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 Amended claims in accordance with Rule 137(2) EPC.

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(54) **Lateral dynamic simulation device**

(57) There is disclosed a lateral dynamic simulation device including a positioning platform (1), a motor mechanism (2) and a carriage (3). The positioning platform (1) has an upright positioned arm (10). The motor mechanism (2) has multiple degrees of freedom and comprises a base (20), a platform (21) and a plurality of stretchable bars (22) to join the base (20) and the platform (21) by

the universal joints (220). The carriage (3) has a space (30) at the frontal portion for carrying passengers and a back portion (31) at the rear portion. The base (20) of the motor mechanism (2) is fixed to the arm (10) of the positioning platform (1) and the platform (21) of the motor mechanism (2) is fixed to the back portion (31) of the carriage (3).

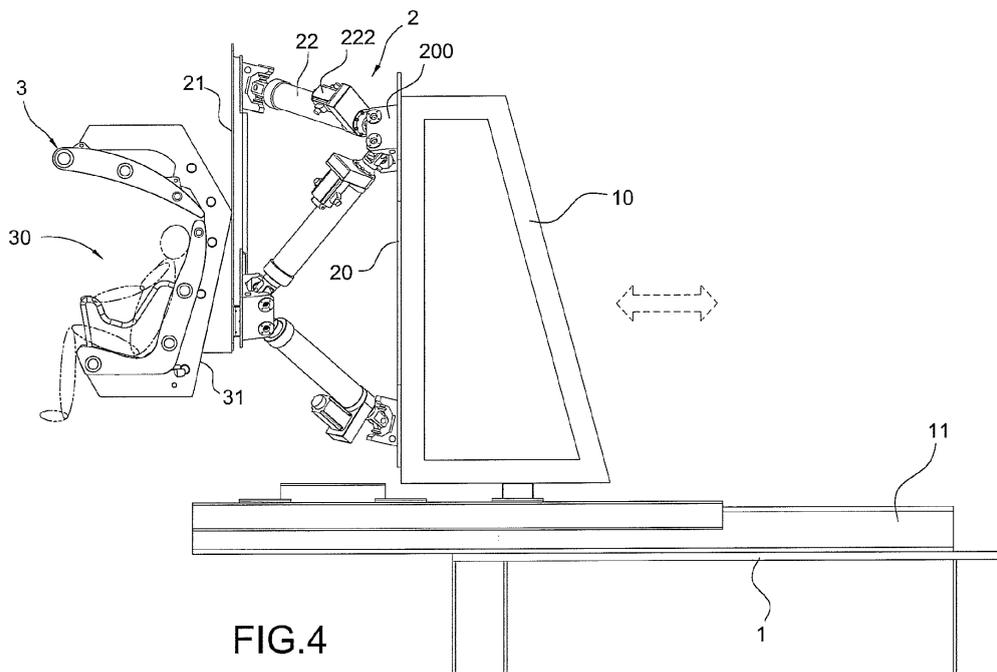


FIG.4

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] NONE

BACKGROUND

[0002] A) TECHNICAL FIELD

[0003] The present invention relates to an entertainment facility. More particularly, the present invention relates to a lateral dynamic simulation device that is capable of performing in six degrees of freedom of motion with the Stewart Platform.

[0004] B) RELATED ART

[0005] Stewart Platform is a parallel working platform including six linear actuators, six universal joints, which join the upper and lower parts, and the platform and the base. The six linear actuators has varieties of lengths to motivate the universal joints to lead the platform on the top position in different positions and angles, thus to satisfy the inquiry for operation.

[0006] The conventional technique of applying Stewart Platform in the entertainment facility includes placing the passenger carriage above the Stewart Platform in the early stage, or reversely hang the Stewart Platform in the air and beneath the Stewart Platform. The former is an older design and the latter is designed based on the dynamic simulation for the reality and the convulsion. The dynamic force motors from the top of the carriage thus to enable the players to experience the simulation of reality.

[0007] However, the Stewart Platform is designed to position above the rear part of the carriage that substantially blocks the view to the carriage, and accordingly the surrounding layout and design. After all, such dynamic simulation for the entertainment facility not only provides the players the physical experience but also the visual and audio effects. Therefore, if the surrounding layout and design are affected, the reality simulation cannot be as good as it supposed to be.

BRIEF SUMMARY

[0008] The present invention provides a lateral dynamic simulation device including a motor mechanism. The Stewart Platform, with six degrees of freedom positioned behind the carriage is connected to a motor to enable the players to feel the reality of hanging in the air while sitting in the carriage without affecting the surrounding layout and design since the Stewart Platform is positioned at the rear side of the carriage.

[0009] The present invention provides a lateral dynamic simulation device comprising a positioning platform, a motor mechanism and a carriage. The positioning platform comprises an upright arm. The motor mechanism comprises a plurality of degrees of freedom and comprises a base and a platform and a plurality of stretchable

bars connecting the base and the platform. The stretchable bars are connected to the base and the platform by the universal joint. The carriage comprises a seating space at a frontal portion for carrying passengers; and the back side of the seating space is a rear portion of the carriage. The base of the motor mechanism is fixed positioning on the arm of the platform, and the platform of the motor mechanism is securely connected to the rear portion of the carriage.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] These and other features and advantages of the various embodiments disclosed herein will be better understood with respect to the following description and drawings, in which like numbers refer to like parts throughout, and in which:

[0011] FIG. 1 is a perspective view of the present invention;

[0012] FIG. 2 is a perspective view along another angle of the present invention;

[0013] FIG. 3 is a local exploded view of a motor mechanism of the present invention;

[0014] FIG. 4 is an aspect of operation of the present invention;

[0015] FIG. 5 is a perspective view of a motor mechanism according to another embodiment of the present invention;

[0016] FIG. 6 is a planer graph of a motor mechanism according to another embodiment of the present invention; and

[0017] FIG. 7 is a perspective view of a motor mechanism according to another embodiment of the present invention

DETAILED DESCRIPTION

[0018] Referring to Fig. 1 and 2, perspective and perspective view along another angle of the present invention, the present invention provides a lateral dynamic simulation device comprising a positioning platform 1, a motor mechanism 2 and a carriage 3.

[0019] The positioning platform 1 is for placing and fixing the dynamic simulation device on the ground, and comprises an upright arm 10 positioned erectly for positioning the motor mechanism 2. In the embodiment of the present invention, the positioning platform 1 comprises a sliding track 11 for the arm 10 to move horizontally therein.

[0020] The motor mechanism 2 comprises six degrees of freedom. Referring to Fig. 3 at the same time, the motor mechanism 2 comprises a base 20, a platform 21 and a plurality of stretchable bars 22 for connecting the base 20 and the platform 21. The stretchable bars 22, the base 20 and the platform 21 are joined by the universal joint 220. The assembly of the above elements forms the motor mechanism 2 with six degrees of freedom, for example the Stewart Platform. In the embodiment of the present

invention, the base 20 and the platform 21 are formed in triangular shape and positioned alternatively for the stretchable bar 22 to connect the tips of the triangular base 20 and the platform 21. Furthermore, the base 20 and the platform 21 also comprise axial portions 200, 210 at the triangle tips, and the axial portions 220, 210 comprise axial holes 211 for receiving the universal joints 220 of the stretchable bar 22. The universal joints 220 of stretchable bars 22 comprise a protruded axle 221 to fit into the axial hole 211. The axial hole can be formed in a C-shape opening for receiving the corresponding axle 221. Every stretchable bar 22 can be a linear actuator and respectively control the length by a motor device 222. The motor device 222 can be a motor or an oil cylinder.

[0021] The carriage 3 is for carrying passengers, referring to Fig. 4, the carriage 3 comprises a space 30 at the frontal region for the passengers to sit and a back portion 31 behind the space 30 of the carriage 3. The present invention has the base 20 of the motor mechanism 2 fixed to the arm 10 of the positioning platform 1, and the platform 21 of the motor mechanism 2 is fixed to the back portion 31 of the carriage 3, thus the carriage 3 is positioned in air by the joining the motor mechanism 2 without having the frontal vision blocked by the motor mechanism 2. With the lateral position, the overall space occupation in height can be substantially reduced to benefit the surrounding layout and design.

[0022] Furthermore, referring to Fig. 4, the arm 10 of the positioning platform 1 is able to slide in the sliding track 11 and to move horizontally, thus when the arm 10 moves backward horizontally on the sliding track 11, the passengers can get on the carriage 3 easily as the carriage 3 is correspondingly positioned on the positioning platform 1. When the motor mechanism 2 is about to operate, the arm 10 moves forward horizontally by the sliding track 11 and push the carriage 3 out of the frontal side of the positioning platform 1 to allow the passengers to experience more excitement of hanging in air. Moreover, the sliding track 11 can be positioned underneath the arm 10, or positioned above the arm 10 as shown in Fig. 7. The tripping accident can be avoided when the sliding track 11 is positioned above the arm 10.

[0023] Referring to Figs. 5 and 6, to increase the stability for the motor mechanism 2 and support the carriage 3, bars 23 can be installed along the stretchable bars 22 to join the base 20 and the platform 21. With the reinforcement of the bars 23 for supporting the base 20 and the platform 21, the motor mechanism 2 can perform more steadily in supporting the carriage 3 in the lateral position, and accordingly to upgrade the safety.

In summary there is disclosed a lateral dynamic simulation device including a positioning platform 1, a motor mechanism 2 and a carriage 3. The positioning platform 1 has an upright positioned arm 10. The motor mechanism 2 has multiple degrees of freedom and comprises a base 20, a platform 21 and a plurality of stretchable bars 22 to join the base 20 and the platform 21 by the

universal joints 220. The carriage 3 has a space 30 at the frontal portion for carrying passengers and a back portion 31 at the rear portion. The base 20 of the motor mechanism 2 is fixed to the arm 10 of the positioning platform 1 and the platform 21 of the motor mechanism 2 is fixed to the back portion 31 of the carriage 3.

[0024] The above description is given by way of example, and not limitation. Given the above disclosure, one skilled in the art could devise variations that are within the scope and spirit of the invention disclosed herein, including configurations ways of the recessed portions and materials and/or designs of the attaching structures. Further, the various features of the embodiments disclosed herein can be used alone, or in varying combinations with each other and are not intended to be limited to the specific combination described herein. Thus, the scope of the claims is not to be limited by the illustrated embodiments.

Claims

1. A lateral dynamic simulation device, comprising a positioning platform (1), comprising an upright arm (10); a motor mechanism (2), with multiple degrees of freedom, comprising a base (20), a platform (21) and a plurality of stretchable bars (22) connecting said base (20) and said platform (21); said stretchable bar (22), said base (20) and said platform (21) are joined by universal joints (220); and a carriage (3), having a space (30) at a frontal portion for passengers to sit, and a back portion (31) at a rear side of said carriage (3); wherein said base (20) of said motor mechanism (2) is fixed to said arm (10) of said positioning platform 1, and said platform (21) of said motor mechanism (2) is fixed to said back portion (31) of said carriage (3).
2. The lateral dynamic simulation device according to claim 1, wherein said base (20) comprises a sliding track (11) to allow said arm (10) to slide horizontally.
3. The lateral dynamic simulation device according to claim 2, wherein said sliding track (11) is positioned underneath or above said arm (10).
4. The lateral dynamic simulation device according to one of the preceding claims, wherein said motor mechanism (2) is a Stewart Platform.
5. The lateral dynamic simulation device according to one of the preceding claims, wherein said base (20)

and platform (21) of said motor mechanism (2) are formed in triangular shape and positioned alternatively, and said stretchable bars (22) are joined to tips of triangles of said base (20) and said platform (21).

6. The lateral dynamic simulation device according to claim 5, wherein said base (20) and said platform (21) further comprise an axial portion (210) at triangle tips, and said axial portion (210) comprises hole (211) for adopting said universal joints (220) of the stretchable bar (22); said universal joints (220) of said stretchable bar (22) have protruded axle (221) axially positioned in the hole (211).
7. The lateral dynamic simulation device according to claim 6, wherein said hole (211) is formed as a C-shape opening.
8. The lateral dynamic simulation device according to one of the preceding claims, wherein said base (20) and platform (21) of the motor mechanism (2) further comprise an axial portion (210) having hole (211) formed correspondingly to receive said universal joint (220) of said stretchable bar (22); said every universal joint (220) of said stretchable bar (22) comprises an axle (221) to position axially in said hole (211); said hole (211) is formed as a C-shape opening.
9. The lateral dynamic simulation device according to one of the preceding claims, wherein said stretchable bars (22) of said motor mechanism (2) is a linear actuator, and can control a length by a motor device (222).
10. The lateral dynamic simulation device according to one of the preceding claims, wherein said motor device (222) can be a motor or an oil cylinder.
11. The lateral dynamic simulation device according to one of the preceding claims, wherein among every said stretchable bar (22) of said motor mechanism (2), bars (23) are position for joining said base (20) and said platform (21).

Amended claims in accordance with Rule 137(2) EPC.

1. A lateral dynamic simulation device, comprising a positioning platform (1), comprising an upright arm (10); a motor mechanism (2), with multiple degrees of freedom, comprising a base (20), a platform (21) and a plurality of stretchable bars (22) connecting said base (20) and said platform (21); said stretchable bar (22), said base (20) and said platform (21) are joined by uni-

versal joints (220); and a carriage (3), having a space (30) at a frontal portion for passengers to sit, and a back portion (31) at a rear side of said carriage (3); wherein said base (20) of said motor mechanism (2) is fixed to said arm (10) of said positioning platform 1, and said platform (21) of said motor mechanism (2) is fixed to said back portion (31) of said carriage (3), **characterized in that** said positioning platform (1) comprises a sliding track (11) to allow said arm (10) to slide horizontally, and **in that** said sliding track (11) is positioned underneath or above said arm (10).

2. The lateral dynamic simulation device according to claim 1, wherein said motor mechanism (2) is a Stewart Platform.

3. The lateral dynamic simulation device according to one of the preceding claims, wherein said base (20) and platform (21) of said motor mechanism (2) are formed in triangular shape and positioned alternatively, and said stretchable bars (22) are joined to tips of triangles of said base (20) and said platform (21).

4. The lateral dynamic simulation device according to claim 3, wherein said base (20) and said platform (21) further comprise an axial portion (210) at triangle tips, and said axial portion (210) comprises hole (211) for adopting said universal joints (220) of the stretchable bar (22); said universal joints (220) of said stretchable bar (22) have protruded axle (221) axially positioned in the hole (211).

5. The lateral dynamic simulation device according to claim 4, wherein said hole (211) is formed as a C-shape opening.

6. The lateral dynamic simulation device according to one of the preceding claims, wherein said base (20) and platform (21) of the motor mechanism (2) further comprise an axial portion (210) having hole (211) formed correspondingly to receive said universal joint (220) of said stretchable bar (22); said every universal joint (220) of said stretchable bar (22) comprises an axle (221) to position axially in said hole (211); said hole (211) is formed as a C-shape opening.

7. The lateral dynamic simulation device according to one of the preceding claims, wherein said stretchable bars (22) of said motor mechanism (2) is a linear actuator, and can control a length by a motor device

(222).

8. The lateral dynamic simulation device according to one of the preceding claims, wherein said motor device (222) can be a motor or an oil cylinder. 5

9. The lateral dynamic simulation device according to one of the preceding claims, wherein among every said stretchable bar (22) of said motor mechanism (2), bars (23) are position for joining said base (20) and said platform (21). 10

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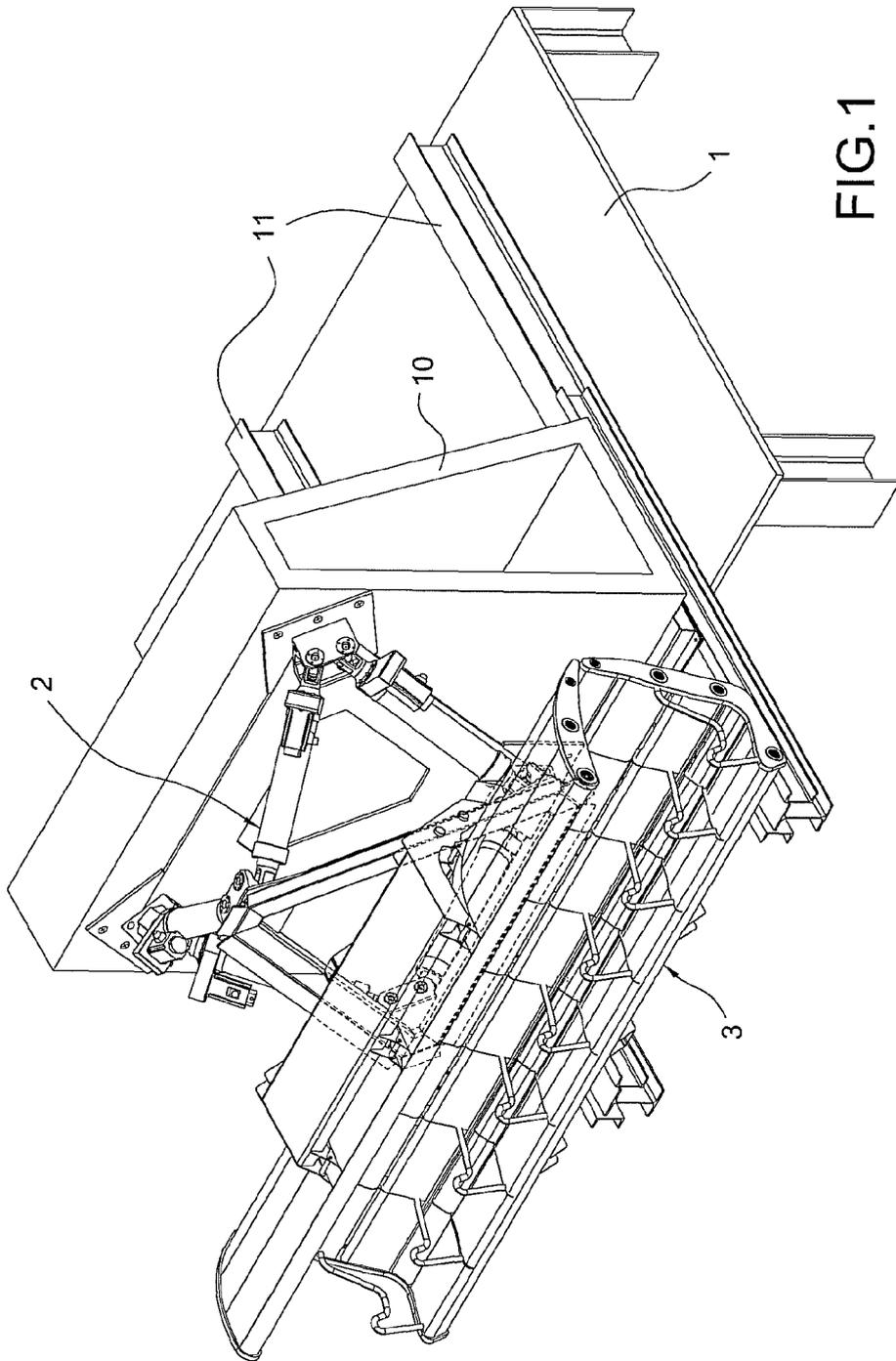


FIG.1

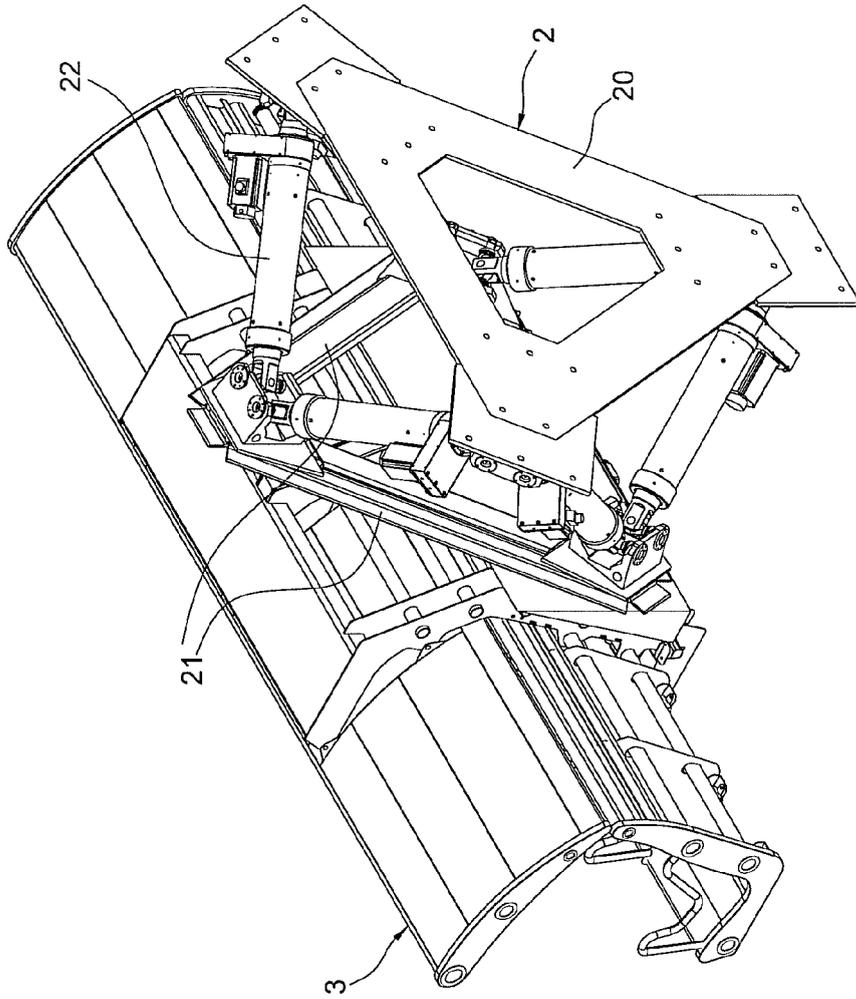


FIG.2

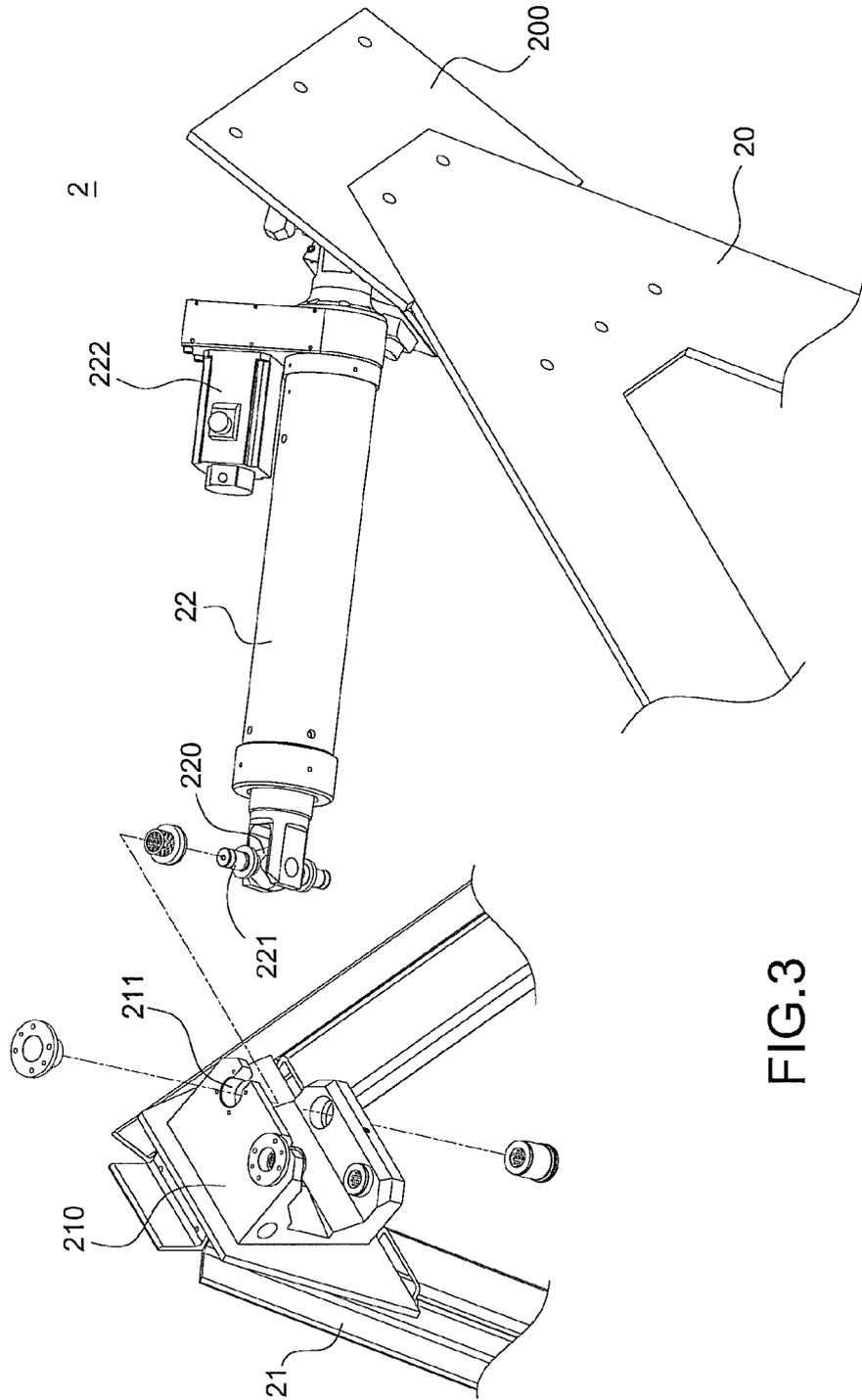


FIG.3

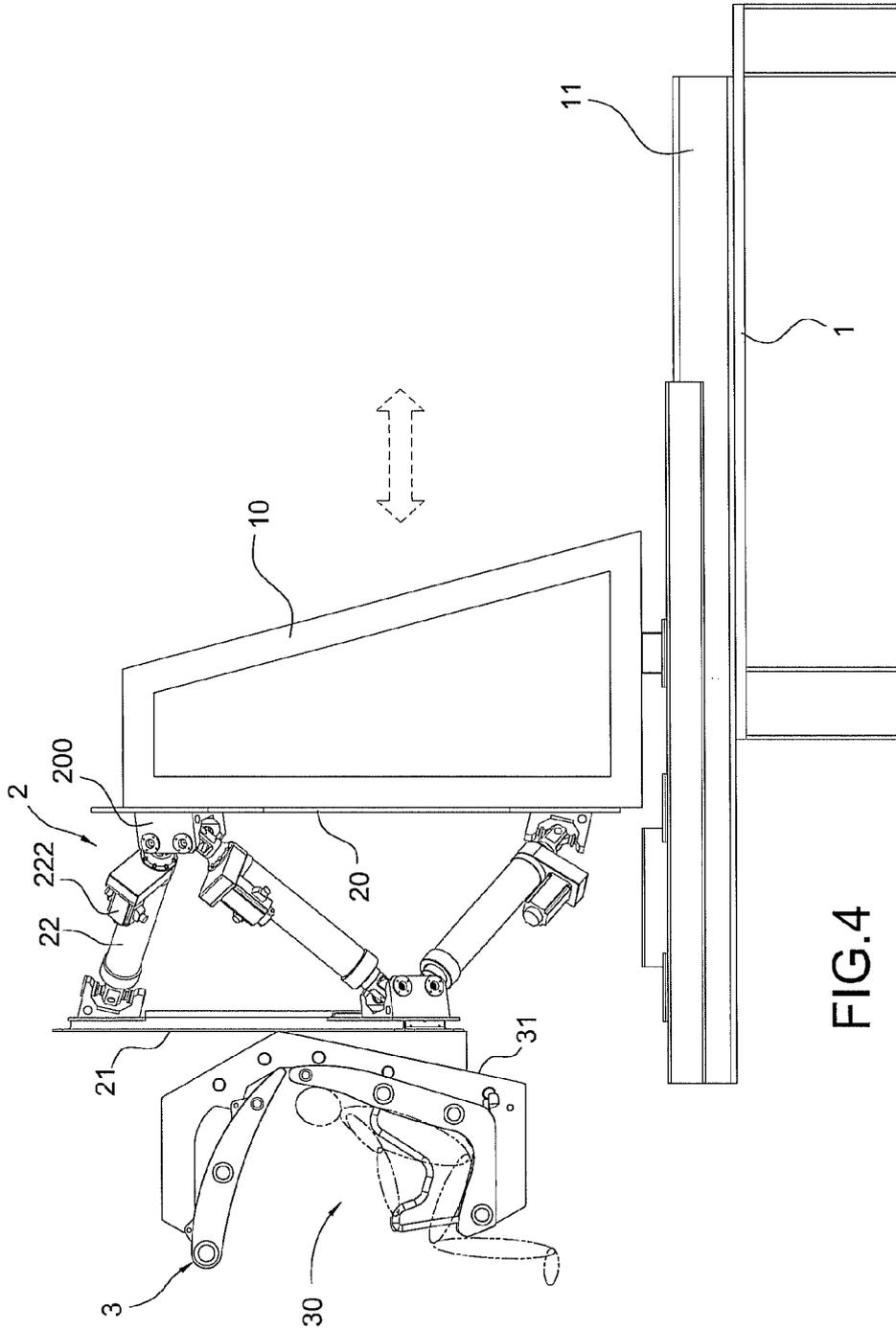


FIG. 4

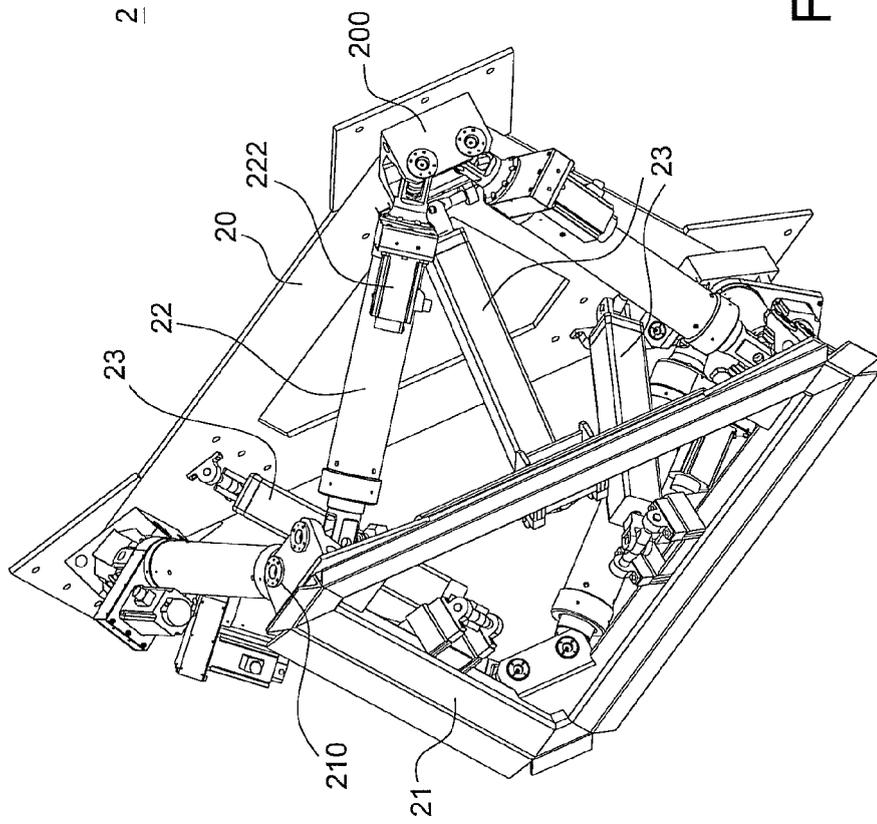


FIG.5

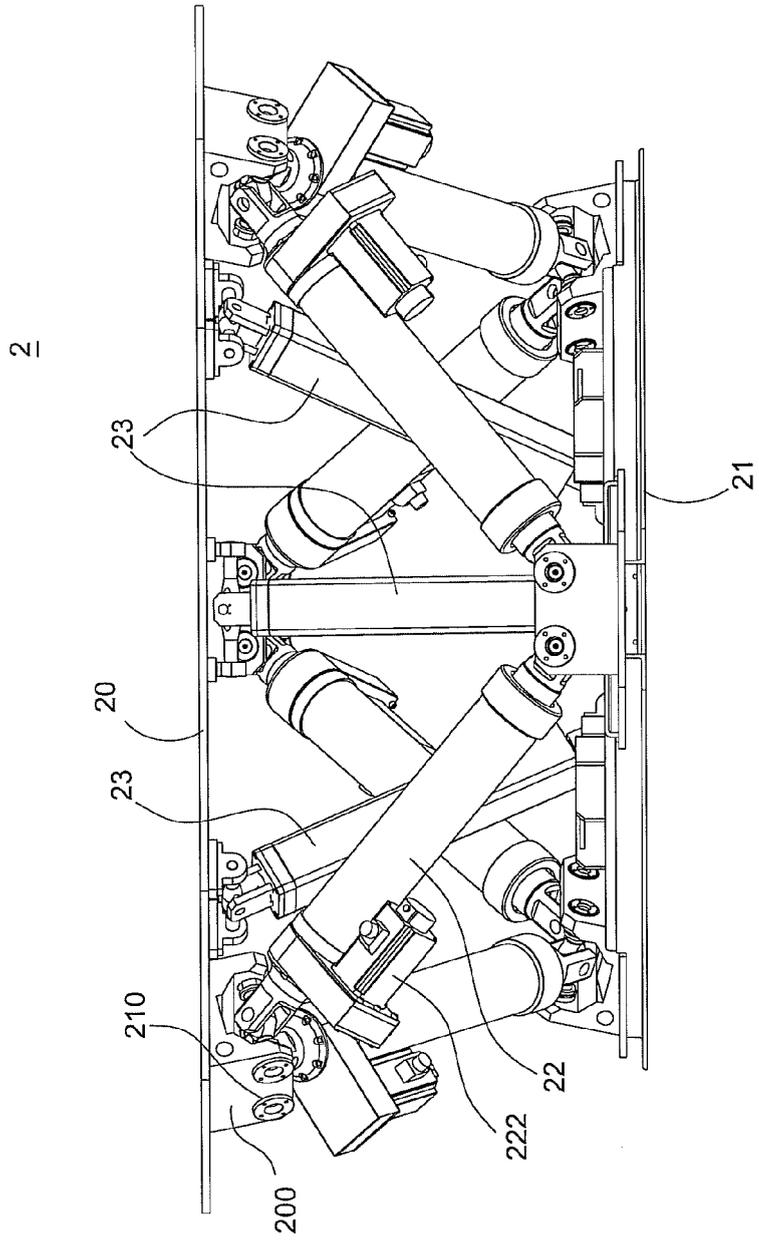


FIG.6

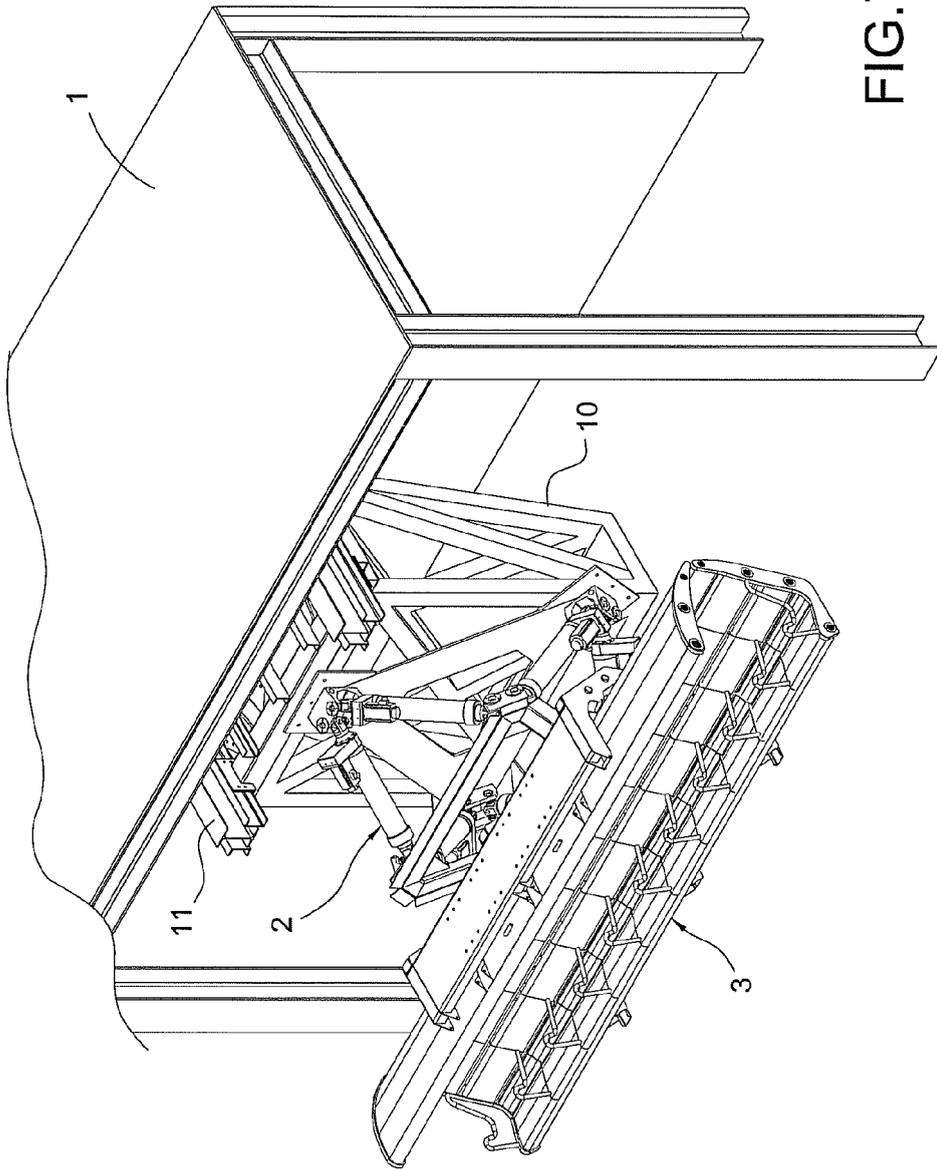


FIG.7



EUROPEAN SEARCH REPORT

Application Number
EP 11 16 2214

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 210 652 A1 (BROGENT TECHNOLOGIES INC [TW]; LAI DENG-HORNG [TW]; CHIEN KE-CHENG [TW]) 28 July 2010 (2010-07-28)	1,4-11	INV. A63G7/00 A63G31/02 A63G31/16
A	* paragraphs [0010], [0011], [0017], [0018]; figures *	2,3	
X	US 5 453 011 A (FEUER EDUARD [US] ET AL) 26 September 1995 (1995-09-26)	1	
A	* column 2, line 26 - line 65; figure 1 *	2-11	
A	WO 99/56846 A1 (UNIVERSAL STUDIOS INC [US]) 11 November 1999 (1999-11-11)	1-11	
A	* page 3, line 23 - line 28; figure 2 *	1-11	
A	US 2009/209357 A1 (CRAWFORD DAVID W [US] ET AL) 20 August 2009 (2009-08-20)	1-11	TECHNICAL FIELDS SEARCHED (IPC) A63G
A	* abstract; figures *	1-11	
A	US 2002/183123 A1 (DE-GOL GINO DANIEL [GB]) 5 December 2002 (2002-12-05)	1-11	
A	* paragraph [0069]; figure 1 *	1-11	
A	KR 2011 0030097 A (SIN DONG HO [KR]) 23 March 2011 (2011-03-23)	1-11	
A	* abstract; figures *		
The present search report has been drawn up for all claims			
4	Place of search Munich	Date of completion of the search 26 August 2011	Examiner Lucas, Peter
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

EPO FORM 1503 03.02 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 11 16 2214

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26-08-2011

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 2210652	A1	28-07-2010	NONE	

US 5453011	A	26-09-1995	AU 7171494 A	03-01-1995
			WO 9429828 A1	22-12-1994

WO 9956846	A1	11-11-1999	AT 314126 T	15-01-2006
			AU 3762299 A	23-11-1999
			DE 69929187 T2	24-08-2006
			EP 1079906 A1	07-03-2001
			ES 2257046 T3	16-07-2006
			JP 4356052 B2	04-11-2009
			JP 2002513663 A	14-05-2002
			US 6095926 A	01-08-2000

US 2009209357	A1	20-08-2009	NONE	

US 2002183123	A1	05-12-2002	AT 281221 T	15-11-2004
			AU 6406301 A	24-12-2001
			DE 60106909 D1	09-12-2004
			DE 60106909 T2	10-11-2005
			EP 1289616 A1	12-03-2003
			ES 2232628 T3	01-06-2005
			WO 0195989 A1	20-12-2001
			GB 2364927 A	13-02-2002
			JP 2004503308 A	05-02-2004

KR 20110030097	A	23-03-2011	NONE	
