**, which is fixedly attached to the collar, into a neutral default or resting orientation. In this position, rotation stops **332**, **334**, **362**, **364** are each at the clockwise end of their respective stop channels **376**. When a rotational force sufficient to stretch one of the tension springs **390**, **392** is applied to first shaft **220**, the shaft rotates.

When the first shaft is rotated counterclockwise, the actuation collar **360** also rotates and the top tension spring **392** is stretched. The rotation stops **332**, **334** of the bottom plate keep the rotation limiter **370** stationary while the collar rotates.

The actuation collar can continue to rotate in a counterclockwise direction until the rotation stops **362**, **364** come into contact with the counterclockwise end of their respective stop channels **376** which prevents further rotation. When rotation stops **362**, **364** contact the counterclockwise end of their respective stop channels **376**, simultaneously, the actuation arm **368** pushes against counterclockwise switch **326** as follows. The actuation arm pushes the bias roller **322** and bias arm **321** of counterclockwise switch against switch contact **323**, activating the counterclockwise switch. Actuation collar **360** will remain in this position, keeping the switch active, as long as a rotational force continues to be applied to first shaft **220**. When the force is removed, the actuation collar, in effect, springs back. The top tension spring **392** rotates the actuation collar clockwise, moving the actuation arm away from the activated switch, which then opens or deactivates. Actuation collar **360** rotates back into its default position.

When the first shaft is rotated clockwise from its default position, the actuation collar **360** also rotates. The rotation stops **362**, **364** of the actuation collar, at the clockwise end of their respective stop channels **376**, push the rotation limiter **370** in a clockwise rotation. As the rotation limiter rotates, the bottom tension spring **390** is stretched. The actuation collar can continue to rotate in a clockwise direction, along with the rotation limiter **370**, until the rotation stops **332**, **334** of the base plate come into contact with the counterclockwise end of their respective stop channels **376** which prevents further rotation. When the rotation stops **332**, **334** contact the counterclockwise end of their respective stop channels **376**, simultaneously, the actuation arm **368** pushes against the clockwise switch **320**, activating the switch. Actuation collar **360** will remain in this position, keeping the switch active, as long as

a rotational force continues to be applied to first shaft **220**. When the force is removed, the bottom tension spring **390** rotates the actuation collar counterclockwise, moving the actuation arm away from the activated switch, which then opens or deactivates. Actuation collar **360** rotates back into its default position.

When either switch **320**, **326** of pedal assembly **200** is activated, control device **100** communicates an input signal to a personal computer. With reference to FIG. 10, in one embodiment of the control device **100**, each shaft **220**, **230**, **260** is associated with its own pair of switches **320**, **326**, for a total of six switches in pedal assembly **200**. When one of the switches is activated, the switch generates an electric signal which is transmitted to a USB keyboard controller chip **420** via one of dedicated wires **410**. USB keyboard controller chip **420** may be connected to the personal computer using a USB Type-A plug **430**. In the present embodiment, controller chip **420** associates electrical signals received from each of dedicated wires **410** with particular keyboard commands. When controller chip **420** receives a signal, it communicates the associated keyboard command in an input signal to the computer. For example, when clockwise switch **320** of first shaft **220** is activated, an electric signal is generated and received by controller chip **420** and the controller chip tells the connected computer to execute a w-key command. In other words, the computer is made to behave as if the w-key of the computer's keyboard had been pressed.

In another embodiment of control device **100**, the sensor means **310** of the top plate **380** comprise an optical sensor **312**. With reference to FIGS. 7 to 9, in this embodiment the actuation arm **368** of actuation collar **360** is replaced with an LED **369**. The LED **369** is connected to a power source (not shown). The optical sensor **312** comprises a LED position sensor **313**. The top plate positions the optical sensor **312** above the LED **369** such that light emitted by the LED will be received by the LED position sensor **313**.

The operation of detector means **300** wherein the sensor means **310** comprise an optical sensor **312** will now be described with reference to FIGS. 7 to 9. When the first shaft is rotated counterclockwise or clockwise, the actuation collar **360** also rotates. Rotation limiter **370** and tension springs **390**, **392** operate as described above with respect to the embodiment of control device **100** shown in FIGS. 4 to 6. The LED **369** rotates with the actuation collar and continuously emits a light beam parallel to the first shaft **220**. The LED position sensor **313**, which is stationary relative to the LED **369**, receives the light emitted by the LED. The LED position sensor **313** generates an electrical signal based on the part of the sensor that receives the light. This electrical signal is transmitted to a sensor controller chip (not shown) via sensor circuitry **314**. The sensor controller chip may be connected to a personal computer using a USB Type-A plug. In the present embodiment of the control device **100**, the sensor controller chip determines progressive movement of the first shaft **220**, counterclockwise or clockwise, based on changes in the electrical signals received over time. The sensor controller chip communicates information regarding the progressive movement of the first shaft in an input signal to the personal computer, wherein a software driver may associate different computer commands with different movements of the first shaft, according to a user's preference.

Those skilled in art will appreciate that rotation limiter **370** may comprise other mechanisms not explicitly shown in FIGS. 3 to 9. The rotation limiter **370** may, for example, be eliminated by incorporating elements of the rotation limiter into the actuation collar and the base plate. Other examples will be apparent to those skilled in the art.

Those skilled in art will appreciate that detector means **300** may comprise other mechanisms not explicitly shown in FIGS. 3 to 9. Detector means **300** may, for example, comprise a single optical sensor adapted to detect the movement of each

of the shafts **220**, **230**, **260**. Other examples will be apparent to those skilled in the art.

Those skilled in art will further appreciate that the three rotatable members of control device **100** may be replaced with other mechanisms, not explicitly described, which enable the control device to move in three distinct directions. The rotatable members may, for example, be replaced with a ball and socket system, equipped with detector means **300** adapted to detect the movement of the ball and socket. The detector means may, for example, comprise a single optical sensor. Other examples will be apparent to those skilled in the art.

In another embodiment of the control device **100**, pedal assembly **200** may have an associated means **500** to adjust the assembly's incline relative to the user's feet. With reference to FIG. 11, the incline adjustor **500** comprises a pedestal **510**, a hinge **520** and adjustable lifting means such as a threaded rod **530**. One side of base plate **270** is pivotably attached by means of hinge **520** to pedestal **510**, so that the base plate can pivot up and down. Threaded rod **530** is journaled through a flange **532** attached to an outer surface of housing **250** for example so that the rod's lower end bears against pedestal **510**. The rod includes a knob **534** that can be turned in one direction to increase the tilt of the pedal assembly towards the user and in the other direction to tilt it away from the user into a more horizontal position. The incline of the pedal assembly may be adjusted to provide maximum comfort to a user of pedal assembly **200**.

In alternate embodiments of the control device, other incline adjusters can be used, such as an adjustable wedge or even a motorized lift.

A description of the operation of control device **100** according to the embodiment described in FIGS. 1 to 6 follows. A user of the control device connects the control device to a personal computer or game console using a USB connection. Next, the

user sits down and places his/her feet on pedals **210**, **290** of pedal assembly **200**. The pedals are initially in their neutral or resting positions. By applying force to the pedals, the user can move the pedals, which move in concert, with three degrees of freedom. For each degree of freedom, the pedal assembly generates an input signal for the personal computer.

With regard to the first degree of freedom, pitch, both pedals can be pivoted simultaneously forwards or simultaneously backwards. The user applies downward pressure with the balls or toes of the feet to effect forward pivoting of the pedals. Similarly, a user applies downward pressure with the heels of the feet to effect a backward pivot. When the pedals pivot forwards or backwards, they rotate (or pitch) around the horizontal axis of shaft **220**.

The user pivots the pedals forwards or backwards a predetermined distance until the pedals stop. This coincides with the activation of one of switches **320** or **326** so that the control device commands the connected computer to execute a function or functions associated with either a forward or backward pivot, as the case may be. When the user ceases to apply pressure to the pedals, the pedals return to their neutral position. The pedals, in effect, spring back to their neutral position.

With regard to the second degree of freedom, yaw, one pedal can be moved forward and the other pedal moved backward simultaneously. To effect this movement, the user pushes one foot forwards and/or pulls the other foot backwards. When a pedal is moved forward or backward, it rotates (or yaws) a short distance around the vertical axis of shaft **230**.

The user pivots the pedals forwards or/ or backwards a predetermined distance until the pedals stop and the control device commands the connected computer to execute a function or functions associated with either left pedal forward (right pedal backward) or right pedal forward (left pedal backward), as the case may be. When

the user ceases to apply pressure to the pedals, the pedals return to their neutral position.

With regard to the third degree of freedom, roll, one pedal can be depressed and the other pedal raised simultaneously. To effect this movement, the user applies downward pressure to one pedal, distributing pressure evenly to the length of the pedal, and allows the other pedal to rise. When a pedal is depressed or raised, it rotates (or rolls) a short distance around the horizontal axis of shaft 260.

The user depresses one of the pedals a predetermined distance until the pedals stop and the control device commands the connected computer to execute a function or functions associated with either a left pedal depression or a right pedal depression, as the case may be. When the user ceases to apply pressure to the pedal, the pedals return to their neutral position.

Although a few embodiments of the present invention have been shown and described, it will be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the invention, the scope of which is defined in the claims and their equivalents.

CLAIMS

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A control device actuatable by a user's feet for use with a computer, the control device comprising:

a stationary base assembly;

three rotatable members comprising:

a first rotatable member mounted on the top of said base assembly and rotatable about a first axis;

a second rotatable member mounted on said first rotatable member and rotatable about a second axis perpendicular to said first axis;

a third rotatable member mounted on said second rotatable member and rotatable about a third axis perpendicular to said first and second axes, said third rotatable member having a shaft member substantially parallel to the third axis and mounted on said second rotatable member, said third rotatable member having two pedals fixedly attached to said shaft member wherein said two pedals virtually form a plate; and

detector means operable to detect respective rotation of said three rotatable members, and communicating an input or inputs to the computer based on the detected respective rotation, the computer being responsive to said input or inputs to execute one or more functions correlating to said respective rotation.

2. The control device of claim 1 wherein said detector means comprise spring means to bias said three rotatable members in respective default positions.

3. The control device of claim 2 wherein said detector means comprise switch means arranged to detect a predetermined amount of clockwise or

counterclockwise rotation of said three rotatable member relative to said respective default positions and operable to transmit a signal when rotation is detected.

4. The control device of claim 3 wherein said switch means comprise:
a first switch means arranged to detect rotation of said first rotatable member;
a second switch means arranged to detect rotation of said second rotatable member; and
a third switch means arranged to detect rotation of said third rotatable member.
5. The control device of claim 4 wherein said switch means are optical switches or mechanical switches.
6. The control device of claim 2 wherein said detector means comprise an optical sensor arranged to detect rotation of said three rotatable members and operable to transmit a signal when rotation is detected.
7. The control device of claim 2 wherein said detector means comprise:
a first optical sensor arranged to detect rotation of said first rotatable member;
a second optical sensor arranged to detect rotation of said second rotatable member; and
a third optical sensor arranged to detect rotation of said third rotatable member;
wherein said optical sensors are operable to transmit a signal when rotation is detected.
8. The control device of any one of claims 3 to 7 further comprising a USB keyboard control chip, said control chip operable to receive said signal, match

said signal to said one or more functions, and communicate to the computer through a USB connection said one or more functions in said input or inputs.

9. The control device of claim 6 or 7 further comprising a control chip, said control chip operable to receive said signal, determine progressive movement of said three rotatable members based on said signal, and communicate said progressive movement to the computer in said input or inputs.

10. The control device of claim 9 wherein the computer comprises a software driver for matching said input or inputs to said one or more functions.

11. The control device of any one of claims 1 to 10 wherein said one or more functions are configurable.

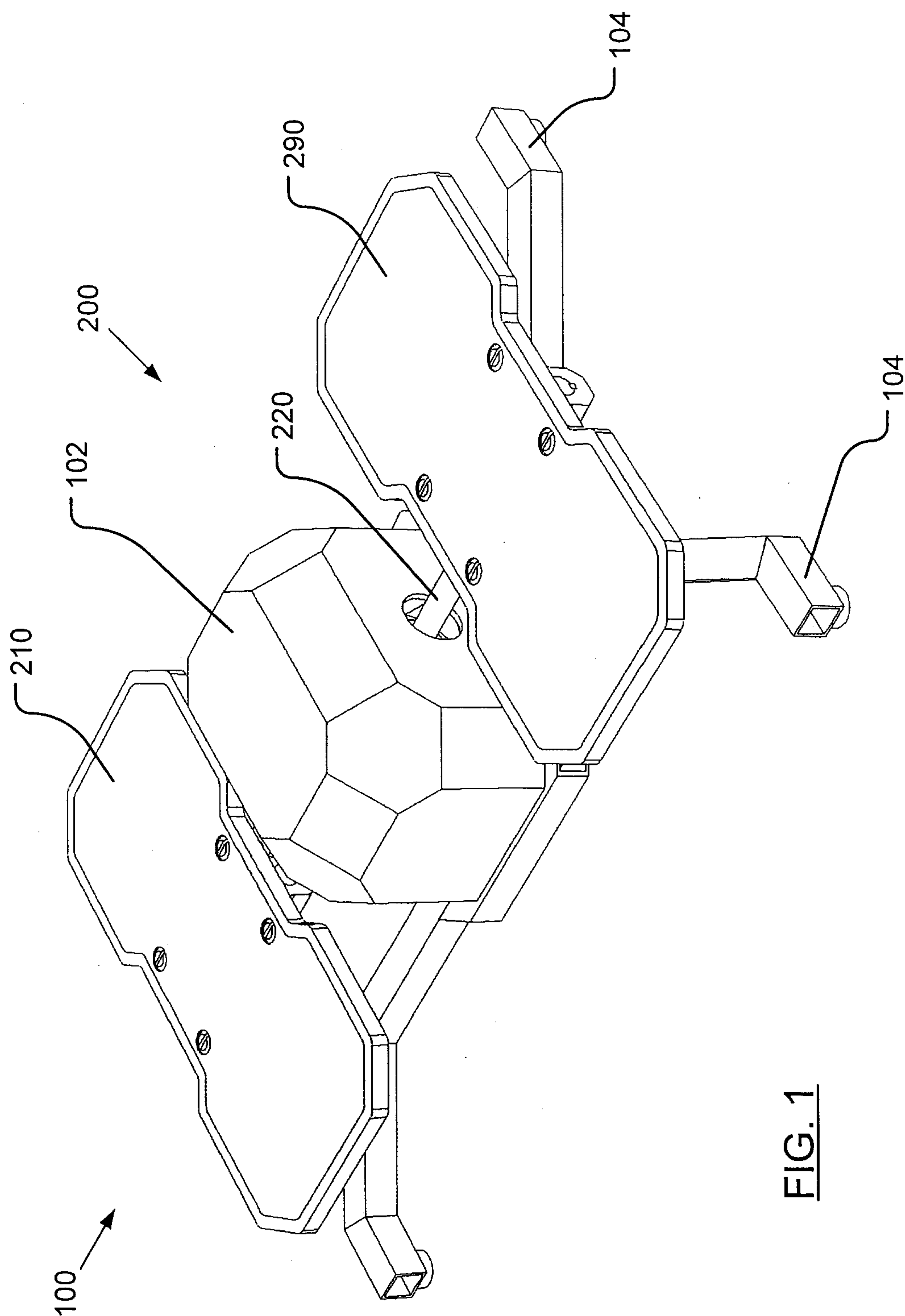
12. The control device of any one of claims 1 to 11 wherein said pedals include foot receiving members mounted on the top of said pedals.

13. The control device of any one of claims 1 to 12 wherein said base assembly comprises an incline adjustment means.

14. The control device of claim 1 wherein each said pedal is fixedly attached to the shaft member, substantially at a longitudinal midpoint of the pedal.

15. The control device of any one of claims 1 to 12 and 14 wherein each said pedal includes an incline adjustment means.

16. The control device of any one of claims 1 to 15 wherein said two pedals are mounted on said shaft member on either side of said second rotatable member.

FIG. 1

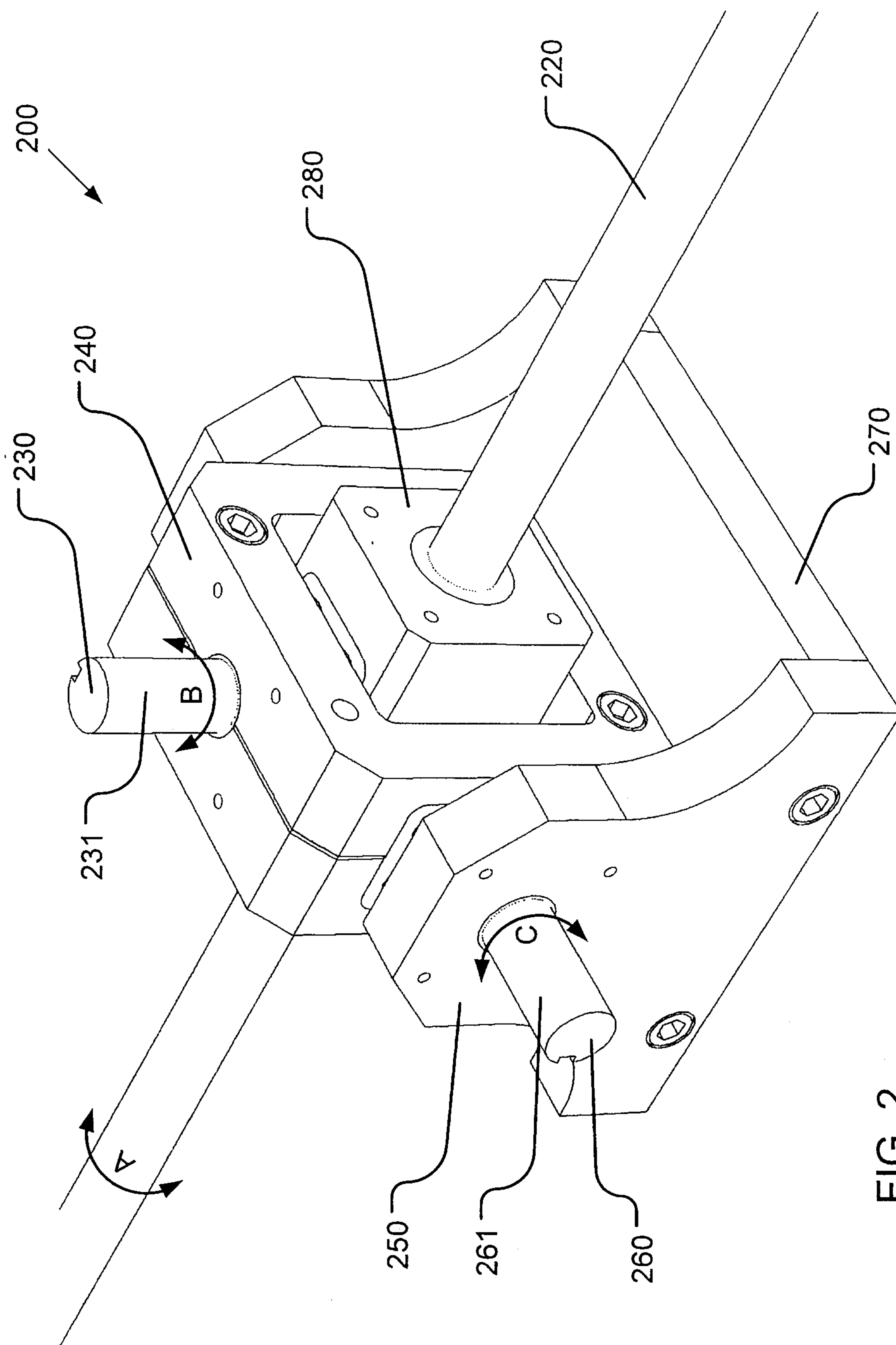


FIG. 2

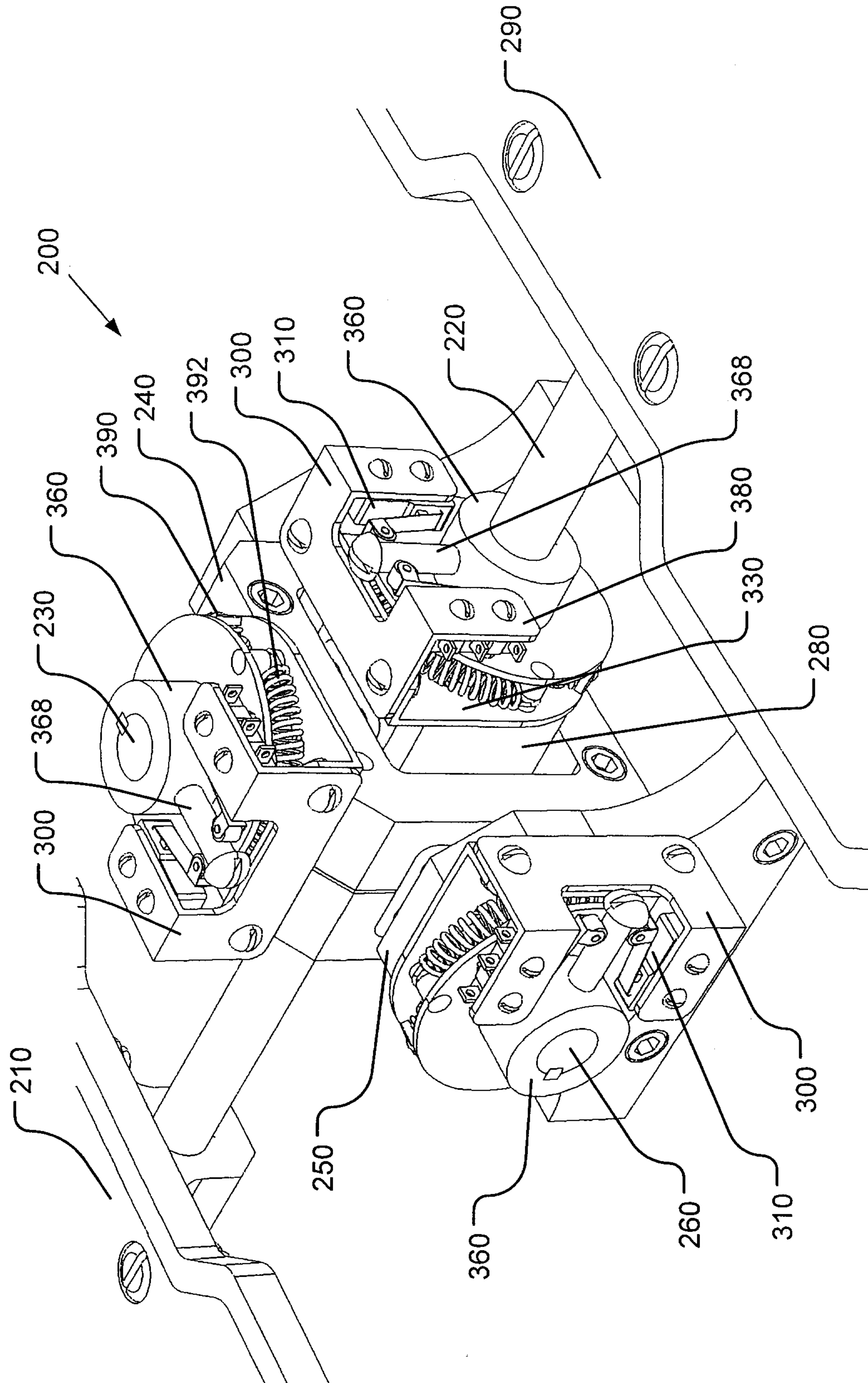


FIG. 3

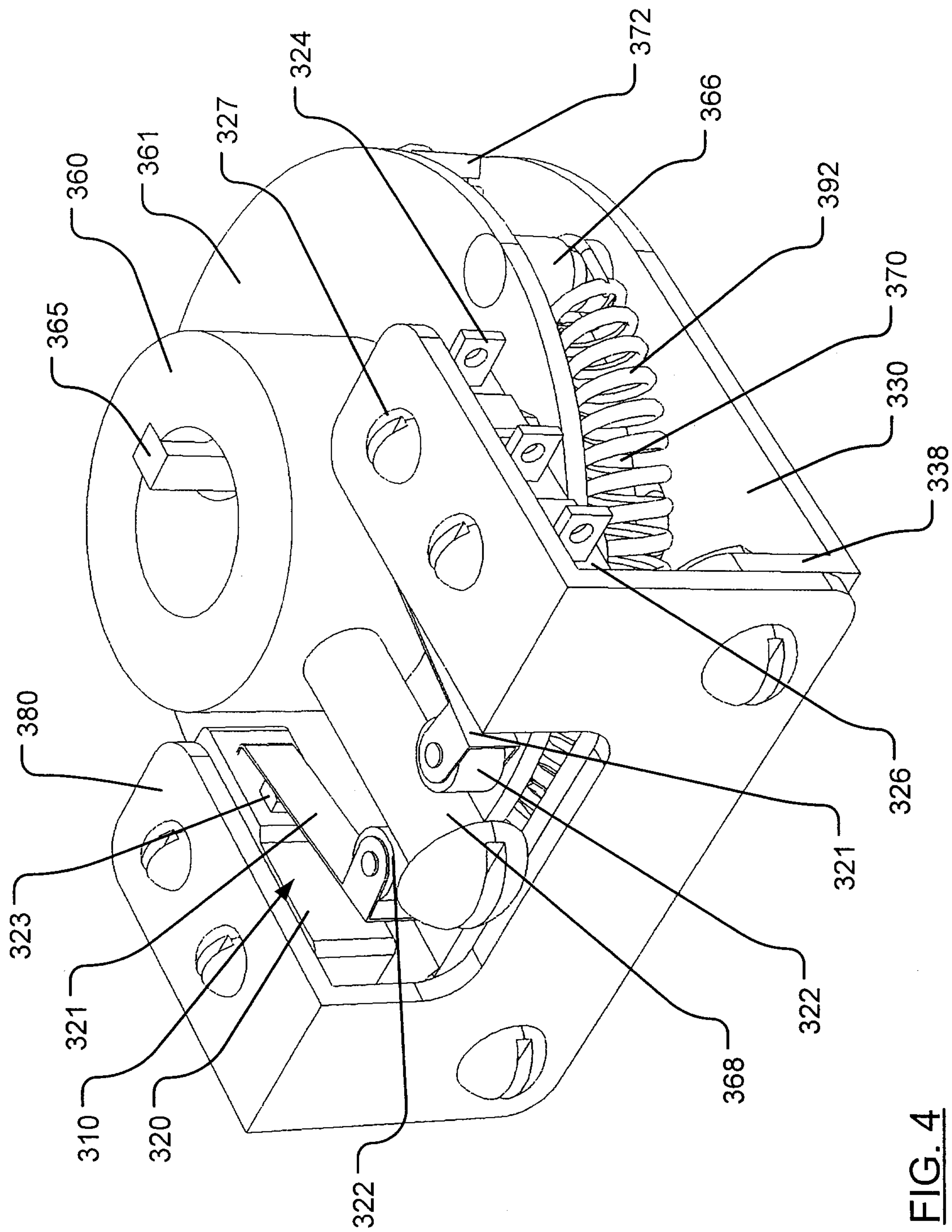
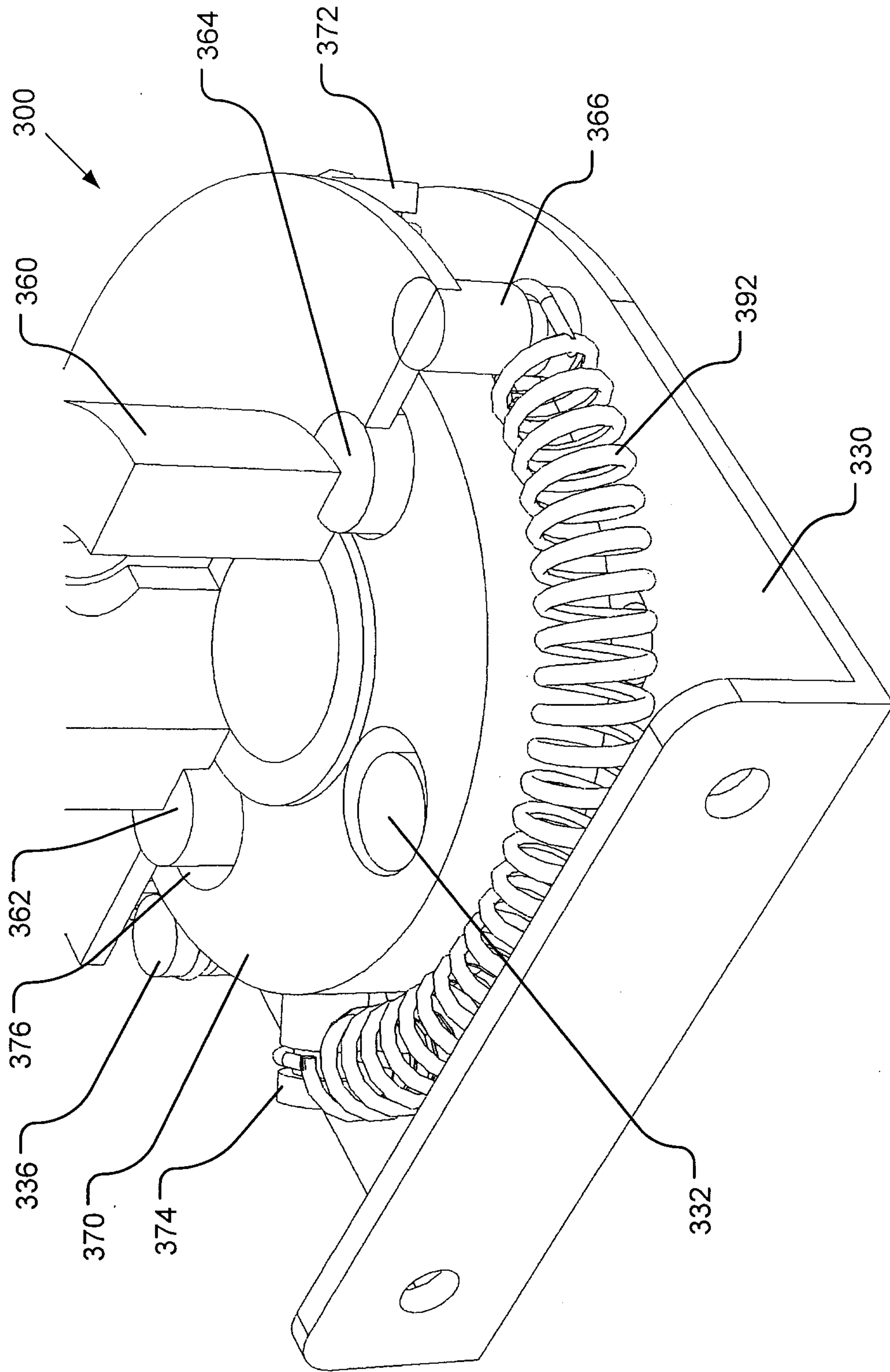
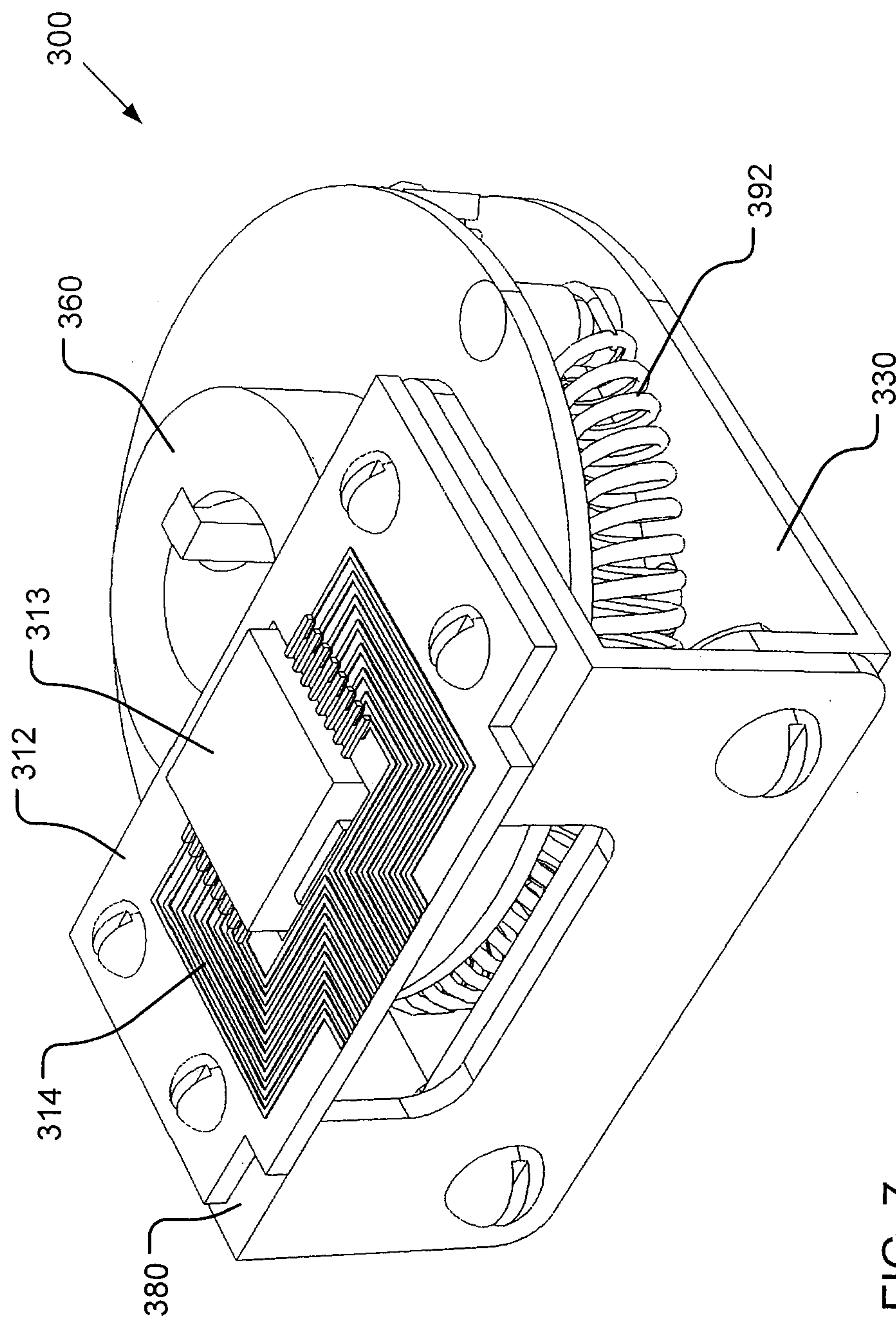
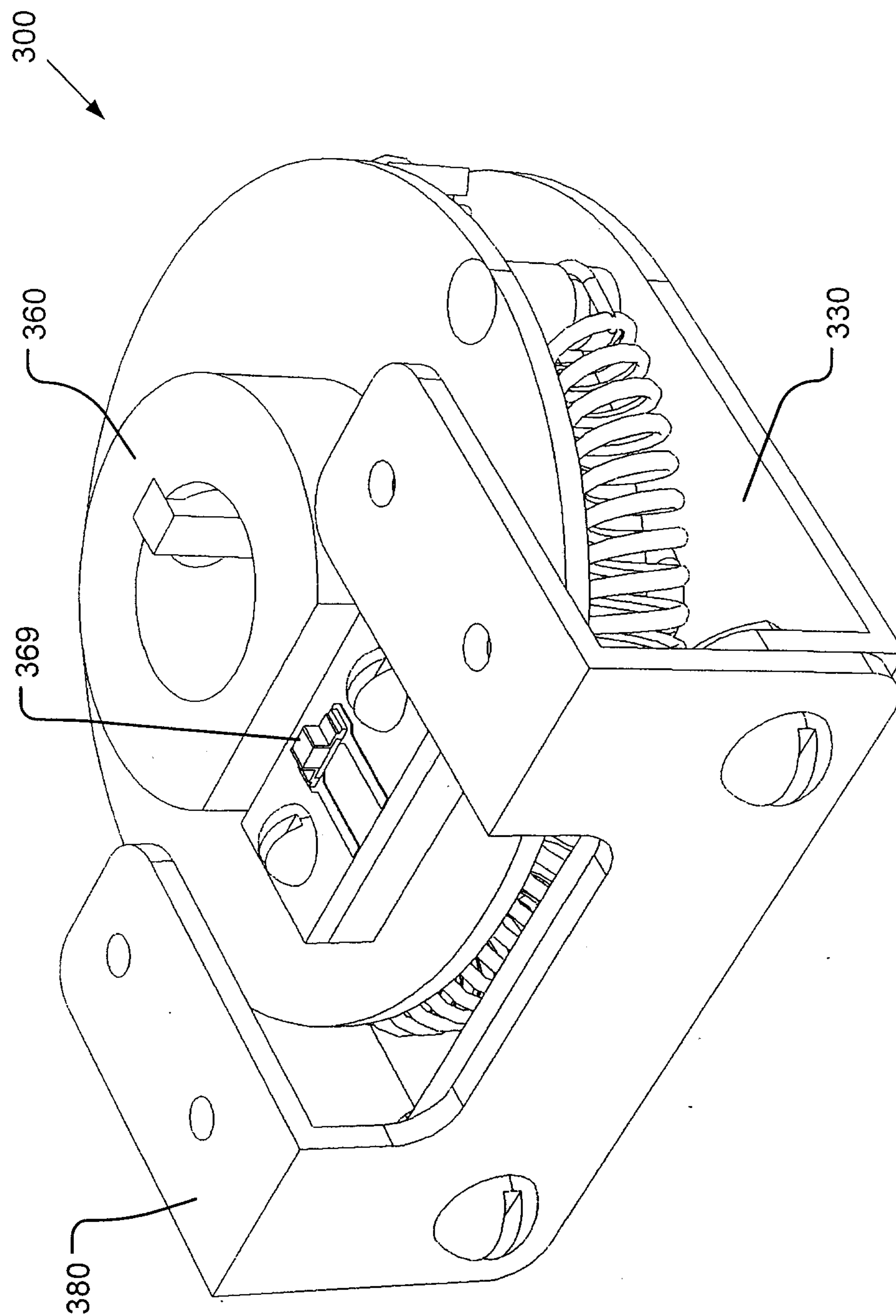
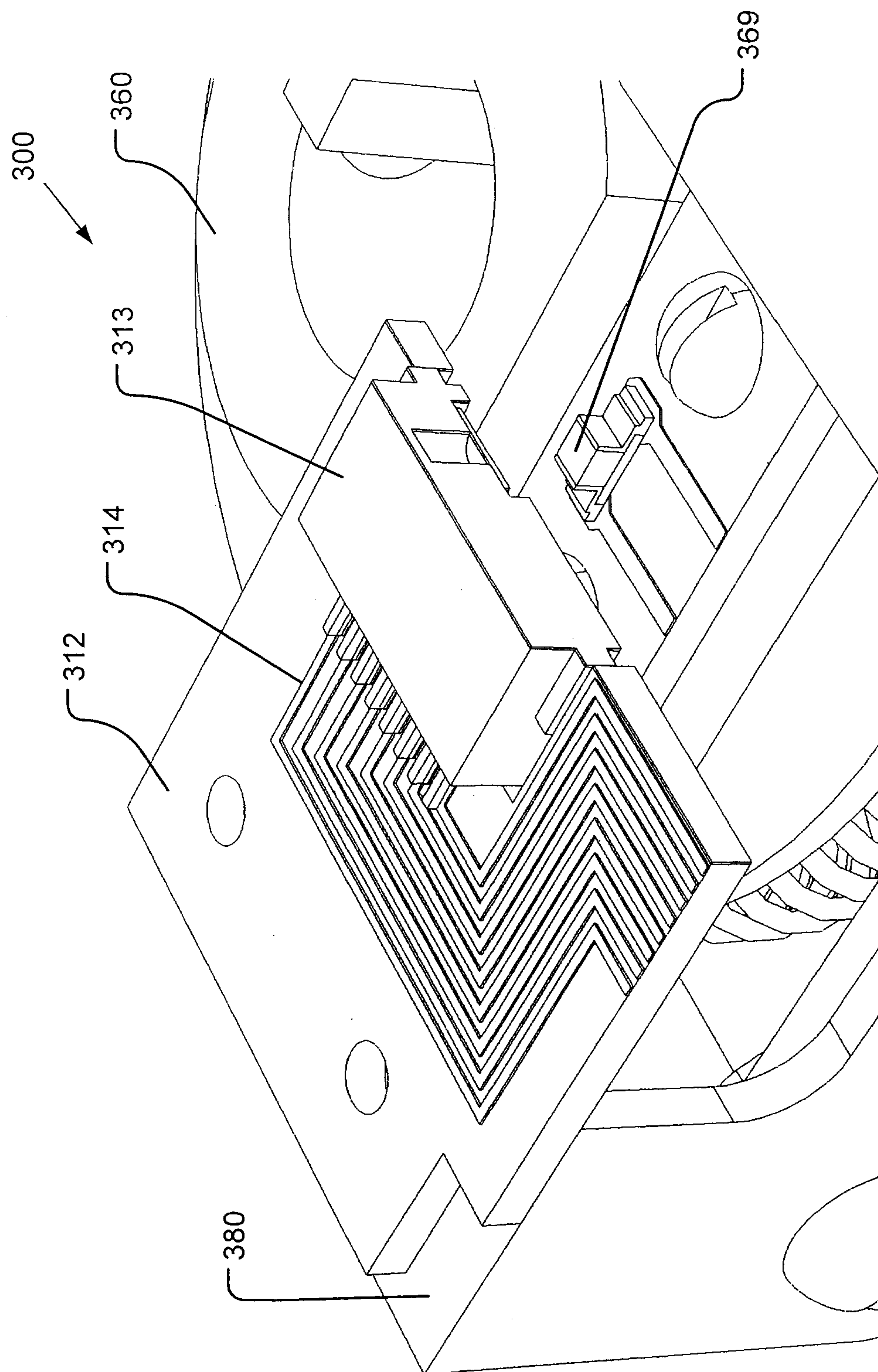


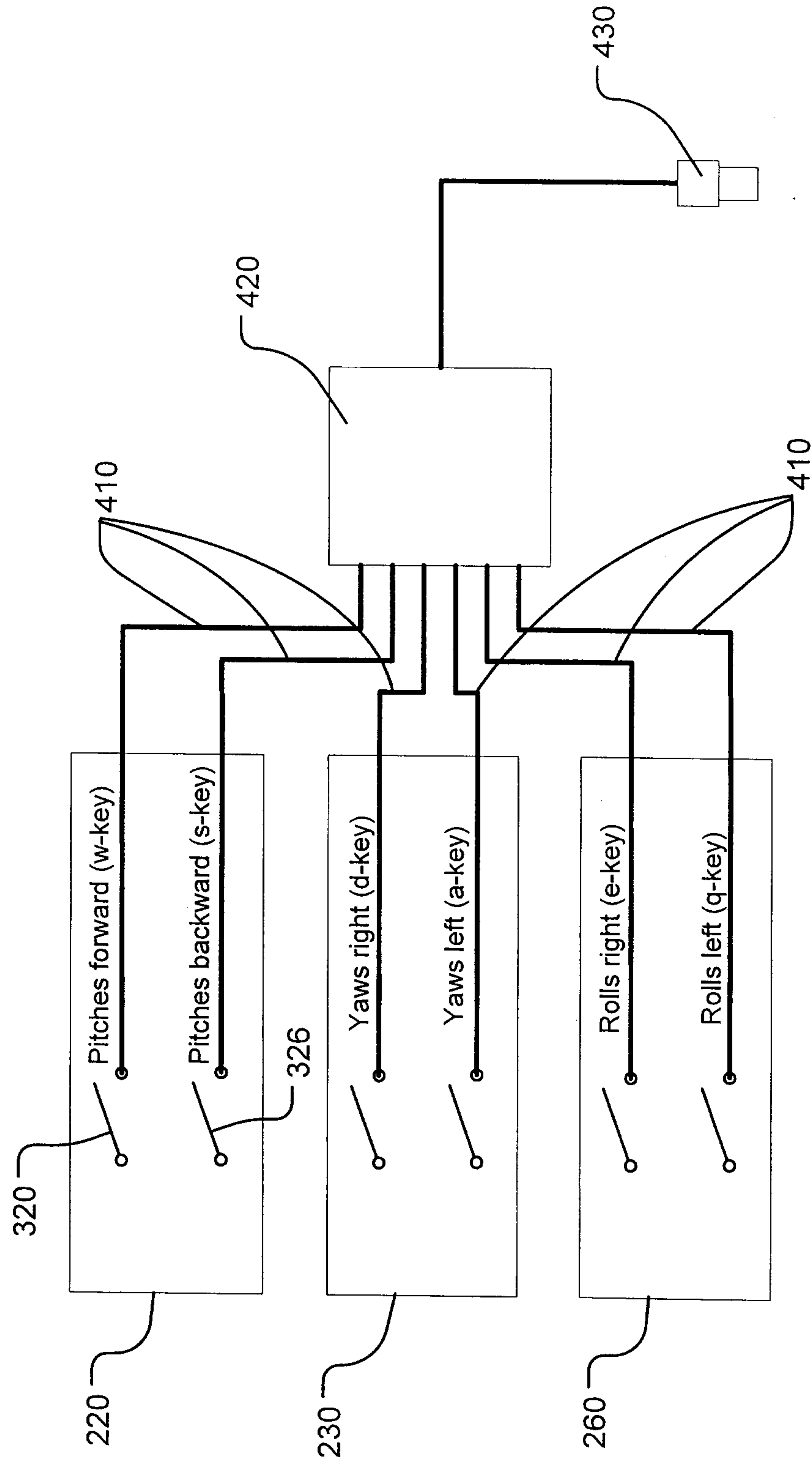
FIG. 4

**FIG. 6**

FIG. 7

FIG. 8

**FIG. 9**

FIG. 10

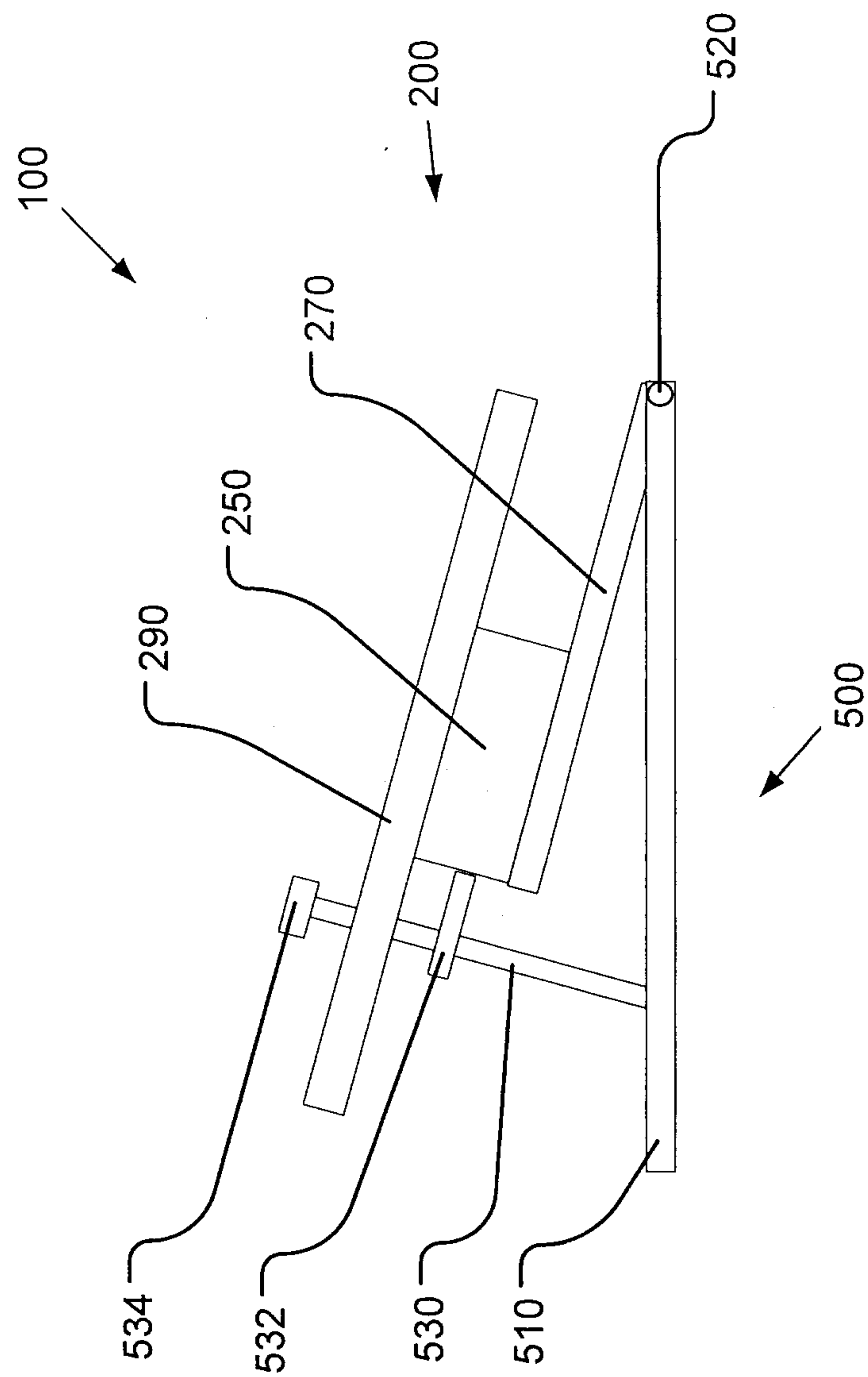


FIG. 11

