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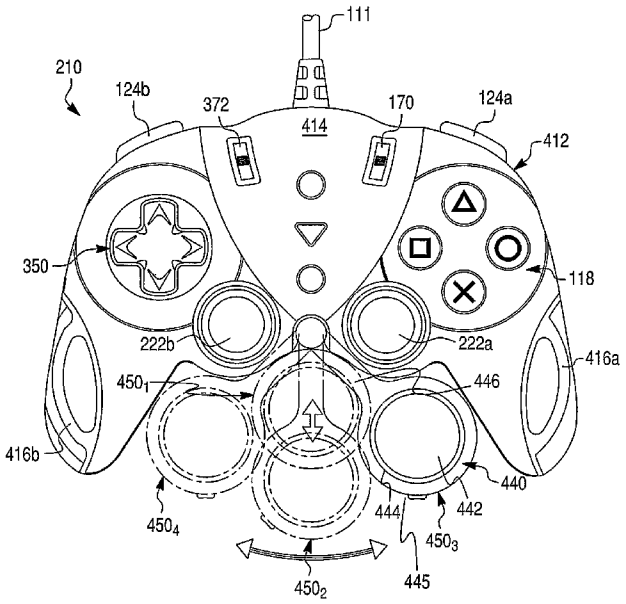
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(54) Title: ERGONOMICALLY CONFIGURABLE VIDEO GAME CONTROLLER



(57) Abstract: An ergonomically configurable hand-held video game controller for interaction with a computer gaming unit. The video game controller comprises an configurable control members which may be selectively positioned relative to the main housing to accommodate preferred ergonomic positions for custom preferences of a user. In one embodiment, a particular operational device such as a trackball may be shifted from the right side of the controller to the left side to accommodate left and right handed users. A moveable modular assembly may also be replaceable to unlimited configurations of a single control unit.

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ERGONOMICALLY CONFIGURABLE VIDEO GAME CONTROLLER

BACKGROUND OF THE INVENTION

1. Field of the invention

The present invention relates to hand-held video game controllers in general, and more specifically to a ergonomically configurable hand-held video game controller.

2. Description of the Related Art

Computer video games are well known in the art. Such devices range from small hand-held all-in-one units, to larger stand-alone units which interact with stand-alone controllers. For more sophisticated play, stand-alone computer units provide tremendous processing power and work with associated peripheral devices, such as a remote controller and television display in an attempt to bring the player a more dramatic gaming experience to that of hand-held devices. A central stand-alone console contains all the essential processing components to run a computer game. A controller is connected to communicate operation control commands from a user. As previously mentioned, this conventional arrangement is well known in the art.

With the tremendous commercial success of stand-alone computer gaming systems, an entire peripheral market has emerged ranging from advanced video controllers, joystick input devices, steering wheel devices for racing games, multi-tap controllers, vibrating controllers, video stands, audio systems and the like. Programmable controllers are also available which allow a user to customize the operation of control buttons by programming different modes of operation.

Trackballs have been employed in such devices as lap tops computers and other electronic devices. In such devices, such as laptop, a control ball is rotatably mounted into the surface of the console and optical sensors sense the movement of the ball. Such prior art devices have been employed to control the simple movement of a cursor on the lap top display screen. However, the prior art is void of a hand held control unit incorporating a track ball control member or the use of a track ball control member to in a personal video gaming platform. The present invention includes several embodiments for various implementation of a track ball to control a video game in a hand held controller.

Figs. 1A and 1B represent a prior art hand held controller including a conventional directional pad, a pair of stick control members and four control buttons. The directional pad is limited to finite control in four directions. More specifically,
the video game controller 10 of the prior art includes a plurality of buttons 14, a multi-directional switch 16, commonly known as D-pad (Directional pad), joystick input devices 18a and 18b, and triggers (shoulder buttons) 20. D-pads are well known in the game controller art, and function to provide particular contact closures depending upon where the user applies pressure on an operating button thereof. When the user depresses the uppermost or northern position of the D-pad, such is equivalent to depressing a key of a standard keyboard. When the user depresses the rightmost or east portion of the D-pad, such is equivalent to a different key of a standard keyboard being depressed. Likewise, separate keystroke entries are made by depressing the southern portion and western portion. It is possible to provide for yet additional keystroke entries by depression of the D-pad in portions intermediate the north, east, south and west positions without departing from the scope of the present invention.

The video game controller 10 has various buttons to implement several modes of operation. The video game controller 10 and the computer gaming unit contain circuitry

and drivers to effectuate the commands given from a user to the computer gaming unit via the video game controller 10. For example, a start button 24 is used to start a video game once the computer gaming unit is turned on. Usually an opening screen appears to the operator on a display device. Another example of a button with specific functions is the select button 28.

Often times, each button 14, joystick input device 18a or 18b, trigger (shoulder button) 20 has a particular command in which it executes. For example, if a user is playing a hockey game loaded on the computer gaming unit, D-pad 16 would control the movement of the player under the control of the video game controller 10. The other players would be controlled by an additional user through another video game controller or by the computer gaming unit itself. When the user presses upon the button 14 with the square, the player on the display would pass the hockey puck to another player, while if the user presses the button 14 with the triangle, the player to shoot the puck towards the goal. Similarly, the right trigger 20 may allow the player under the control of the video game unit to check, or hit, another player on the screen. Or the button 14 with the circle allows a player to accelerate and move faster than normal. Thus, each button 14, trigger 20, pad 16 and joystick input devices 18a, 18b has a distinct function assigned to it.

Many games allow a user to select a "turbo" mode for a particular function. It is often desirable to have a particular function at an accelerated speed or provide an additional power boost to the action on the display. Thus, a user will effectuate the "turbo" or program mode through activation of the "turbo" button 30. For example, when the hockey player in the above example is skating and the user wishes to activate the "turbo" function, he might hold down button 14 with the circle on the top while simultaneously pressing the "turbo" button 30. This would essentially place the circle button 14 in "turbo" or program mode. When circle button 14 is in "turbo" mode the

player may skate faster than if circle button 14 was pressed while not in "turbo" or program mode. Thus, a particular button may be selectively programmed in either normal or "turbo" modes.

While known hand-held video game controllers, including but not limited to those discussed above, have proven to be acceptable, such devices are nevertheless susceptible to improvements that may enhance their performance and ease and convenience of use. With this in mind, a need exists to develop improved hand-held video game controllers that advance the art.

SUMMARY OF THE INVENTION

The present invention is directed to an ergonomically configurable hand-held video game controller for interaction with a computer gaming unit. The video game controller comprises configurable control members which may be selectively positioned relative to the main housing to accommodate preferred ergonomic positions for custom preferences of a user. In one embodiment, a particular operational device such as a track ball may be shifted from the right side of the controller to the left side to accommodate left and right handed users. A moveable modular assembly may also be replaceable to unlimited configurations of a single control unit.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1A is a top plan view of a conventional video game controller of the prior art;

Fig. 1B is a bottom plan view of the conventional video game controller of the prior art;

Fig. 2A is a top plan view of a video game controller according to a first exemplary embodiment of the present invention;

Fig. 2B is a front view of the video game controller according to the first exemplary embodiment of the present invention;

Fig. 2C is a left side view of the video game controller according to the first exemplary embodiment of the present invention;

Fig. 3 is a schematic diagram of an electronic circuitry of the video game controller according to the first exemplary embodiment of the present invention;

Fig. 4A is a partially exposed top view of the video game controller according to the first exemplary embodiment of the present invention;

Fig. 4B is a partially exposed rear view of the video game controller according to the first exemplary embodiment of the present invention;

Fig. 5A is a sectional view as seen from the plane indicated by the line A-A in Fig. 4A;

Fig. 5B is a sectional view as seen from the plane indicated by the line B-B in Fig. 4A;

Fig. 6A is a top plan view of a video game controller according to a second exemplary embodiment of the present invention;

Fig. 6B is a front view of the video game controller according to the second exemplary embodiment of the present invention;

Fig. 6C is a left side view of the video game controller according to the second exemplary embodiment of the present invention;

Fig. 7A is a top plan view of a video game controller according to a third exemplary embodiment of the present invention;

Fig. 7B is a front view of the video game controller according to the third exemplary embodiment of the present invention;

Fig. 7C is a left side view of the video game controller according to the third exemplary embodiment of the present invention.

Fig. 8 is plan view of an alternate embodiment of the present invention with movable control member.

Figs.9-10 are top and bottom view of another alternate embodiment showing a trackball mounted to an underneath surface.

Fig. 11depicts the controller of the present invention used by an end sure in combination with a gaming platform

Fig. 12 is a plan view of an alternate embodiment of the present invention with reconfigurable modular controller members.

Fig. 13.is a partially sectional view of the modular assembly taken longs lines 13-13 of Fig. 12.

Fig. 14 is a partial section view of the modular assembly of Fig. 13 according to an alternate embodiment of present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred embodiments of a present invention will now be described with the reference to accompanying drawings. For purposes of the following description, certain terminology is used in the following description for convenience only and is not limiting. The words “right”, “left”, “bottom” and “top” designate directions in the drawings to which reference is made. The words "inwardly" and "outwardly" refer to directions toward and away from, respectively, the geometric center of the present invention and designated parts thereof. However, it is to be understood that the invention may assume various alternative orientations, except where expressly specified to the contrary. The terminology includes the words specifically mentioned above, derivatives thereof and words of similar import.

It is also to be understood that the specific article illustrated in the attached drawings, and described in the following specification is simply exemplary embodiment of the inventive concept. Specific dimensions and other physical characteristics relating to the embodiment disclosed herein are not to be considered as limiting, unless expressly stated otherwise. Additionally, the word "a," as used in the claims, means "at least one."

Figs. 2A-2C, 3, 4A, 4B, 5A and 5B depict a hand-held video game controller 110 according to a first exemplary embodiment of the present invention. A video game controller 110 is ergonomically formed to be held by a hand(s) of a user. The video game controller 110 includes a plurality of operating members for manipulation of the users hand to facilitate interaction with game play. The controller may be of the programmable type and may include a vibratory member for heightened game play as well as lighted buttons etc. A communication cable 111 is provided to transmit operation commands to a stand-alone computer gaming unit, or a game console, (not shown) in response to

manipulation of said operation members by the user. Located at the terminal end of the communication cable 111 is a plug 111a. The plug 111a is used to connect the communication cable 111 to the computer gaming unit. The plug 111a has a series of electrical connections that correspond to an electrical connection within a receptacle of the computer gaming unit. Alternatively, the video game controller 110 may be a wireless controller includes a radio frequency or infrared transmitter for sending control signals to the game console, wherein the game console includes a receiver for receiving the control signals from the game controller.

The computer gaming unit typically includes a disc drive mechanism in which a disc, such as a compact disc, has stored thereon a video game program, and a conventional circuitry for executing the video game program stored on disc. For example, the gaming unit may include a processor, memory and stored system programs for controlling the operation of the gaming unit, controller interface circuitry, and audio/video generating and outputting circuitry. An example of suitable computer gaming units are the Nintendo N64™, SEGA Genesis, X-Box, Gamecube, Sony Playstation game systems, etc. The hand-held video game controller 10 according to this embodiment of the present invention is connected to the gaming unit via a direct wire link in the form of the communication cable 111. Further, a wireless control unit can be connected to the gaming unit by, for example, a direct wire link or by mating connectors.

As illustrated in Figs. 2A-2C, the game controller 110 includes a hollow casing 112 defining a central control section 114, and left and right hand grip sections 116a and 116b extending out from the control section 114. Thus, the game controller 110 is intended to be utilized by both hands of a user. The user grasps the respective left and right hand grip sections 116a and 116b with each hand, the user's thumbs remaining extended over the central control section 114. Typically, a player grips the left and right

handgrip sections 116a and 116b during play and operates control switches corresponding to the handgrip sections gripped.

The control section 114 includes a plurality of operating members, which the user will utilize to enter data and control signals. Those operating members, which are disposed on the control section 114, are intended to be individually operated by one or both thumbs of the user.

A button pad 118 provided with a plurality of user activated buttons (or switches) 119 are mounted to the control section 114 of the casing 112 and accessible from an outer peripheral surface of the casing 112. The game controller 110 also includes a battery (not shown) that supplies power to the internal components of the controller.

The game controller 110 is further provided with a joystick input device 122 on the left side of the control section 114 of the casing 112, and trigger switches (shoulder buttons) 124a, 124b and 126a, 126b. The joystick input device 122 is a directional control device usually used as an input device for two or three dimensional movement of an object controlled by the game controller 110, while the trigger switches 124a, 124b, 126a and 126b can be used for performing at least one control function associated with the object. Typically, the trigger switches are used to fire weapons during a game.

Video game controllers have various buttons to implement several modes of operation within the game controller 110. The video game controller 110 and the computer gaming unit contain circuitry and drivers to effectuate the commands given from the user to the computer gaming unit via the video game controller 110. For example, a "START" button 128 is used to start a video game once the computer gaming unit is turned on. Usually an opening screen appears to the operator on a display device. Another example of a button with specific functions is a "SELECT" button 130. The SELECT button 130 allows the user to scroll through the various options presented by the

computer gaming unit. A "TURBO" button 132 allows the user to select a "TURBO" mode for a particular function. It is often desirable to have a particular function at an accelerated speed or provide an additional power boost to the action on the display. Also, the user will effectuate a program mode through activation of a "PROGRAM" button 134.

The video game controller 110 also includes a frequency response unit in the form of conventional vibration device that is well known in the art. Such device includes activation of a rotating eccentric weight and is commonly known to those skilled in the art. The video game controller 110 of the present invention includes a 3-position vibration switch 131 to selectively turn off the vibrating member or select between low and high vibration modes.

Furthermore, the game controller 110 in accordance with the first exemplary embodiment of the present invention incorporates two integrated trackball control devices: a first trackball control device 140 and a second trackball control device 150. It will be appreciated by comparing Fig. 2A with Fig. 1A that the first trackball control device 140 replaces the D-pad 16 of the video game controller 10 of the prior art, while the second trackball control device 150 replaces the joystick input device 18b of the game controller of the prior art. Preferably, the first and second trackball control devices 140 and 150 are substantially similar and may be in the form of any appropriate off-the-shelf trackball mechanism commonly known to those skilled in the art. As an example, the trackball control devices 140 and 150 may be similar to the trackball mechanisms of the mechanical-type disclosed in U.S. Patent Nos. 5,410,332, 5,171,978, 5,162,780, 5,078,019, 4,933,670, 4,575,086, 4,505,165 and 4,404,865 incorporated herein by reference. Preferably, according to the present invention, the first and second trackball control devices 140 and 150 are optical-type trackball devices including a trackball and associated optical elements, well known in the prior art as may be seen by reference to the

U.S. Patent Nos. 6,586,720, 6,552,716, 6,124,587, 6,084,574, 5,854,482 and 5,680,157 the disclosures of which are incorporated herein by reference. The optical-type trackball devices are well known in the art and could be found in a number of applications, such as, for example, laptops for cursor control and mouse devices.

Conventionally, the trackball devices are used as a position information input device (pointing device) for inputting position information for moving a cursor on the display screen of an information processing apparatus such as a computer. To make the operation space unnecessary, a trackball device includes a spherical body, e.g., a ball, which is rotatably supported in a ball holder so as to expose a part of its outer circumferential portion to the outside, and a circuit for converting the rotation amount of this spherical body into an electrical signal. The trackball is rotatable in any direction independent of the ball holder. The amount obtained by rotating the exposed portion of the spherical body when operated with a finger of the user is converted into the electrical signal. In response to this signal, position information is input to a control unit of an information processing apparatus, such as a computer.

Referring to Figs. 2A-2C and 3, the first trackball control device 140 is the optical-type trackball device and includes a first trackball 142 mounted within a first ball holder 144 for rotation relative to the casing 112 about orthogonal axes, first trackball rotational position sensors 146, and a first selector switch 148 (shown in Figs. 3 and 4B) activated when the first trackball 142 is pressed. In this particular embodiment the first trackball 142 is a spherical ball with a substantially smooth exterior. As shown in Figs. 2A-2C, the first ball holder 144 is integrally mounted in a recess in the control section 114 of the casing 112 so that the first trackball 142 partially extends out thereof.

In this embodiment, as illustrated in Fig. 3 depicting an electronic circuitry 160 of the video game controller 110 according to the first exemplary embodiment of the present

invention, the first trackball control device 140 includes an associated array of first optical (photosensitive) elements 147 forming two rotational position sensors 146 oriented orthogonally to each other. However, in alternate embodiments more or less than two rotational position sensors could be provided and they could be orientated at any suitable orientation relative to each other. The optical elements 146 are electrically connected to an electronic control unit (ECU) 162 of the electronic circuitry 160, such as a microprocessor.

Thus, the first trackball control device 140 is provided to generate a signal indicative to the amount and direction of rotational movement of the first trackball 142 relative to the casing 112 in each of the orthogonal directions.

The second trackball control device 150 is generally identical to the first trackball control device 140 as disclosed hereinabove, and includes a second trackball 152 mounted within a second ball holder 154 for rotation relative to the casing 112 about the orthogonal axes, second trackball rotational position sensors 156, and a second selector switch 158 (shown in Fig. 3) activated when the second trackball 152 is pressed. As shown in Figs. 2A-2C, the second ball holder 154 is integrally mounted in a recess in the control section 114 of the casing 112 so that the second trackball 152 partially extends out thereof. As further illustrated in Fig. 3, the second trackball control device 150 includes an associated array of second optical (photosensitive) elements 157 forming two rotational position sensors 156 oriented orthogonally to each other.

Preferably, the second trackball control device 150 is smaller, than the first trackball control device 140. More preferably, the first trackball 142 is 22 mm in diameter, while the second trackball 152 is 20 mm in diameter. Similarly to the first trackball control device 140, the second trackball control device 150 is, preferably, the optical-type trackball device and includes an associated array of optical (photosensitive) elements 156 forming two rotational position sensors oriented orthogonal to each other. The optical

elements 156 are electrically connected to the ECU 162 of the electronic circuitry 160. Thus, the second trackball control device 150 is provided to generate a signal indicative to the amount and direction of rotational movement of the second trackball 152 relative to the casing 112 in each of the orthogonal directions.

Figs. 4A-5B represent additional partially exposed and sectional views of the first exemplary embodiment of Figs. 2A-2C and 3. In this embodiment, each of the first and second trackball control devices 140 and 150 incorporates the selector switches 148 and 158, respectively, in the form of a micro-switch for enhanced operation of the trackball control device. As illustrated in Figs. 4B and 5B, each of the trackballs 142 and 152 floats in a housing of a spring biased support member. Pressing down on the trackball will cause the trackball to move. The micro-switch, either first or second selector switches 148 and 158, in the form of a make/break contact switch, is positioned underneath the trackball. When the trackball is depresses hard enough, overcoming the spring bias, the contact is made. This switch closes a circuitry to the ECU (micro-controller) 162. Thus micro-controller 162 recognizes whether the trackball has been depressed or remains suspended for rotational control. When the switch is made, the micro-controller continues to send control command signals to the gaming unit using the last known direction and velocity sensed by the controller. Thus the user may employ the trackball control device for a variable that lends itself to continuous fire such as a firing device or controlling the movement of the variable such as a racecar or other moving object. For example, when the user wishes for a game object to continuously move in a particular direction, the user simply moves the trackball until the object moves in the desired direction at the desired speed. Then, when such direction and speed are achieved, the user simply depresses the track ball, the micro-controller will continuously sense the command signals to maintain

directional and speed control. The user simply releases the track ball when a change in direction or speed is desired.

The video game controller 110 further has an ON/OFF switch 133 shown in Fig. 2A. In OFF state of the switch 133, the joystick input device 122 on the left and the second trackball control device 150 on the right function as they are. However, when the switch 133 is in ON state, the left joystick input device 122 and the right trackball control device 150 are swapped. In other words, in ON state, the left joystick input device 122 generates the control signal usually generated by the right trackball control device 150 (when the switch 133 is in OFF state), while the right trackball control device 150 generates the control signal usually generated by the left joystick input device 122.

The integration of the trackball control devices 140 and 150 into the hand-held video game controller 110 provides superior control of a variable signal and is particularly suited for aiming (directional) and force control, for example golfing video games such as Tiger Woods golf on the Playstation II platform as well as other gaming software.

The existing off-the-shelve trackball control devices, for example those found in laptops for cursor control and mouse devices, produce the control signal that is difficult to control and maneuver is some applications. Moreover, different applications may require different sensitivity for controlling the variable signal in the application. Furthermore, personal preferences of the user as well as skill level require different sensitivity for optimal control by a specific user.

Thus, a mechanism to selectively control the sensitivity of the trackball control devices 140 and 150 has been incorporated into the hand held video game controller 110. As shown in Fig. 2A, the video game controller 110 further includes first and second sensitivity switches 170 and 172, respectively, incorporated into the casing 112 to

selectively control the sensitivity of the first and second trackball control devices 140 and 150, respectively.

Each of the sensitivity switches 170 and 172 is slidable between at least three different positions H - high, M - medium and L - low sensitivity of an output of the trackball control devices 140 and 150 for precise motion control in the video game. As illustrated in the schematic diagram of the electronic circuitry 162 in Fig. 3, each of the sensitivity switches 170 and 172 simply moves between a plurality of different positions, either infinitely variable, or between discrete positions. The sensitivity switch 170, 172 makes or brakes contacts in a different manner to vary the resistance between the sensitivity switch 170, 172 and the ECU 162. Thus the voltage drop across the variable resistance will change as will the resultant current. The ECU 162 senses the different conditions and the internal software is programmed to manipulate input (control) signals from the trackball control device 140, 150 differently according to the selected position of the sensitivity switch 170, 172. The specific algorithm to selectively control the trackball control device 140, 150 in response to different sensed conditions (sensitivity switch position) is not essential to the present invention and may be derived and implemented by one of ordinary skill in the art.

Figs. 6A-6C of the drawings illustrate a second exemplary embodiment of a hand-held video game controller according to the present invention. Components, which are unchanged from, or function in the same way as in the first exemplary embodiment depicted in Figs. 2A-2C and 3 are labeled with the same reference numerals, sometimes without describing detail since similarities between the corresponding parts in the two embodiments will be readily perceived by the reader.

A hand-held video game controller 210 of the second exemplary embodiment includes a hollow casing 212 defining a central control section 214, and left and right hand

grip sections 216a and 216b extending out from the control section 214. A button pad 118 provided with a plurality of user activated buttons (or switches) is mounted to the control section 214 of the casing 212 and accessible from an outer peripheral surface of the casing 212.

The game controller 210 is further provided with right (first) and left (second) joystick input devices 222a and 222b, and trigger switches (shoulder buttons) 124a, 124b and 126a, 126b. The right and left joystick input devices 222a and 222b are directional control devices used as input devices for two or three dimensional movement of an object controlled by the game controller 210, while the trigger switches 124a, 124b, 126a and 126b can be used for performing at least one control function associated with the object. Typically, the trigger switches are used to fire weapons during a game.

Moreover, the game controller 210 in accordance with the second exemplary embodiment of the present invention incorporates a trackball input device 240 that replaces the conventional D-pad 16 of the video game controller 10 of the prior art, shown in Fig. 1A. The trackball input device 240 is substantially identical to the trackball input devices 140 and 150 according to the first exemplary embodiment of the present invention. Referring to Figs. 6A-6C, the trackball input device 240 is preferably the optical-type trackball device and includes a trackball 242 mounted within a ball holder 244 for rotation relative to the casing 212 about orthogonal axes.

As shown in Fig. 6A, the video game controller 210 further includes a sensitivity switch 170 incorporated into the casing 212 to selectively control the sensitivity of the trackball control device 240. The game controller 210 also includes a trackball mode switch 272 that provides the game controller 210 with the ability to selectively control which conventional control member, (i.e. the D-pad 16, the right and left joystick input devices 18a and 18b shown in Fig. 1A) the trackball input device 240 will replace. The

trackball mode switch 272 is slidable between at least three different positions D - D-pad, L - left joystick input device and R - right joystick input device. In other words, the trackball mode switch 272 may provide for the trackball input device 240 to take over for the conventionally known D-pad when in position D. When in position L, the trackball input device 240 will then control operation of the variable conventionally associated with the first (left) joystick input device 222b, and in position R, the second (right) joystick input devices 222a. Here again, the switch 272 is selectively positioned to alter the resistance between the switch and an ECU of the game controller 210. Thus, the ECU easily recognizes which mode of operation is selected and utilizes the input of trackball signals to control the operation otherwise associated with the conventional input devices of the prior art. Such increase of programmability allows the user to customize the control of gaming variables to personal likenesses.

Many software applications are developed for use with the conventional game controller 10 shown in Fig. 1A. For example, some games will associate certain controlled variables with the D-pad 16, the left joystick input device 18b or right joystick input device 18a. Thus, the game controller 210 of the present invention will allow the user to selectively control which conventional input device the trackball input device 240 will govern.

Figs. 7A-7C of the drawings illustrate a third exemplary embodiment of a hand-held video game controller according to the present invention. Components, which are unchanged from, or function in the same way as in the first exemplary embodiment depicted in Figs. 2A-2C, 3 and 6A-6C are labeled with the same reference numerals, sometimes without describing detail since similarities between the corresponding parts in the two embodiments will be readily perceived by the reader.

A hand-held video game controller 310 of the third exemplary embodiment includes a hollow casing 312 defining a central control section 314, and right and left hand grip sections 316a and 316b extending out from the control section 314. A button pad 118 provided with a plurality of user activated buttons (or switches) is mounted to the control section 314 of the casing 312 and accessible from an outer peripheral surface of the casing 312. The game controller 310 is further provided with right and left joystick input devices 222a and 222b, a D-pad 350 as a directional control device and trigger switches (shoulder buttons) 124a, 124b and 126a, 126b. The right and left joystick input devices 222a and 222b are directional control devices used as input devices for two or three dimensional movement of an object controlled by the game controller 310, while the trigger switches 124a, 124b, 126a and 126b can be used for performing at least one control function associated with the object. Typically, the trigger switches are used to fire weapons during a game.

Moreover, the game controller 310 in accordance with the third exemplary embodiment of the present invention incorporates a trackball input device 340 centrally located on the control section 314 of the casing 312. The trackball input device 340 may be operated by the thumb of either a right hand or left hand of the user. The trackball input device 340 is substantially identical to the trackball input device 240 according to the second exemplary embodiment of the present invention. Referring to Figs. 7A and 7C, the trackball input device 340 is preferably the optical-type trackball device and includes a trackball 342 mounted within a ball holder 344 for rotation relative to the casing 312 about orthogonal axes.

As shown in Fig. 7A, the video game controller 310 further includes a sensitivity switch 170 incorporated into the casing 312 to selectively control the sensitivity of the trackball control device 340. The game controller 310 also includes a trackball mode

switch 372 that provides the game controller 310 with the ability to selectively take over the control of any of the conventional control members (the D-pad 350, the right joystick input device 222a or the left joystick input device 222b). The trackball mode switch 372 is slidable between at least three different positions D - D-pad, L - left joystick input device and R - right joystick input device. When in position D, the trackball input device 340 overrides and replaces the D-pad 350.

When in position L, the trackball input device 340 will replace the first (left) joystick input device 222b, and in position R, the second (right) joystick input devices 222a. Here again, the switch 372 is selectively positioned to alter the resistance between the switch and an ECU of the game controller 310.

Fig. 8 of the drawings illustrates a fourth exemplary embodiment of a hand-held video game controller according to the present invention. Components, which are unchanged from, or function in the same way as in the first, second and third exemplary embodiments depicted in Figs. 2A-2C, 3, 6A-6C and 7A-7C are labeled with the same reference numerals, sometimes without describing detail since similarities between the corresponding parts in the two embodiments will be readily perceived by the reader.

A hand-held video game controller 410 of the fourth exemplary embodiment includes a hollow casing 412 defining a central control section 414, and right and left hand grip sections 416a and 416b extending out from the control section 414. A button pad 118 provided with a plurality of user activated buttons (or switches) is mounted to the control section 414 of the casing 412 and accessible from an outer peripheral surface of the casing 412. The game controller 410 is further provided with right and left joystick input devices 222a and 222b, a D-pad 350 as a directional control device and trigger switches (shoulder buttons) 124a, 124b and 126a, 126b. The right and left joystick input devices 222a and 222b are directional control devices used as input devices for two or three dimensional

movement of an object controlled by the game controller 410, while the trigger switches 124a, 124b, 126a and 126b can be used for performing at least one control function associated with the object. Typically, the trigger switches are used to fire weapons during a game.

Moreover, the game controller 410 in accordance with the fourth exemplary embodiment of the present invention incorporates a trackball input device 440 movable between at least two operable, preferably more than two, positions with respect to the casing 412. The trackball input device 340 may be operated by the thumb of either a right hand or left hand of the user. The trackball input device 440 is substantially identical to the trackball input device 340 according to the third exemplary embodiment of the present invention. Referring to Fig. 8, the trackball input device 440 is preferably the optical-type trackball device and includes a trackball 442 mounted within a ball holder 444 for rotation relative to the ball holder 444 about orthogonal axes. In turn, the ball holder 444 is mounted in a trackball housing 445. The trackball housing 445 is adjustably mounted to the casing 412 through a support arm 446 movably coupled to the casing 412 to allow a selective user-specific ergonomic adjustment of the trackball input device 440 relative to the casing 412.

More specifically, the support arm 446 of the trackball input device 440 is slideably (telescopically) mounted to the casing 412 for reciprocatingly moving the trackball input device 440 between a retracted position depicted in Fig. 8 by the reference numeral 450_1 and an extended position depicted by the reference numeral 450_2, both for operating either by a right or left thumb of the user. The support arm 446 of the trackball input device 440 is also rotatably mounted to the casing 412 for pivotally moving the trackball input device 440 between a right side position depicted in Fig. 8 by the reference numeral 450_3 for operating by the right thumb of the user and a left side position depicted

by the reference numeral 450_4 for operating by the left thumb of the user. In other words, the trackball housing 445 is provided to swing to right or left for right and left handed gamers or anywhere in between. Also, the trackball housing 445 is capable to slide inward or outward for desired and comfortable position. At any desired position the trackball housing 445can be locked and secured by any appropriate friction locking system known in the art.

Figs. 9-11 of the drawings illustrate a fifth exemplary embodiment of a hand-held video game controller according to the present invention. Components, which are unchanged from, or function in the same way as in the first, second and third exemplary embodiments depicted in Figs. 2A-2C, 3, 6A-6C and 7A-7C are labeled with the same reference numerals, sometimes without describing detail since similarities between the corresponding parts in the two embodiments will be readily perceived by the reader.

A hand-held video game controller 510 of the fifth exemplary embodiment includes a hollow casing 512 defining a central control section 514, and right and left hand grip sections 516a and 516b extending out from the control section 514 and adapted to be hold by a user 550 (shown in Fig. 11). The control section 514 has a front side 515a facing a user (or player) 550 when the video game controller 510 is in use and a rear side 515b disposed opposite the front side 515a.

A button pad 118 provided with a plurality of user activated members (buttons or switches) is mounted to the control section 514 of the casing 512 and is accessible from the front side 515a of the casing 512. The game controller 510 is further provided with right and left joystick input devices 222a and 222b, a D-pad 350 as a directional control device and trigger switches (shoulder buttons) 124a, 124b and 126a, 126b. As illustrated in Fig. 9, the right and left joystick input devices 222a and 222b and the D-pad 350 are also accessible from the front surface 515a of the casing 412. The right and left joystick

input devices 222a and 222b are directional control devices used as input devices for two or three dimensional movement of an object controlled by the game controller 510, while the trigger switches 124a, 124b, 126a and 126b can be used for performing at least one control function associated with the object. Typically, the trigger switches are used to fire weapons during a game.

In other words, a plurality of user operated operating members, such as buttons of the control pad 118, the joystick input devices 222a and 222b, the D-pad 350 and the trigger switches (shoulder buttons) 124a, 124b and 126a, 126b, are provided on the front side 515a of the casing 512 for producing a plurality of game control signals. The user operated operating members are reachable and operated by a thumb 552 of a hand 554 of the user 550 holding the casing 512 during a video game play, i.e., while the user 550 is playing a video game by controlling a video game console 556. As further illustrated in Fig. 11, the video game console 556 is conventionally connected to a monitor 558 trough a communication cable 560, and to the game controller 510 through the communication cable 111.

Moreover, the game controller 510 in accordance with the fifth exemplary embodiment of the present invention incorporates a trackball input device 540 mounted to and accessible from the rear side 515b of the casing 512, as illustrated in Fig. 10, to free the thumb fingers of the user for additional control during game play. The bottom mounted trackball input device 540 provides the user (gamer) with superior edge over other locations of the trackball 542. The trackball input device 540 may be operated by either a right hand or left hand of the user. The trackball input device 540 is substantially identical to the trackball input device 340 according to the third exemplary embodiment of the present invention. Referring to Fig. 10, the trackball input device 540 is preferably the

optical-type trackball device and includes a trackball 542 mounted within a ball holder 544 for rotation relative to the casing 512 about orthogonal axes.

Therefore, the hand-held video game controller in accordance with the present invention represents a novel arrangement of the video game controller that integrates a trackball input device into the hand held game controller for controlling variables in an application. Position of the trackball input device is adjustable relative to a controller casing to allow for user-specific ergonomic adjustment of the trackball input device relative to the casing. Moreover, the trackball input device may be mounted to and accessible from a rear side of the controller casing to free thumb fingers of a user for additional control during game play. Sensitively of the trackball input device may be controlled in addition to selectively choosing which conventional input member the trackball input device will replace. The video game controller with the integrated trackball input device thus provides for superior control of application variables as well as the ability for users to customize the control and operation of applications to meet their personal needs.

Fig. 12 is directed to an additional alternate embodiment of the present invention. In this embodiment the controller 610 includes a modular assembly 675 having a plurality of control members such as sticks 622a,b and trackball 642 as shown in the figure. In this present embodiment, the modular assembly may be selectively positioned relative to the main housing unit or casing 612. In this embodiment the entire modular assembly 675 may be rotated like a dial to almost an infinite number of rotary positions. A plurality of engaging surfaces 676 may be provided so that the user may grasp or otherwise engage the top surface of the modular assembly and simply dial the modular assembly 675 to a desired rotary position. These engagement surfaces can be either recessed portions or projections or simply a roughened surface. Any member that will allow positive

engagement by the user to rotate the modular unit relative to the main housing/casing 612 may be employed. By rotating the modular assembly, each of the sticks 622a, and trackball 642 may be selectively positioned to either side (left or right) of the controller as well as vertical orientations (top to bottom) to customize the configuration of the operational members to ergonomic preferences of a particular user. While three operational members are show and describes (622a,b 642) it is to be understood that additional members may be provided in or on the moveably modular assembly. Moreover, the assembly may include a plurality of trackballs and a single stick or any combination multiple operational members. A single operational member may also be provided in which case the member is positioned off center of the modular assembly to allow the member to be selectively positionable throughout a large range of vertical and horizontal positions by simply rotating the modular assembly relative to the main housing unit/casing 612. The details showing to rotatatable connection of the modular assembly 675 to the main housing unit/casing 612 will no be explained.

Fig. 13 is a partial sectional view of the modular assembly 676 rotatably connected to the main housing unit/casing 612. The modular unit includes a main portion having a stepped or notched portion 680 on the underneath surface. The modular unit 675 simply sits on recessed bottom surface 681 or ledge formed on the main housing unit 612. The modular assembly simply rests in place and sis free to rotate 360 degrees relative to the main housing unit 612. To limit unlimited rotation that could entangle the communication cord/bundle 690 , the modular assembly 675 has a projection or tab 683. A corresponding projection or tab 685 is also fomed on the inner surface of the recessed portion of the main housing 612. Such an arrangement allows the modular assembly 675 to freely rotate 180 degrees in either direction from the position show in Fig. 13. Thus the modular assembly is capable of being positioned in any intermediate rotational position throughout the entire

360 degrees. The modular assembly 675 s retained and connected to the main housing unit 612 by a retaining collar 687. The retaining collar simply has a threaded portion 689 which engages a threaded portion of an upper most inner surface of the main housing unit 691. The retaining collar is simply screwed down and tightened such that the top flange portion 693 engages the top surface of the modular assembly 675 sandwiching the assembly 675 in place. An elastomeric material may be employed between the flange 693 and top surface of the assembly 675 to provide a lock tight arrangement and substantial friction fit. To facilitate retention of the modular assembly 675 in a particular rotary position a plurality of locking tabs or detents 695 are formed on the outer peripheral surface of the modular assembly. These locking tabs are preferably formed of simply protrusions on a tab punched from the surface of the modular assembly and cantilevered from joined area 697. Such an arrangement allows the locking tabs/detents 695 top deflect inward and flush with the outer surface of the modular assembly to not only facilitate installation of the retaining collar 687, but to facilitate a simple repositioning of the modular assembly as desired. The tabs/detents are also preferably chamfered 697 to facilitate easy installation of the retaining collar 687. The retaining collar 687 is simply screed or tightened in place and the inner surface of the retaining collar simply urges the tab inward as the collar is tightened down. The retaining collar and recessed in the main housing unit 612 together with the dimensions of the modular assembly 675 are such that once in place, the locking tabs/detents 695 vertically aligned with a series of recesses 699 formed on the inner surface of the retaining collar. A plurality of recesses 695 are provided to facilitate numerous locked rotary positions of the modular assembly 675. The modular assembly 675 simply need be rotated to a desire position until the tabs/detents 675 engage a corresponding recess 699 and lock in place. The cantilevered nature of the locking tab/detent 697 retains the rotary position of the modular assembly 675 until such

time as the user actively engages surfaces 675 to positively reposition the modular assembly 675. Off course, the number and spacing of the recesses 699, and tabs/detents 697 are matches such that each tab coincidently engages a recessed position when in a desired position. Increasing the number of recessed portions 699 will provide an increase number of positions to which the modular assembly 675 may be positively retained in a particularly rotary position. Off course the tabs may also be formed on a lower portion of the modular assembly and engage recessed portions of the lower portion of the main housing unit 612 if desired. Such an arrangement would eliminate any tendency to accidentally loosen the retaining collar 689. However, that is not large concern given the limited rotational movement of the modular assembly 675 to within a single 180 rotation in opposition directions.

Lastly, the modular assembly 675 may not only be selectively positioned it may also be replaced. The nature of the modular assembly lends itself to reconfiguration by changing out different modular units. This may not only provide an end user unlimited ergonomic configurations to which to choose, but also allow a manufacturer to have a standard main housing unit and swap out modular assemblies for a particular gaming platform or perhaps a particular type of user. Thus a plurality of modular assemblies 675 having differing operational members are contemplated. In such an embodiment, the communication cable/bundle 690 will be provided with a connection member or plug to engage a corresponding mating plug or receptacle within the housing unit 612. Such a game controller unit provides unlimited configurations to both the end user and manufacturer. Furthermore, while rotational displacement has been shown and described, translational movement of a modular assembly may also be employed to provide reconfigurations by a user to accommodate for example left and right hand user.

Rather than a having a cord extending between the modular assembly and internal wiring of the controller, rotary electrical contacts may be employed between the modular assembly and main housing unit. Fig. 14 depicts an alternate embodiment showing a partial sectional view between the modular assembly and main housing unit. In this alternate embodiment, the modular assembly 775 is equipped with a series of electrical contact projections 792 which engage matching continuous ring contacts 794 formed in the main housing unit. While three such contacts are shown, it is understood that sufficient contacts are provided for each specific signal needed to support the operational members within the modular unit. Such an assembly eliminates the need for unplugging and plugging in the modular assembly during replacement. To replace the modular unit in this embodiment all that is needed is that the retainment collar removed and the modular assembly dislodged ad a different modular assembly inserted.

The description of the preferred embodiments of the present invention has been presented for the purpose of illustration in accordance with the provisions of the Patent Statutes. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed. The embodiments disclosed hereinabove were chosen in order to best illustrate the principles of the present invention and its practical application to thereby enable those of ordinary skill in the art to best utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated, as long as the principles described herein are followed. This application is therefore intended to cover any variations, uses, or adaptations of the invention using its general principles. Further, this application is intended to cover such departures from the present disclosure as come within known or customary practice in the art to which this invention pertains. Thus, changes can be made in the above-described invention without departing from the intent

and scope thereof. It is also intended that the scope of the present invention be defined by the claims appended thereto.

What is claimed is:

1. A hand-held video game controller for interaction with a computer gaming unit, said controller comprising:

a hand-held main housing unit; and

a plurality of operating members logistically positioned to said main housing unit for manipulation by a user for producing a plurality of game control signals;

at least one of said plurality of said operating members being selectively moveable to a plurality of logistic positions relative to said main housing unit to allow for user-specific ergonomic adjustment of at least one operating members relative to said casing.

2. The hand held video game controller according to claim 2, wherein said at least one operating member is a trackball input device.

3. The hand-held video game controller according to claim 2, wherein said at least one trackball input device is pivotally movable with respect to said casing.

4. The hand-held video game controller according to claim 2, wherein said at least one trackball input device is linearly movable with respect to said casing.

5. The hand-held video game controller according to claim 2, wherein said at least one trackball input device includes a trackball housing adjustably mounted to said casing.

6. The hand-held video game controller according to claim 5, wherein said at least one trackball input device further includes a support arm integrally connected to said trackball housing and movably coupled to said casing.

7. A hand-held video game controller for interaction with a computer gaming unit, said controller comprising:

a hand-held casing having a front surface including a control section;

a rear surface opposite said front surface;

a plurality of user operated operating members logistically positioned on said front surface of said casing for producing a plurality of game control signals; and

at least one trackball input device integrally mounted to said rear surface of said casing.

8. A hand-held video game controller for interaction with a computer gaming unit, said controller comprising:

a hand-held main housing unit; and

a modular assembly having plurality of operating members logistically positioned thereto for manipulation by a user for producing a plurality of game control signals;

wherein said modular assembly being movably connected to said main housing unit thereby facilitating selective movement to a plurality of different logistic positions relative to said main housing unit to allow for user-specific ergonomic adjustment of at least one operating members.

9. The controller according to claim 9, wherein said modular assembly is removably connected to said main housing unit to thereby facilitate selective replacement of different modular assemblies to permit a plurality of customized user configurations.

10. The controller according to claim 9, wherein said modular assembly is rotationally connected to said main housing unit.

11. The controller according to claim 11, wherein said modular assembly comprises a substantially cylindrical portion seated in a substantially cylindrical recess

formed in said main housing unit, said modular assembly capable of rotating to any rotational positions substantially throughout 360 degrees.

12. The controller according to claim 11, wherein said controller includes a retainer member to retain said modular assembly within said recessed of said main housing init.

13. The controller according to claim 12, wherein said retainer member includes a retainment collar threadingly engaging a second threaded recessed formed in a tops surface of said main housing unit, said modular assembly being disposed between said retainment collar and a bottom portion of said substantially cylindrical recess of said housing,

14. The controller according to claim 11, wherein said modular assembly includes a stop to prevent unlimited rotational movement relative to main housing unit and limit rotational movement to within a single 360 degrees.

15. The controller according to claim 11, wherein said modular assembly includes a retention assembly to retain said modular in a particular selective rotational position relative to said main housing unit.

16. The controller according to claim 15, wherein said retention assembly includes at least one detent projecting from said modular assembly and a plurality of recesses formed in an inner peripheral surface of said substantially cylindrical recess of said main housing unit, said detent being flexibly formed capable if inward deflection upon forced rotational movement of said modular assembly, said detent being biased in an outward position to engage one of said plurality of recesses formed in an inner peripheral surface of said substantially cylindrical recess of said main housing unit to maintain said modular assembly in a desired rotational position relative to said main housing unit.

17. The controller according to claim 16, wherein said at least one detent is formed as a projection on a cantilevered surface external surface of said modular assembly, said cantilevered surface being formed by a cut out portion of said external surface to facilitate inward deflection of said detent upon formed rotational movement of said modular assembly relative to said main housing unit.

18. The controller according to claim 16, wherein said modular assembly includes at least one user engaging surfaces provided on a top exposed surface of said modular assembly to facilitate engagement by a user to dial the modular assembly to a desired rotational position within said 360 degrees.

Fig. 1A
(Prior Art)

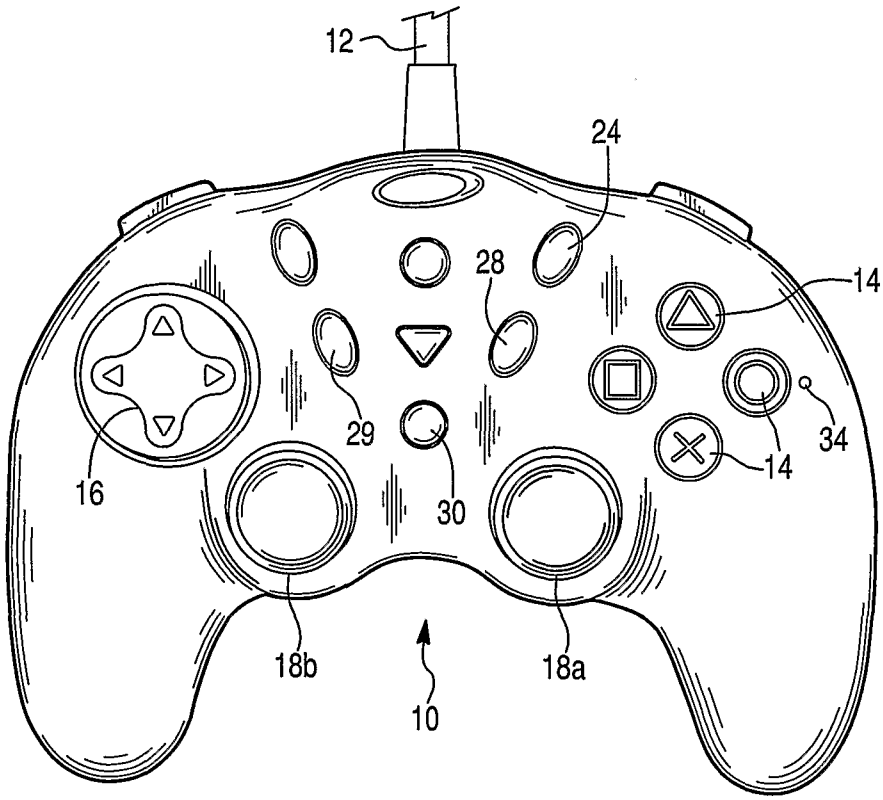


Fig. 1B
(Prior Art)

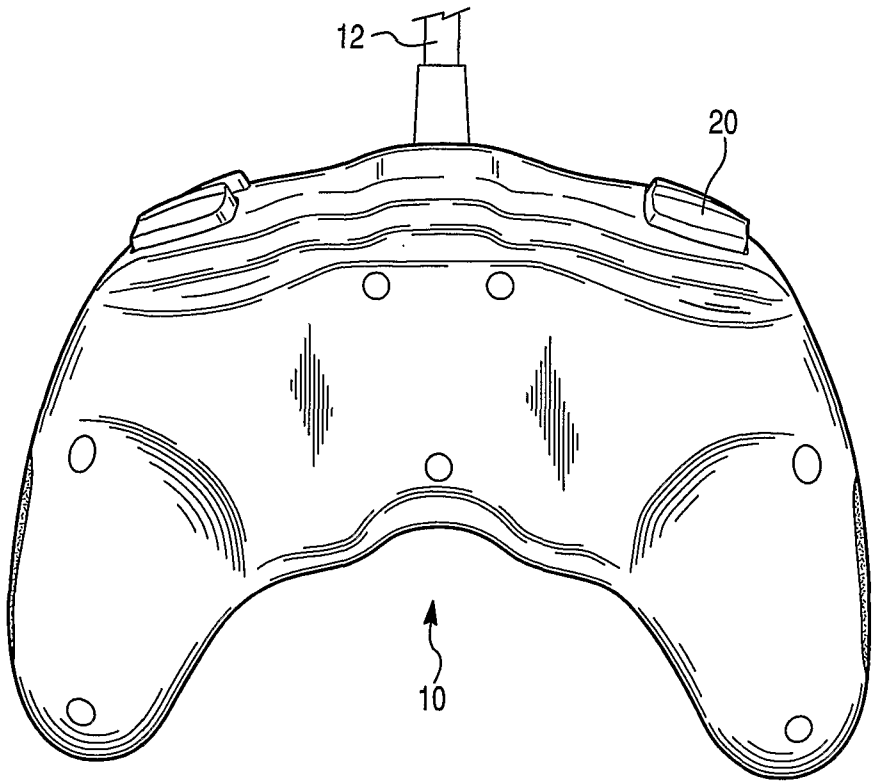


Fig. 2A

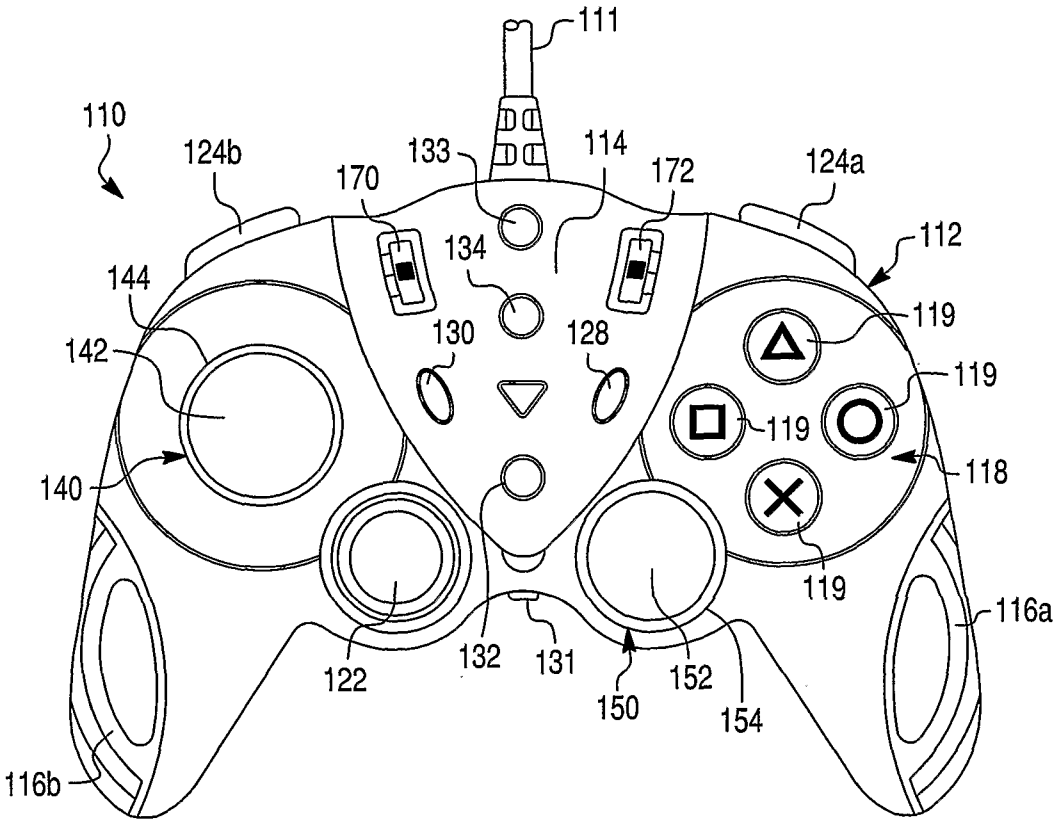

111
110
124b
133
114
170
172
124a
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134
144
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116a
122
132
131
150
152
154
116b

Fig. 2B

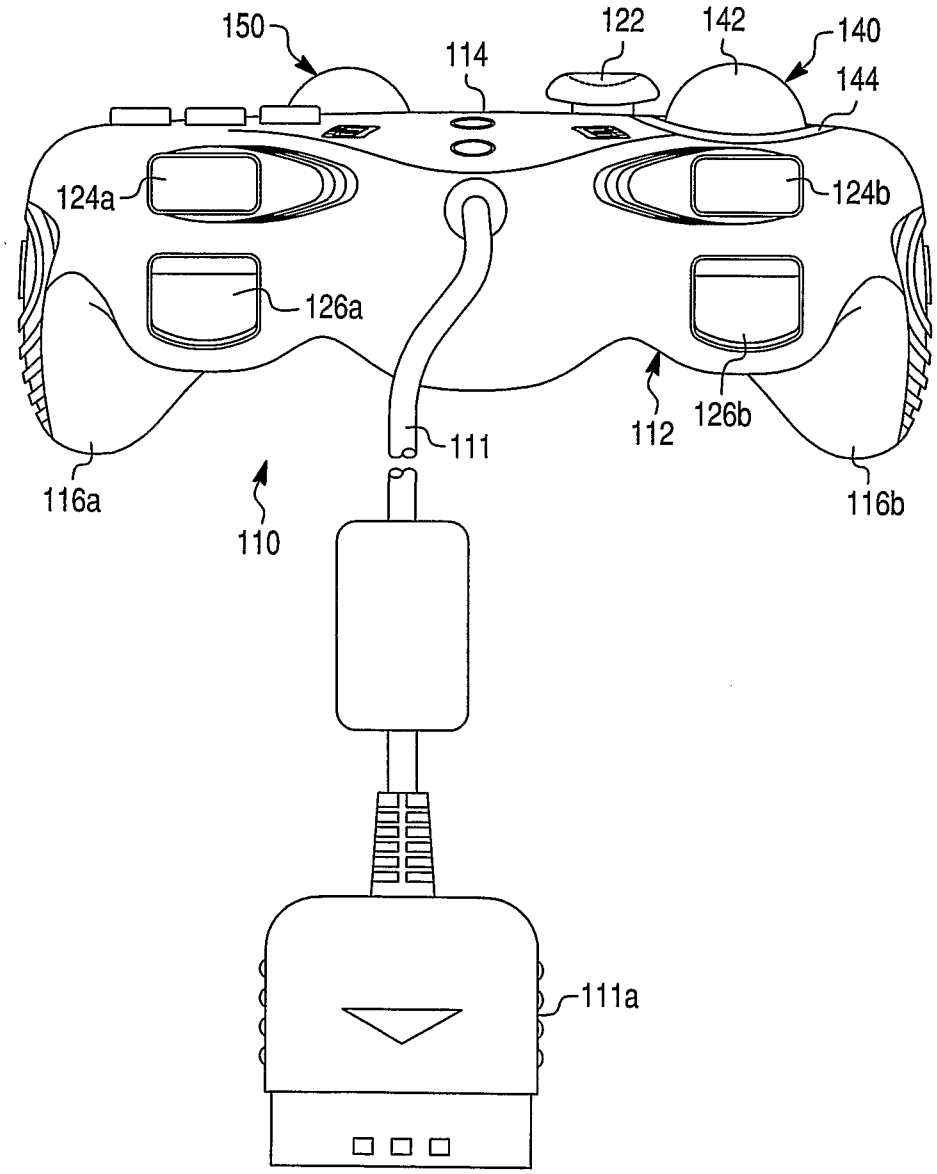

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142
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144
124a
124b
126a
126b
111
112
116a
116b
110
111a

Fig. 2C

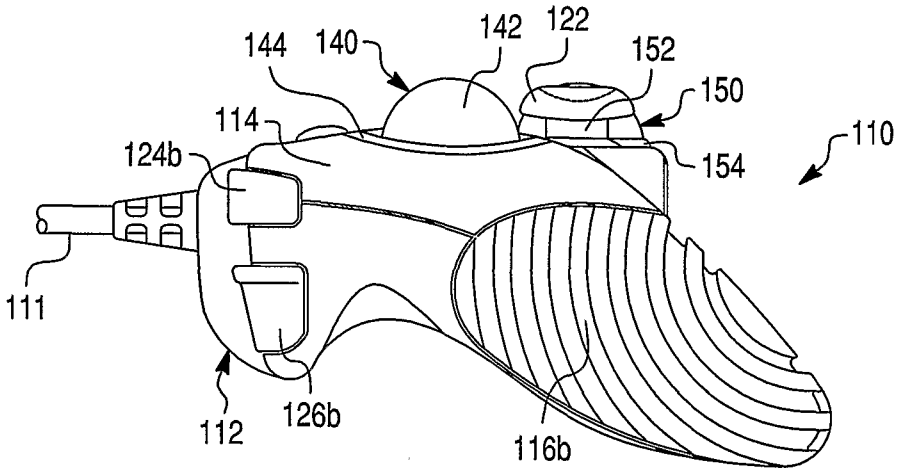


Fig. 3

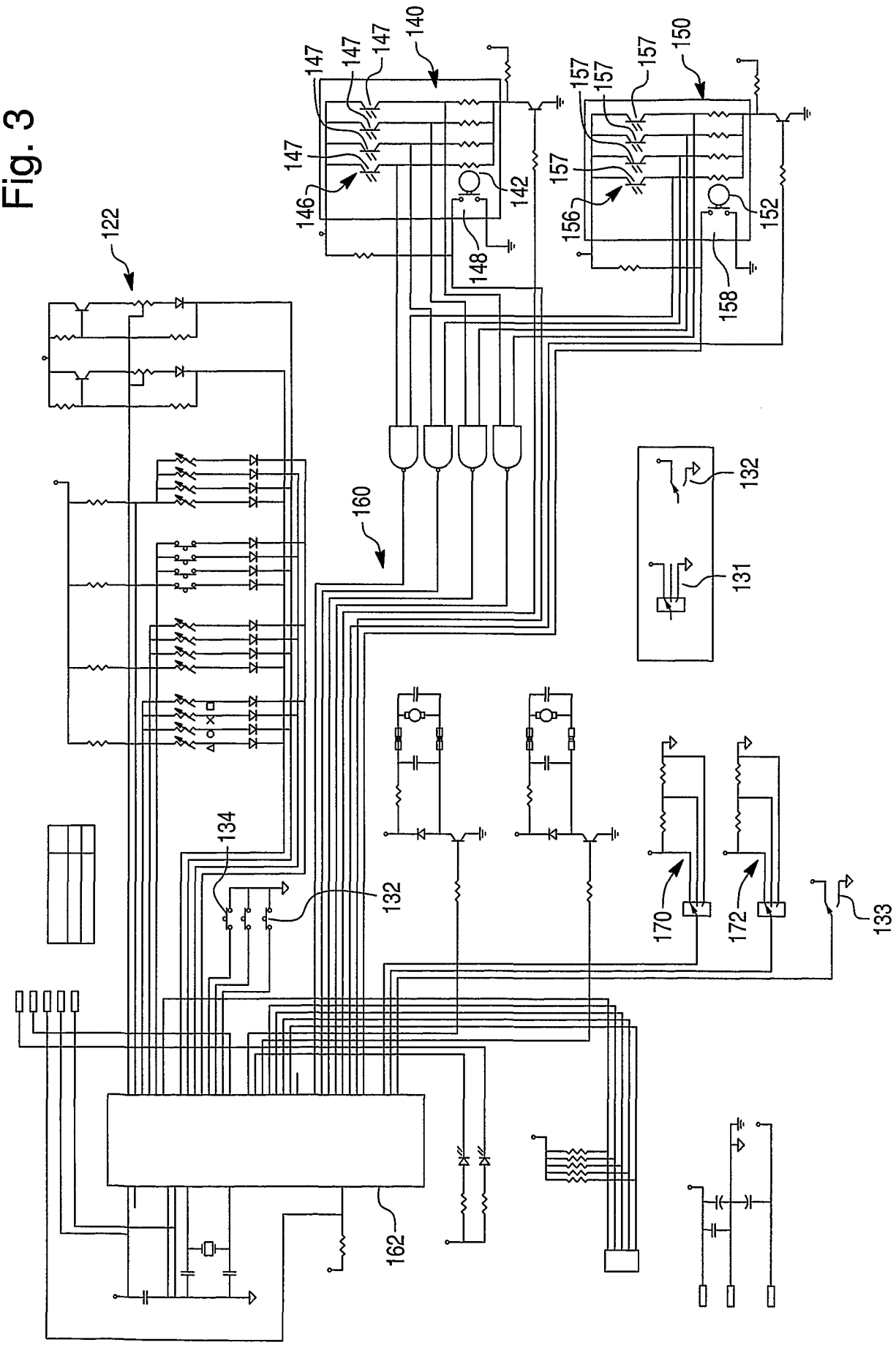

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162

Fig. 4A

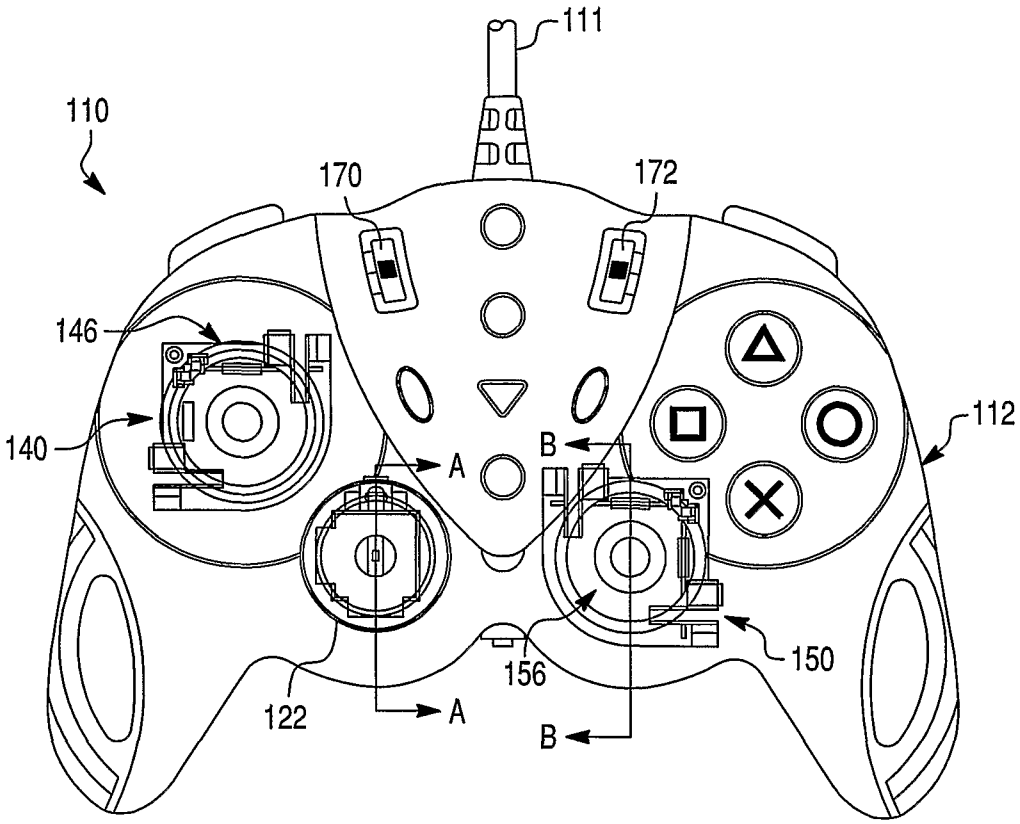


Fig. 4B

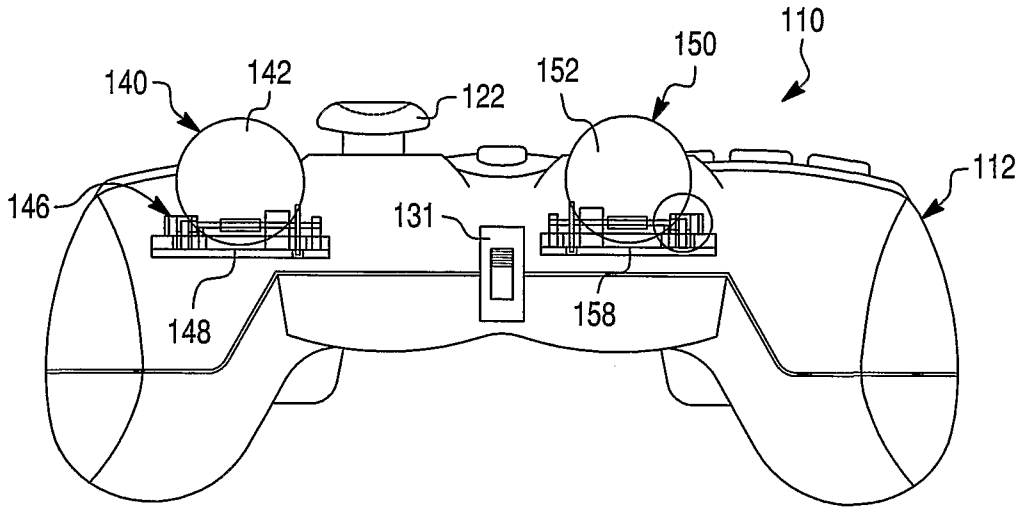


Fig. 5B

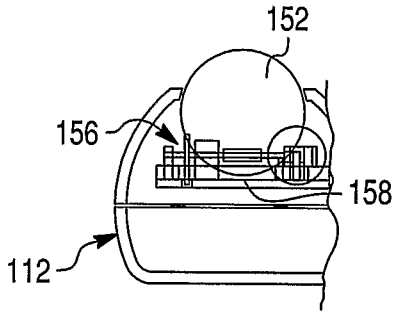


Fig. 5A

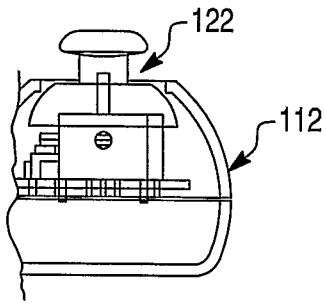


Fig. 6A

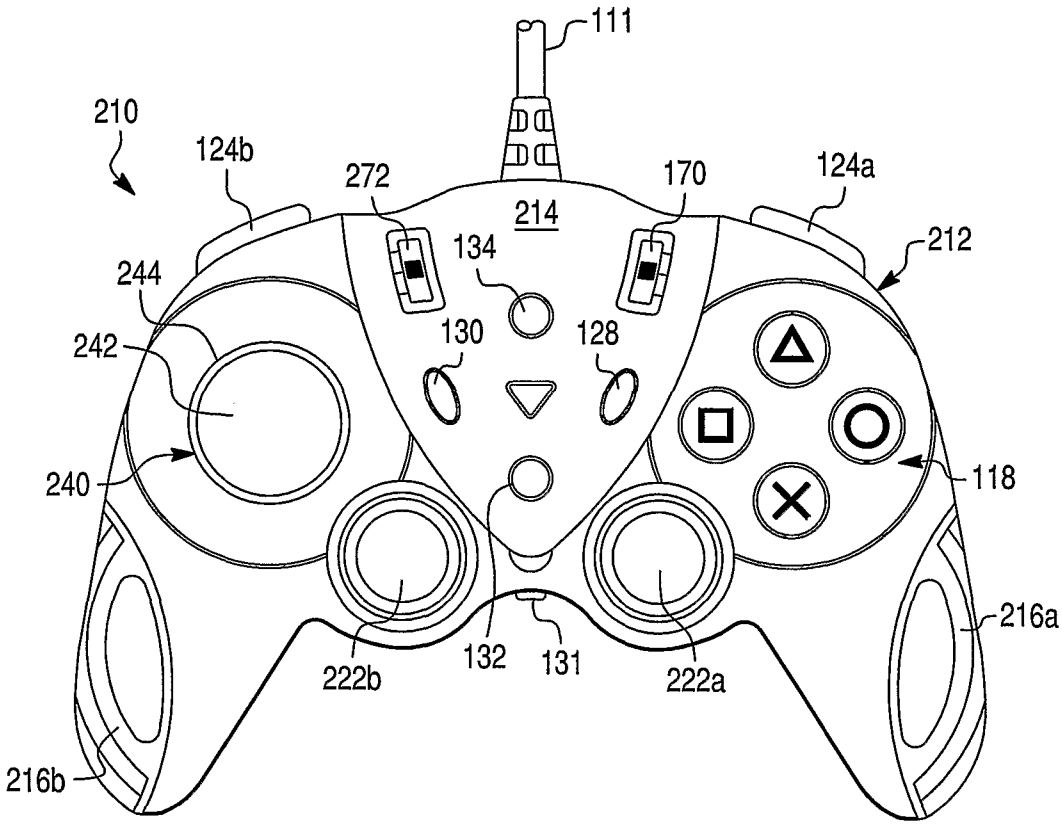

111
210
124b
272
170
124a
214
212
134
244
130
128
242
240
118
216a
222b
132
131
222a
216b

Fig. 6B

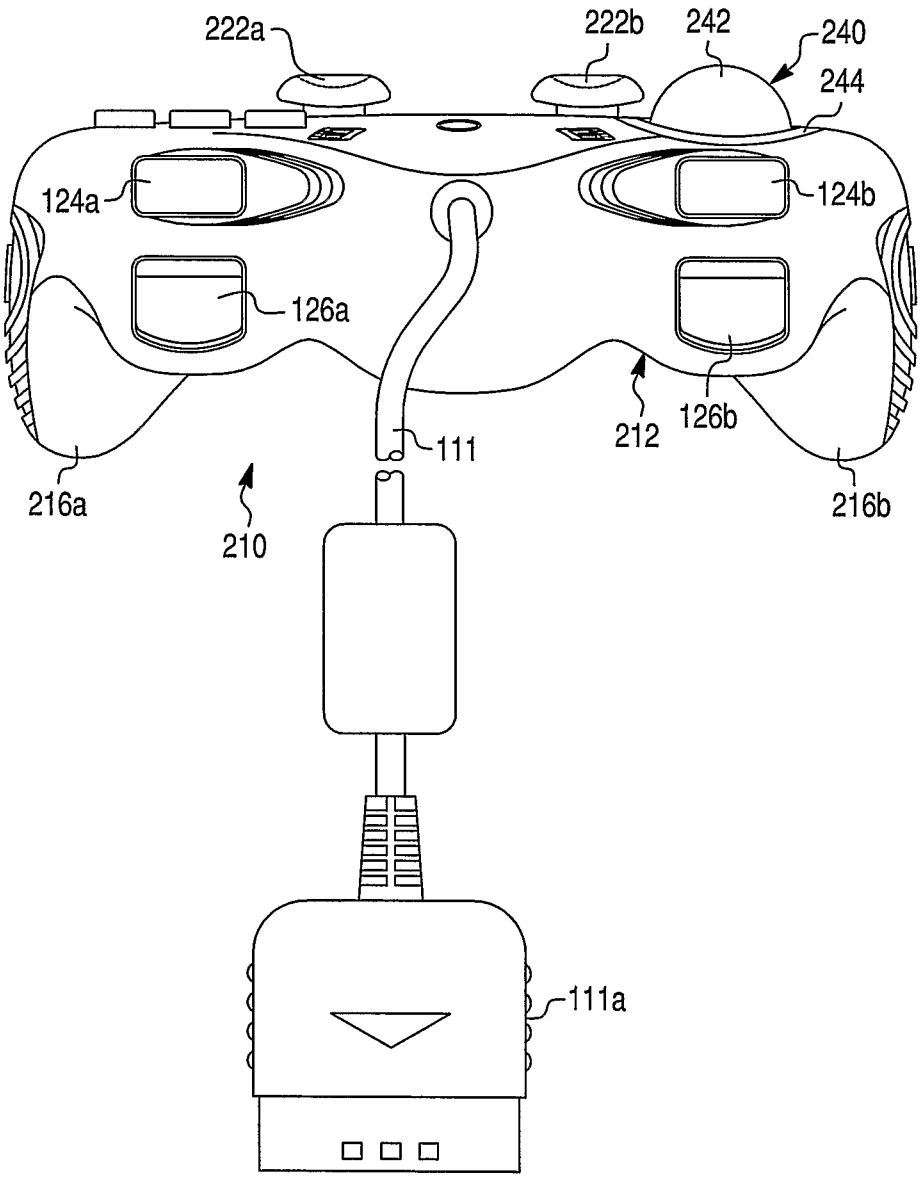

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124b
126a
126b
212
111
216a
210
216b
111a

Fig. 6C

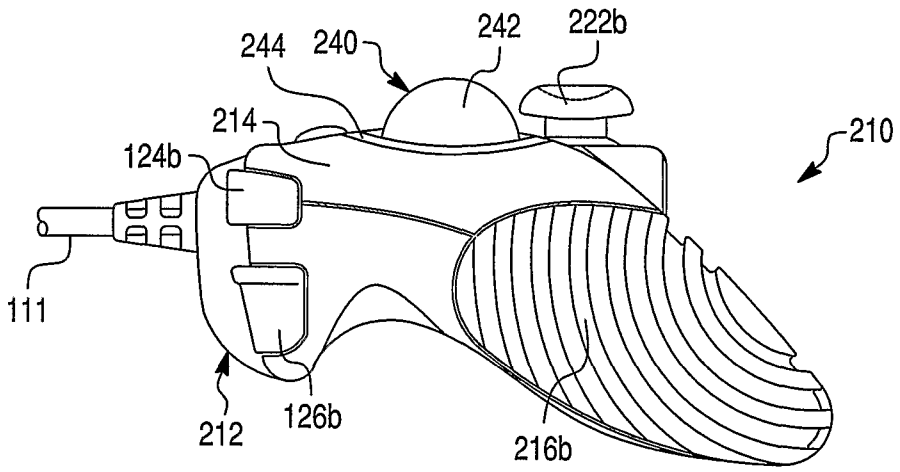


Fig. 7A

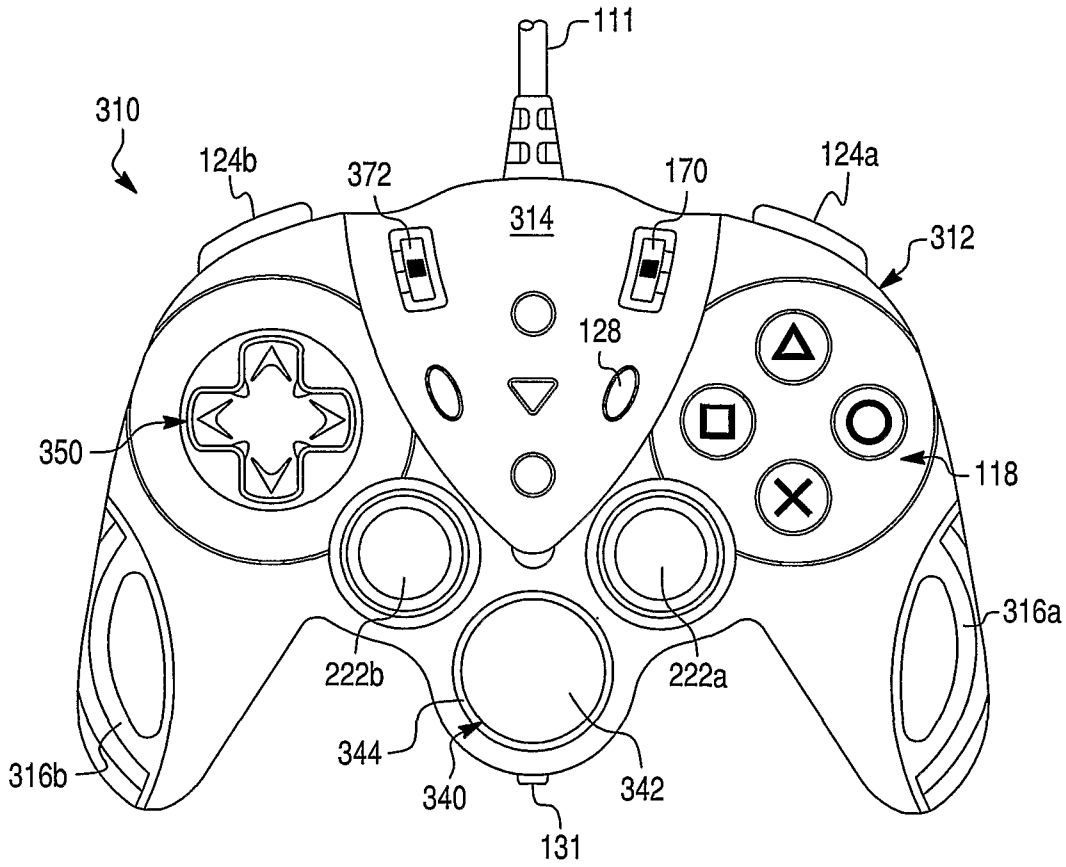

111
310
124b
372
170
124a
314
312
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350
118
316a
222b
222a
344
342
340
316b
131

Fig. 7B

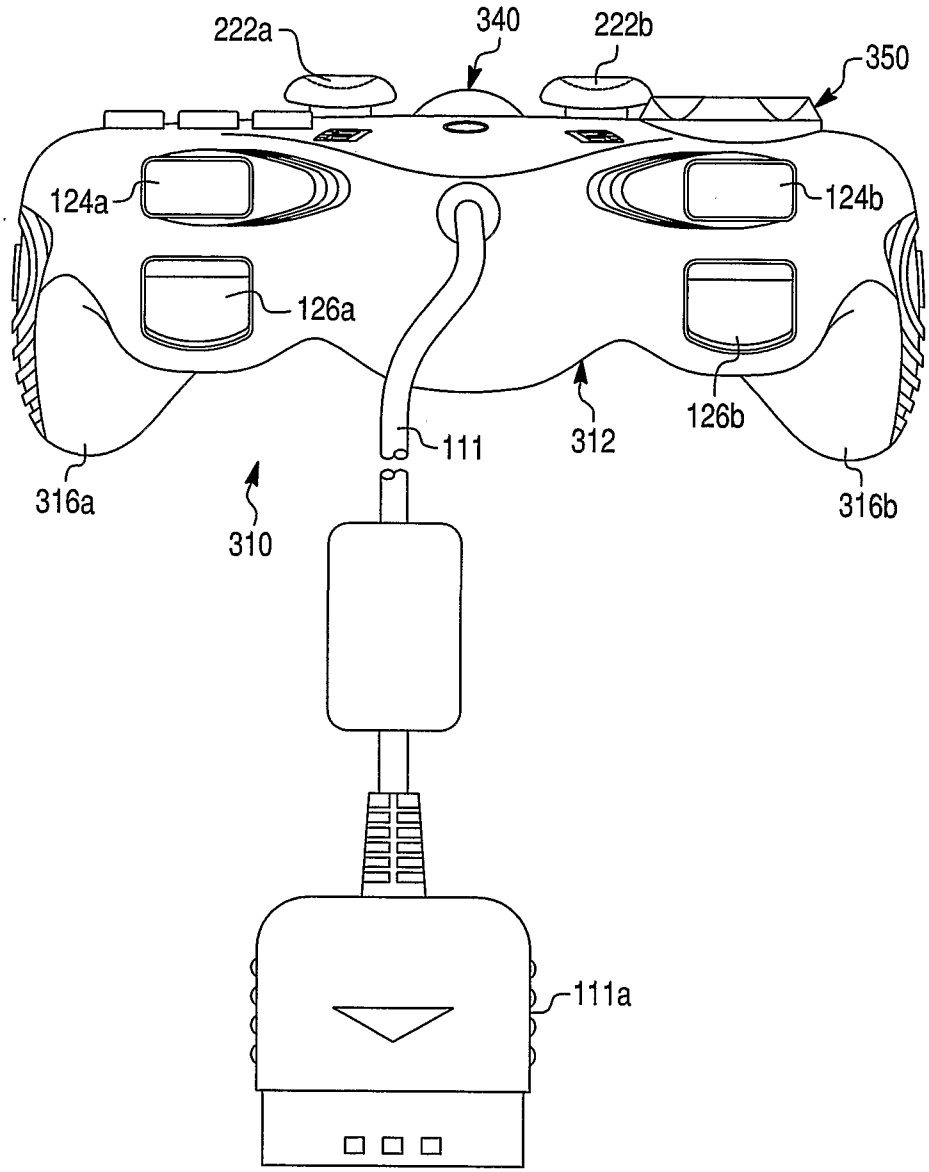

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111a

Fig. 7C

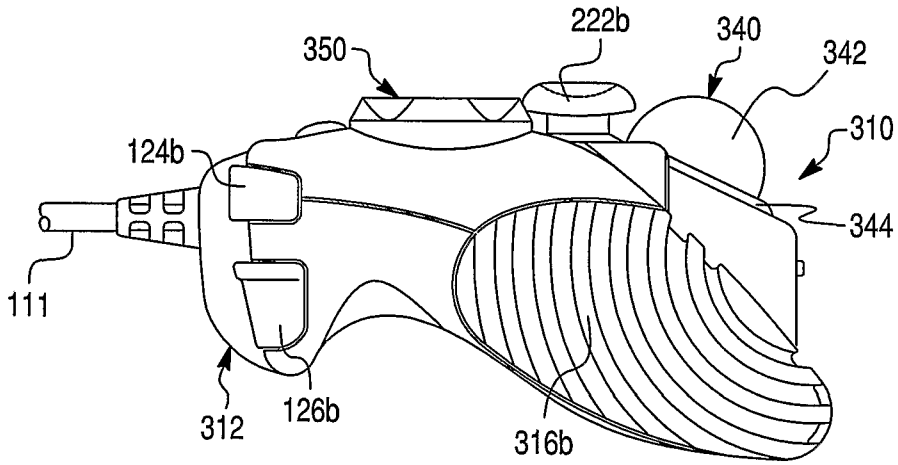


Fig. 8

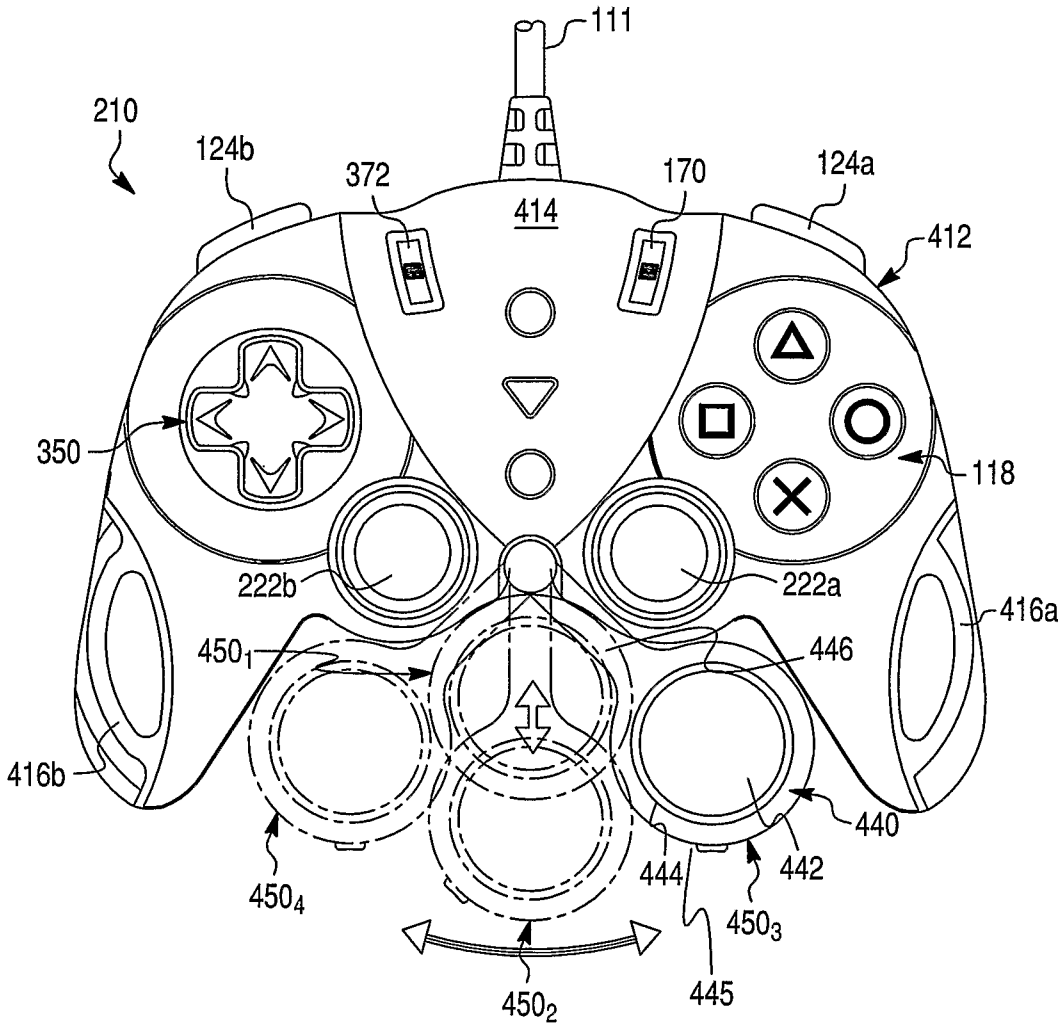

111
210
124b
372
170
124a
414
412
350
118
222b
222a
416a
450_1
446
416b
440
444
442
450_4
450_3
450_2
445

Fig. 9

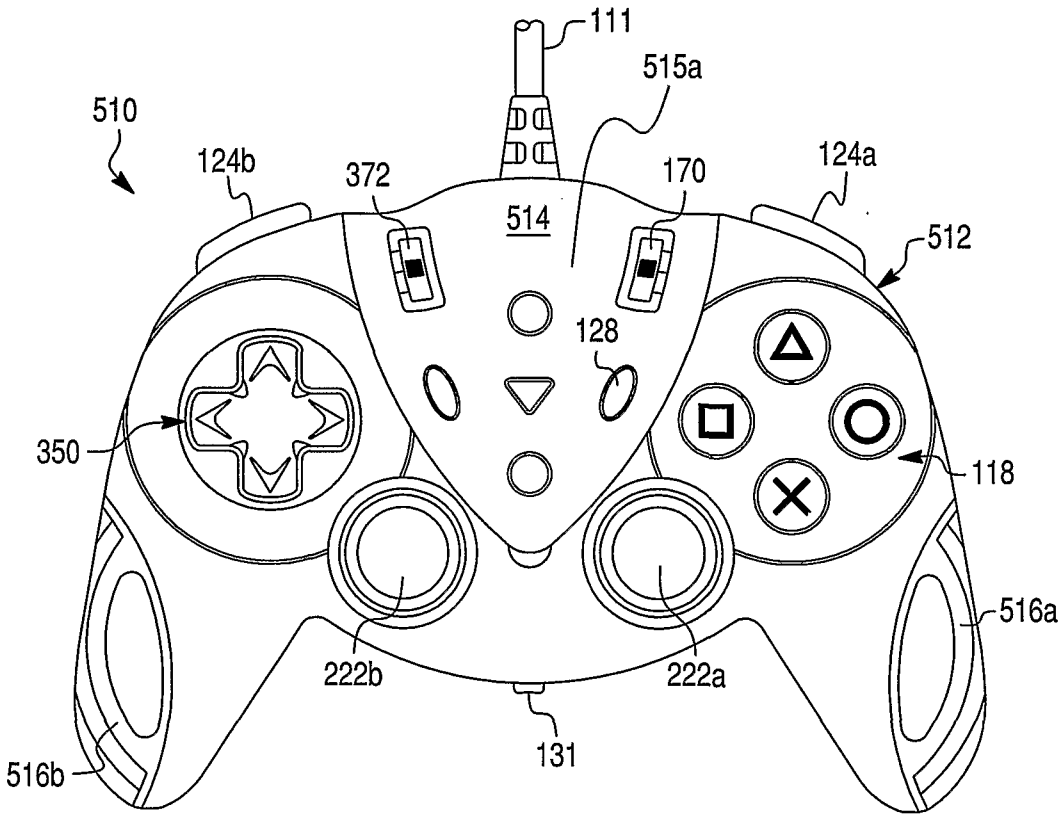
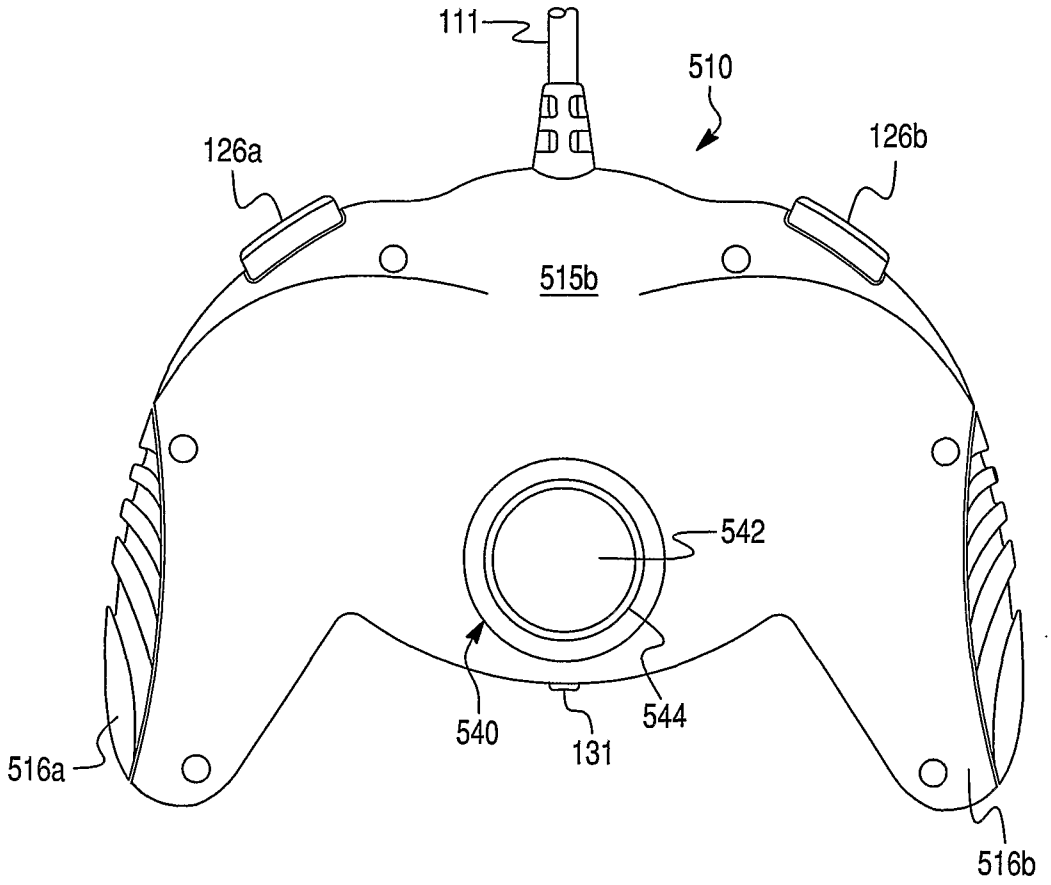

111
515a
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124b
372
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512
128
350
118
516a
222b
222a
131
516b

Fig. 10



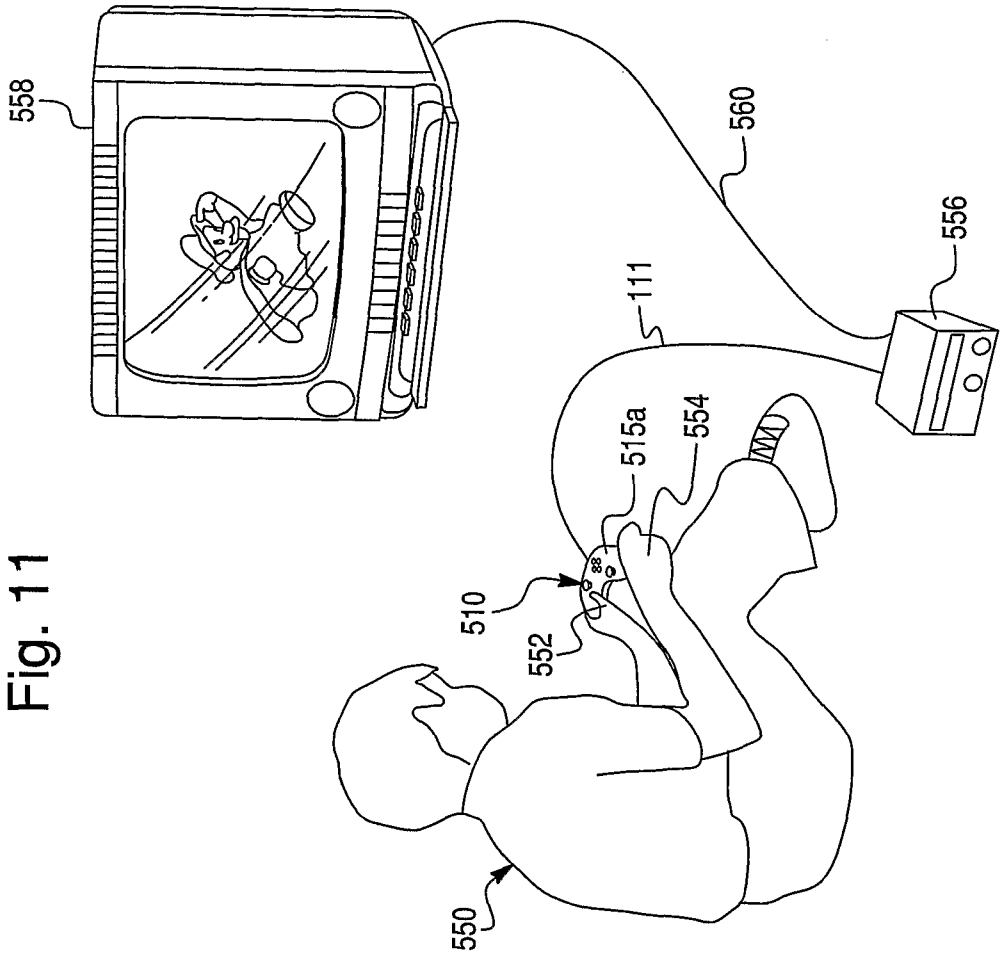


Fig. 11

Fig. 12

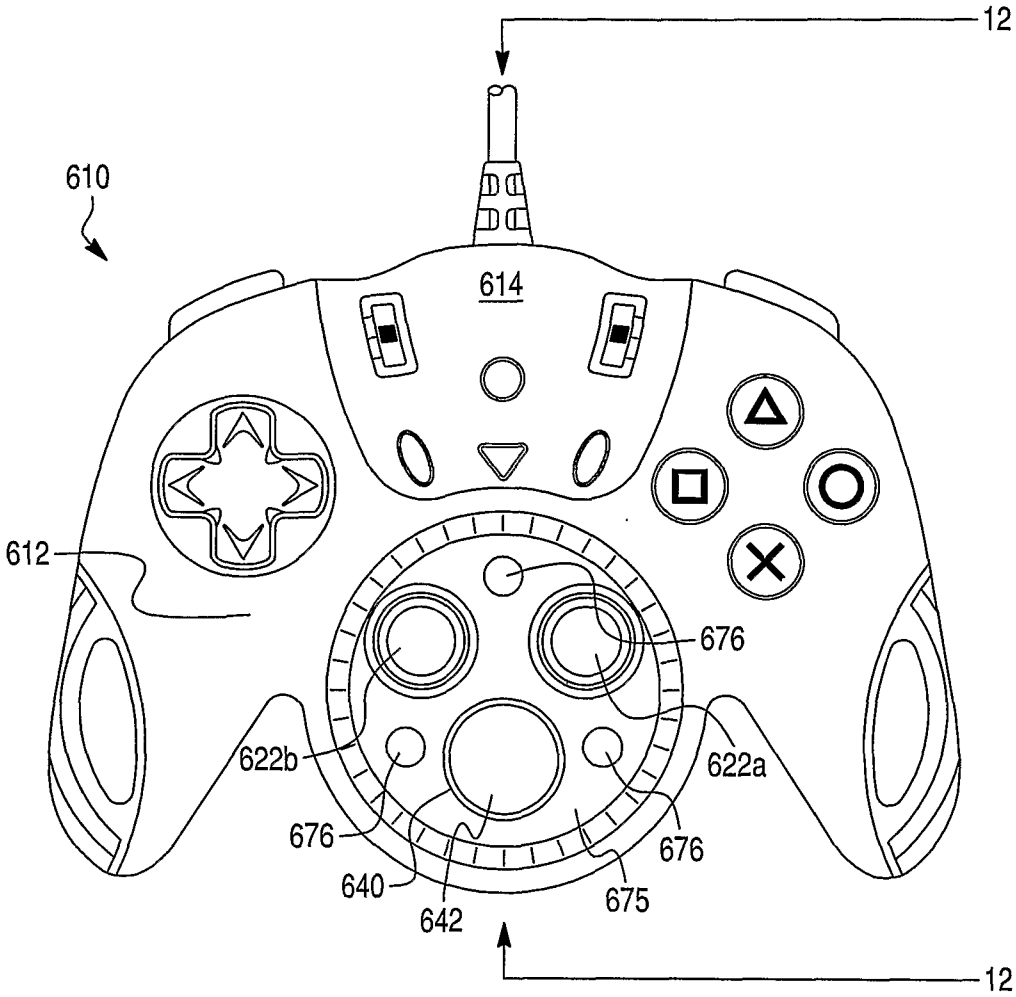

12
610
614
612
676
622b
622a
676
676
640
642
675
12

Fig. 14

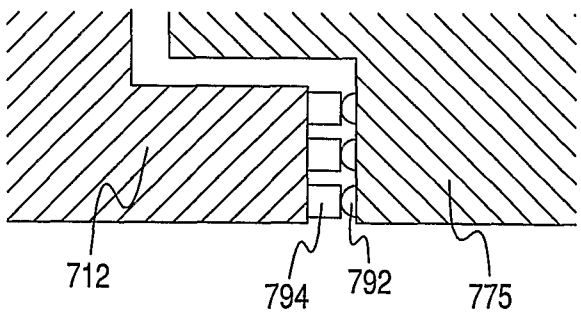
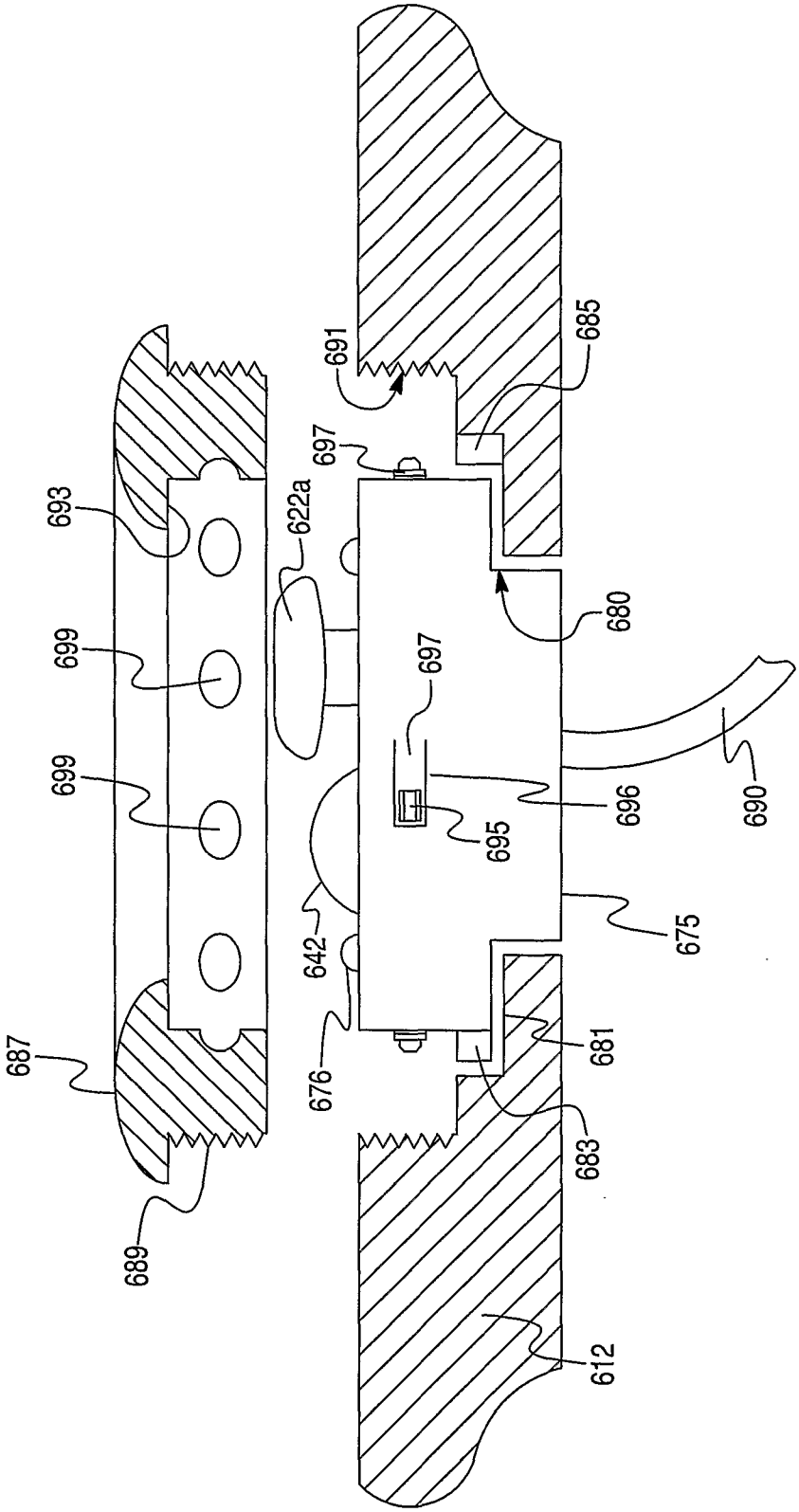

712
794
792
775

Fig. 13


691
685
697
693
622a
680
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675
642
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612

INTERNATIONAL SEARCH REPORT

International application No
P[redacted]/US2005/034438

A. CLASSIFICATION OF SUBJECT MATTER
INV. A63F13/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A63F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 743 100 B1 (NEISER GABE) 1 June 2004 (2004-06-01) figure 1a	1,8
X	EP 1 201 274 A (MIDWAY AMUSEMENT GAMES, LLC) 2 May 2002 (2002-05-02)	1,2,8,9
A	abstract; figure 1	3-6, 10-18
A	WO 2004/019596 A (TTPCOM LIMITED; WYKES, DAVID, HENRY) 4 March 2004 (2004-03-04) abstract	1-6,8-18
A	US 5 883 690 A (MEYERS ET AL) 16 March 1999 (1999-03-16) abstract	1-6,8-18

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 February 2006	29 06 2006

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Arnold, S

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2005/034438

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-6, 8-18

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-6,8-18

Video game controller with moveable operating members

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2. claim: 7

Video game controller with trackball on rear surface

INTERNATIONAL SEARCH REPORT

[redacted]Information on patent family members

International application No
P[redacted]/US2005/034438

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6743100 B1	01-06-2004	NONE	
EP 1201274 A	02-05-2002	AT 294014 T	15-05-2005
		CA 2360618 A1	30-04-2002
		DE 60110340 D1	02-06-2005
		DE 60110340 T2	02-03-2006
		ES 2241766 T3	01-11-2005
WO 2004019596 A	04-03-2004	AU 2003255801 A1	11-03-2004
US 5883690 A	16-03-1999	NONE	