

EXHIBIT 4



US006906700B1

(12) **United States Patent**
Armstrong

(10) **Patent No.: US 6,906,700 B1**
(45) **Date of Patent: Jun. 14, 2005**

(54) **3D CONTROLLER WITH VIBRATION**

(75) Inventor: **Brad A. Armstrong**, Carson City, NV (US)

(73) Assignee: **Anascape**, Carson City, NV (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 481 days.

(21) Appl. No.: **09/715,532**

(22) Filed: **Nov. 16, 2000**

Related U.S. Application Data

(63) Continuation of application No. 08/677,378, filed on Jul. 5, 1996, now Pat. No. 6,222,525, which is a continuation-in-part of application No. 08/393,459, filed on Feb. 23, 1995, now Pat. No. 5,565,891, which is a continuation-in-part of application No. 07/847,619, filed on Mar. 5, 1992, now Pat. No. 5,589,828.

(51) **Int. Cl.**⁷ **G09G 5/08**

(52) **U.S. Cl.** **345/161**; 345/156

(58) **Field of Search** 345/156-172; 74/471 XY; 200/5 R, 6 A, 6 R, 9, 40, 41, 50.32-50.37, 61, 45 R, 61.46, 61.53, 512, 518-521, 530, 564; 341/20-35

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,430,284 A	11/1947	Evers	.....	341/187
3,296,882 A	1/1967	Durand	.....	74/471
3,611,068 A	10/1971	Fujita	.....	338/2
3,693,425 A	9/1972	Starita et al.	.....	73/862,044
3,710,050 A	1/1973	Richards	.....	200/61.43
3,771,037 A	11/1973	Bailey	.....	318/580
3,806,471 A	4/1974	Mitchell	.....	252/519
3,921,445 A	11/1975	Hill et al.	.....	73/862
3,952,173 A	4/1976	Tsuji et al.	.....	200/511
3,988,556 A	10/1976	Hyodo	.....	200/511
3,993,884 A	11/1976	Kondur et al.	.....	200/295
4,045,650 A	8/1977	Nestor	.....	200/556
4,099,409 A	7/1978	Edmond	.....	73/862

4,133,012 A	1/1979	Takamiya et al.	.....	360/90
4,158,759 A	6/1979	Mason	.....	219/720
4,164,634 A	8/1979	Gilano	.....	200/5 A
4,216,467 A	8/1980	Colston	.....	341/20
4,224,602 A	9/1980	Anderson et al.	.....	340/321
4,246,452 A	* 1/1981	Chandler	.....	200/5 A

(Continued)

FOREIGN PATENT DOCUMENTS

AU	2379484	8/1984
AU	544234	5/1985
AU	557120	12/1986

(Continued)

OTHER PUBLICATIONS

IBM Technical Disclosure Bulletin, vol. 21, No. 9, Feb. 1, 1979, pp. 3845-3846, Anonymous author, Title: "Keyboard Device For Upper And Lower Case Keying Without Shifting". The Present Applicant could not locate a copy of this IBM disclosure but lists the data because it was cited as an "X" reference in a European Patent Office Search report on a related invention filed for by another Applicant.

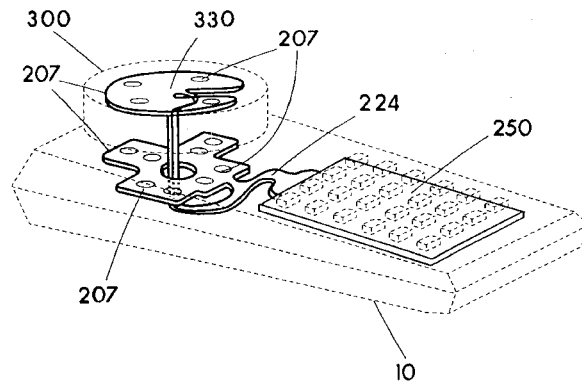
(Continued)

Primary Examiner—Chanh Nguyen

(57) **ABSTRACT**

A hand operated controller or converter structured for allowing hand inputs to be converted or translated into electrical outputs, the controller structured with a plate or platform moveable relative to a base or housing about two mutually perpendicular axes generally parallel to the platform to effect a plurality of sensors for defining output signal(s) based on movement of the platform. The sensors each have an electrically active activator spatially separated from an electric contact surface. A tactile feedback motor with shaft and offset weight is mounted as a component of the controller for providing vibration to be felt by a hand operating the controller. In some embodiments the sensors are pressure sensitive variable output sensors.

33 Claims, 40 Drawing Sheets



35

four unidirectional sensors, said four unidirectional sensors used to input a first axis and a second axis of control for the game;

a first bi-directional proportional sensor, said first bi-directional proportional sensor used to input a third axis of control for the game;

a second bi-directional proportional sensor, said second bi-directional proportional sensor used to input a fourth axis of control for the game;

a third bi-directional proportional sensor, said third bi-directional proportional sensor used to input a fifth axis of control for the game;

a fourth bi-directional proportional sensor, said fourth bi-directional proportional sensor used to input a sixth axis of control for the game;

an independent first button structured to activate a first button sensor, said first button depressible by a single finger of the user, said first button sensor capable of outputting a proportional signal used to control the game;

an independent second button structured to activate a second button sensor, said second button depressible by a single finger of the user, said second button sensor capable of outputting a proportional signal used to control the game;

a sheet connecting to at least eight of the sensors.

15. A 3-D graphics controller used with a television based game, comprising:

a housing;

a first element structured to activate four unidirectional sensors used to control a television based game, said first element supported at least in part by said housing and sufficiently exposed to allow two axes of input;

a second element structured to activate a first two bi-directional proportional sensors used to control the game, said second element supported at least in part by said housing;

a third element structured to activate a second two bi-directional proportional sensors used to control the game, said third element supported at least in part by said housing;

an independent first button sensor, said first button sensor depressible by a single finger of a user, said first button sensor creates simple switched On/Off data used to control the game, said independent first button sensor at least in part connected to

a sheet;

an independent pivotal second button structured to activate a second button sensor, said second button pivots upon depression by a single finger of the user, said second button sensor at least in part connected to said sheet, said second button sensor capable of outputting a proportional signal used to control the game;

an independent pivotal third button structured to activate a third button sensor, said third button pivotal upon depression by a single finger of the user, said third button sensor at least in part connected to said sheet, said third button sensor capable of outputting a proportional signal used to control the game;

active tactile feedback vibration detectable by the user of the game, said active tactile feedback vibration provided by

an offset weight connected to

a motor, said motor supported within said housing.

36

16. A 3-D graphics controller for controlling a television based game, comprising:

a first element structured to activate four unidirectional sensors, said four unidirectional sensors useful to control the television based game; said four unidirectional sensors at least in part connected to

a first sheet;

a second element structured to activate a first two bi-directional proportional sensors, said first two bi-directional proportional sensors at least in part connected to said first sheet, said first two bi-directional sensors useful to control the television based game;

a third element structured to activate a second two bi-directional proportional sensors, said second two bi-directional proportional sensors useful to control the television based game; said second two bi-directional proportional sensors at least in part connected to

a second sheet, said first sheet located on a first plane, and said second sheet located on a second plane;

an independent first button sensor, said first button sensor depressible by a single finger of the user, said first button sensor at least in part connected to said first sheet, said first button sensor capable of transforming depression into a proportional signal useful to control the television based game;

an independent second button sensor, said second button sensor depressible by a single finger of the user, said second button sensor at least in part connected to said first sheet, said second button sensor capable of transforming depression into a proportional signal useful to control the television based game;

tactile feedback means for providing vibration detectable by the user of said electronic game, said tactile feedback means supported within said controller.

17. A 3-D graphics controller for controlling a game, comprising:

a first element structured to activate four unidirectional sensors, said four unidirectional sensors useful to control a game; said four unidirectional sensors at least in part connected to

a first sheet;

a second element structured to activate a first two bi-directional proportional sensors, said first two bi-directional proportional sensors at least in part connected to said first sheet, said first two bi-directional sensors useful to control the game;

a third element structured to activate a second two bi-directional proportional sensors, said second two bi-directional sensors useful to control the game; said second two bi-directional proportional sensors at least in part connected to a second sheet, said first sheet located on a first plane, and said second sheet located on a second plane within said controller;

an independent first button, said first button depressible by a single finger of the user, said first button positioned to activate a first proportional sensor and said first button positioned to activate a simple switched On/Off sensor useful to control the game; said first proportional sensor connected to said first sheet, said first proportional sensor capable of transforming depression of said first button into a proportional signal useful to control said electronic game;

an independent second button, said second button depressible by a single finger of the user, said second