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(54) **DICE SHAKER DEVICE**

(57) The present invention relates to a dice shaker device (1) for reliably providing a randomized state of at least one die, said dice shaker device (1) comprising a dice plate (10), a dice plate actuator (20) configured to apply a reciprocating force to said dice plate (10), a casing (30), a circumferential ridge surface (40) extending around an outer perimeter of said dice plate (10), and a dice rolling space (50) at least partly defined by said casing (30), said dice plate (10), and said circumferential ridge surface (40), wherein said circumferential ridge surface (40) is parallel with an upper surface (11) of said dice plate (10) and wherein said circumferential ridge surface (40) has a width that is equal to or less than half the width of the at least one die that the dice shaker device (1) is arranged to provide a randomized state of.

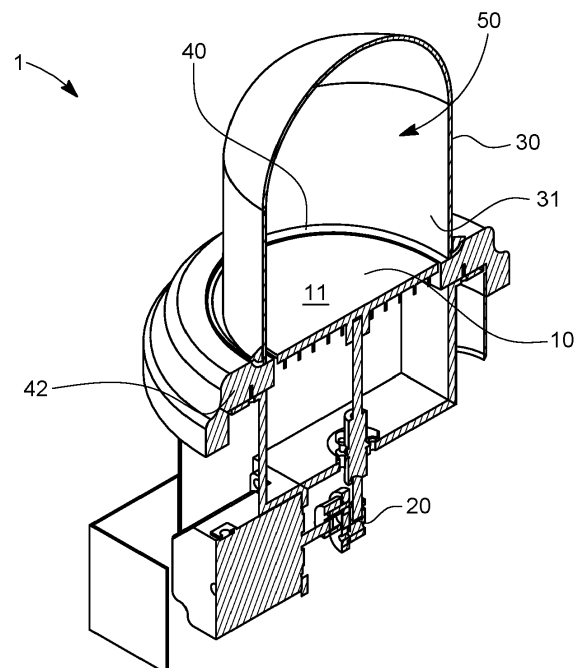


FIG. 2

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a dice shaker device.

BACKGROUND OF THE INVENTION

[0002] When playing games involving a die being rolled, it is often required that the die conclusively lands on one of its primary sides for the die roll to be considered valid. If the die ends up in an inconclusive state, for example by coming to rest on one of its edges, then the game state often have to be reset to allow a reroll of the die.

[0003] Casinos frequently employ the use of dice shaker devices to reduce the effect that human handling bias has when rolling a die. Such devices should preferably be able to operate without human supervision, and be able to reset the game state as needed when an inconclusive state is arrived at. Commonly available dice shaker devices are able to operate independently, but often fail to employ means for preventing the die from coming to rest in an inconclusive state.

SUMMARY OF THE INVENTION

[0004] It is an object of the present invention to alleviate at least some of the mentioned drawbacks of the prior art and to provide a dice shaker that reduces the risk of a die rolled thereby becoming stuck in an inconclusive state, e.g. resting on an edge thereof. This and other objects, which will become apparent in the following, are accomplished by a dice shaker device as defined in the accompanying independent claim.

[0005] The term exemplary should in this application be understood as serving as an example, instance or illustration.

[0006] The rules of many dice rolling games include provisions for how to handle a die becoming stuck in an inconclusive state. Often, that game round or phase becomes void when a die comes to rest in an inconclusive state, thus requiring the game state to be reset. The die coming to rest in an inconclusive state is thus commonly seen as a violation of the game rules. The claimed subject-matter of the present application specifies technical means, i.e. a dice shaker device, that is configured to implement a die randomization adhering to such game rules, i.e. one that has lower risk of coming to rest in an inconclusive state. The technical feature of the dice shaker device leading to the correct implementation of the game rules primarily relates to the circumferential ridge surface and its interaction with the dice plate and the casing of the device. Other features of the present invention will become apparent in the following.

[0007] The present invention is at least partially based on the realisation that having a circumferential ridge sur-

face extend around an outer perimeter of the dice plate is beneficial, as it provides means for avoiding the die randomized by the dice shaker device to become stuck in an inconclusive state.

[0008] According to the first aspect of the present invention, a dice shaker device for reliably providing a randomized state of at least one die is provided. The dice shaker device comprises a dice plate, a dice plate actuator configured to apply a reciprocating force to said dice plate, a casing, a circumferential ridge surface extending around an outer perimeter of said dice plate, and a dice rolling space at least partly defined by said casing, said dice plate, and said circumferential ridge surface. The circumferential ridge surface is parallel with an upper surface of said dice plate and has a width that is equal to or less than half the width of the at least one die that the dice shaker device is arranged to provide a randomized state of.

[0009] Having a circumferential ridge surface extend around an outer perimeter of said dice plate has been shown to decrease the rate of inconclusive results of the die that is to be randomized. The die or dice being moved by the reciprocating motion of the dice plate will collide with the circumferential ridge surface instead of coming to rest in an inconclusive state. Since the width of the circumferential ridge surface is equal to or less than the width of the die being randomized, the risk of the die coming to rest on the circumferential ridge surface is reduced. The width is measured as the circumferential ridge surface's extension along a line defining the shortest distance between the casing and the dice plate.

[0010] According to one example embodiment, the width of the circumferential ridge surface is larger than 36% of the width of the at least one die that the device is arranged to provide a randomized state of.

[0011] According to one example embodiment, said circumferential ridge surface extends from the casing and towards the dice plate. Thus, the die rolling space is defined, inside of which the die to be randomized may be placed.

[0012] According to one example embodiment, the dice plate and the circumferential ridge surface are arranged such that a gap therebetween is provided. The gap is small enough that the die to be randomized may not fall therethrough, but large enough to allow the dice plate to move between its two positions without colliding with the circumferential ridge surface. Thus, reciprocating movement of the dice plate along an axis perpendicular to the upper surface thereof is allowed.

[0013] According to one example embodiment, said dice plate actuator is configured to apply a reciprocating force to said dice plate such that said dice plate is movable between a first position and a second position, wherein said first position is such that said upper surface of said dice plate is above the circumferential ridge surface, and wherein said second position is such that said upper surface of said dice plate is below the circumferential ridge surface. When coming to rest, the upper sur-

face of the dice plate may be aligned, by means of the dice plate actuator, with the circumferential ridge surface.

[0014] The reciprocating force applied by the dice plate actuator has at least one component that is perpendicular to the upper surface of the dice plate. The two positions of the dice plate are thus offset at least along an axis perpendicular to the upper surface of the dice plate.

[0015] According to one example embodiment, the circumferential ridge surface is perpendicular to a lower portion of the casing. Thus, the risk of the die either being wedged between the circumferential ridge surface and the casing is reduced. Also, the risk of the die coming to rest at an angle, standing on the dice plate and resting against the casing, is reduced.

[0016] According to one example embodiment, said circumferential ridge surface is an integral part of a device frame to which said casing and said dice plate actuator is connected. This increases the stability of the circumferential ridge surface and simplifies assembly of the dice shaker device.

[0017] According to one example embodiment, the casing has a cylindrically shaped lower portion. Having a circular cross-section of the dice rolling space has proved beneficial in reducing the amount of occurrences of inconclusive die results. Consequently, the dice plate is circular, and the circumferential ridge surface is annular.

[0018] According to one aspect of the present invention, a method for reliably providing a randomized state of at least one die is provided. Said method comprises the steps of: providing at least one die in a dice rolling space at least partly defined by a casing of a dice shaker, a dice plate, and a circumferential ridge surface extending around an outer perimeter of said dice plate and which circumferential ridge surface is parallel with an upper surface of said dice plate; applying a reciprocating force to said dice plate by means of a dice plate actuator such that the state of the at least one die is randomized; aligning said upper surface of said dice plate with said circumferential ridge surface, which has a width that is less than half the width of the at least one die; and ceasing to apply said reciprocating force to said dice plate, such that said at least one die comes to rest on a plane jointly defined by the upper surface of the dice plate and the circumferential ridge surface.

[0019] By applying a reciprocating force to the dice plate, a reciprocating movement thereof is induced. This causes a die resting thereon to be randomized, as it is repeatedly thrown upwards into the air by the movement of the dice plate. When the application of the reciprocating force is ceased, the dice plate stops moving and the die comes to rest thereon. By having the die be randomized by a reciprocating movement of the dice plate while being arranged inside the dice rolling space that is at least partially defined by the casing of the dice shaker, the dice plate, and the circumferential ridge surface extending around the outer perimeter of the dice plate, the risk of having the die end up in an inconclusive state is

reduced.

[0020] Generally, all terms used in the description are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the [element, device, component, means, step, etc.]" are to be interpreted openly as referring to at least one instance of said element, device, component, means, step, etc., unless explicitly stated otherwise.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] These and other features and advantages of the present invention will now be further clarified and described in more detail, with reference to the appended drawings showing different embodiments of a dice shaker device according to the present invention.

Figure 1 is a perspective view of a dice shaker device according to the present invention,

Figure 2 is a cross-sectional perspective view of the dice shaker device of Figure 1,

Figure 3 is a cross-sectional side view of the dice shaker device of Figure 1.

DETAILED DESCRIPTION OF EMBODIMENTS

[0022] In the following detailed description, some embodiments of the present invention will be described. However, it is to be understood that features of the different embodiments are exchangeable between the embodiments and may be combined in different ways, unless anything else is specifically indicated. Even though in the following description, numerous specific details are set forth to provide a more thorough understanding of the present invention, it will be apparent to one skilled in the art that the present invention may be practiced without these specific details. In other instances, well known constructions or functions are not described in detail, so as not to obscure the present invention.

[0023] Figure 1 is a perspective view of a dice shaker device 1 according to the present invention. The dice shaker device 1 comprises a device frame 42, to which a casing 30 is attached, and a dice plate actuator 20 arranged to apply a reciprocating force to a disc-shaped dice plate 10 provided at least partially inside of the casing 30. The dice plate actuator 20 may for example comprise an electric motor and a suitable gearing arrangement for transferring the rotational force generated by the electric motor to the reciprocating force applied to the disc-shaped dice plate 10. The casing 30 has a cylindrical lower portion 31 that connects to the device frame 42, and a dome-shaped top portion closing off a dice rolling space 50 that is defined in part by the casing 30. The casing 30 is transparent, such that the results of the die randomization may be viewed from outside of the dice shaker device 1.

[0024] Figure 2 is a cross-sectional perspective view

of the dice shaker device 1 of Figure 1. As seen herein, the dice shaker device 1 comprises a dice plate 10 connected to the dice plate actuator 20, on an upper surface 11 of which the die to be randomized may be placed. A circumferential ridge surface 40 extends around an outer perimeter of the dice plate 10, such that a ridge is formed in connection with and extending from the casing 30. The circumferential ridge surface 40 does not move with the dice plate 10, but is integrally formed with the device frame 42 to which the dice plate actuator 20 and the casing 30 is connected.

[0025] The dice rolling space 50 is partly defined by the casing 30, the dice plate 10, and the circumferential ridge surface 40, with the latter two defining a lower limit of the dice rolling space 50 and the former defining the lateral and upper limits thereof. The dice rolling space 50 does not have any openings that are large enough for the die that is to be randomized to exit through. The circumferential ridge surface 40 is parallel with the upper surface 11 of the dice plate 10, and the dice plate 10 aligns with the circumferential ridge surface 40 when the reciprocating movement thereof is ceased.

[0026] The dice plate 10 is shown in a resting state in Figures 1-3. When a reciprocating force is applied thereto, the dice plate 10 moves between a first position and a second position, the first position being such that the upper surface 11 of the dice plate 10 is above the circumferential ridge surface 40, and the second position being such that the upper surface 11 of the dice plate 10 is below the circumferential ridge surface 40. When the application of the reciprocating force is ceased, the dice plate 10 returns to the resting state. The oscillating movement between the first position and the second position causes a die resting on the upper surface 11 of the dice plate 10 to move randomly.

[0027] Figure 3 is a cross-sectional side view of the dice shaker device 1 of Figure 1. The circumferential ridge surface 40 has a width in the radial direction that is equal to or less than half the width of the die that is to be randomized by the dice shaker device 1. This reduces the risk of the die coming to rest on top of the circumferential ridge surface 40 as the dice plate 10 is moving, which could result in an inconclusive randomization result or a failed randomization. The circumferential ridge surface 42 extends from the lower portion 31 of the casing 30 and towards the dice plate 10. Also, the dice plate 10 and the circumferential ridge surface 40 are arranged such that a gap 41 is formed therebetween. This gap 41 is small enough that the die that is to be randomized may not pass therethrough, but large enough to allow the dice plate 10 to move between the first and second position without colliding with or becoming wedged against the circumferential ridge surface 40.

[0028] The person skilled in the art realizes that the present invention by no means is limited to the embodiments described above. The features of the described embodiments may be combined in different ways, and many modifications and variations are possible within the

scope of the appended claims. In the claims, any reference signs placed between parentheses shall not be construed as limiting to the claim. The word "comprising" does not exclude the presence of other elements or steps than those listed in the claim. The word "a" or "an" preceding an element does not exclude the presence of a plurality of such elements.

10 Claims

1. A dice shaker device (1) for providing a randomized state of at least one die, said dice shaker device comprising:

a dice plate (10);
a dice plate (20) actuator configured to apply a reciprocating force to said dice plate (10);
a casing (30);
a circumferential ridge surface (40) extending around an outer perimeter of said dice plate; and
a dice rolling space (50) at least partly defined by said casing (30), said dice plate (10), and said circumferential ridge surface (40);
wherein said circumferential ridge surface (40) is parallel with an upper surface (11) of said dice plate and wherein said circumferential ridge surface has a width that is less than half the width of the at least one die that the dice shaker device (1) is arranged to provide a randomized state of.

2. The dice shaker device (1) according to claim 1, wherein the width of the circumferential ridge surface (40) is larger than 36% of the width of the at least one die that the device is arranged to provide a randomized state of.

3. The dice shaker device (1) according to any one of the preceding claims, wherein said circumferential ridge surface (40) extends from the casing (30) and towards the dice plate (10).

4. The dice shaker device (1) according to any one of the preceding claims, wherein the dice plate (10) and the circumferential ridge surface (40) are arranged such that a gap (41) therebetween is provided.

5. The dice shaker device (1) according to any one of the preceding claims, wherein said dice plate actuator (20) is configured to apply a reciprocating force to said dice plate (10) such that said dice plate is movable between a first position and a second position, wherein said first position is such that said upper surface (11) of said dice plate (10) is in parallel with or above the circumferential ridge surface (40), and wherein said second position is such that said upper surface (11) of said dice plate (10) is below the circumferential ridge surface (40).

6. The dice shaker device (1) according to any one of the preceding claims, wherein the circumferential ridge surface (40) is perpendicular to a lower portion (31) of the casing (30). 5
7. The dice shaker device (1) according to any one of the preceding claims, wherein said circumferential ridge surface (40) is an integral part of a device frame (42) to which said casing (30) and said dice plate actuator (20) is connected. 10
8. The dice shaker (1) device according to any one of the preceding claims, wherein the casing (30) has a cylindrically shaped lower portion (31). 15
9. A method for reliably providing a randomized state of at least one die, said method comprising:
- providing at least one die in a dice rolling space at least partly defined by a casing of a dice roller, a dice plate, and a circumferential ridge surface extending around an outer perimeter of said dice plate and which circumferential ridge surface is parallel with an upper surface of said dice plate, 20
- applying a reciprocating force to said dice plate by means of a dice plate actuator such that the state of the at least one die is randomized, 25
- aligning said upper surface of said dice plate with said circumferential ridge surface, wherein said circumferential ridge surface has a width that is less than half the width of the at least one die, and 30
- ceasing to apply said reciprocating force to said dice plate, such that said at least one die comes to rest on a plane jointly defined by the upper surface of the dice plate and the circumferential ridge surface. 35

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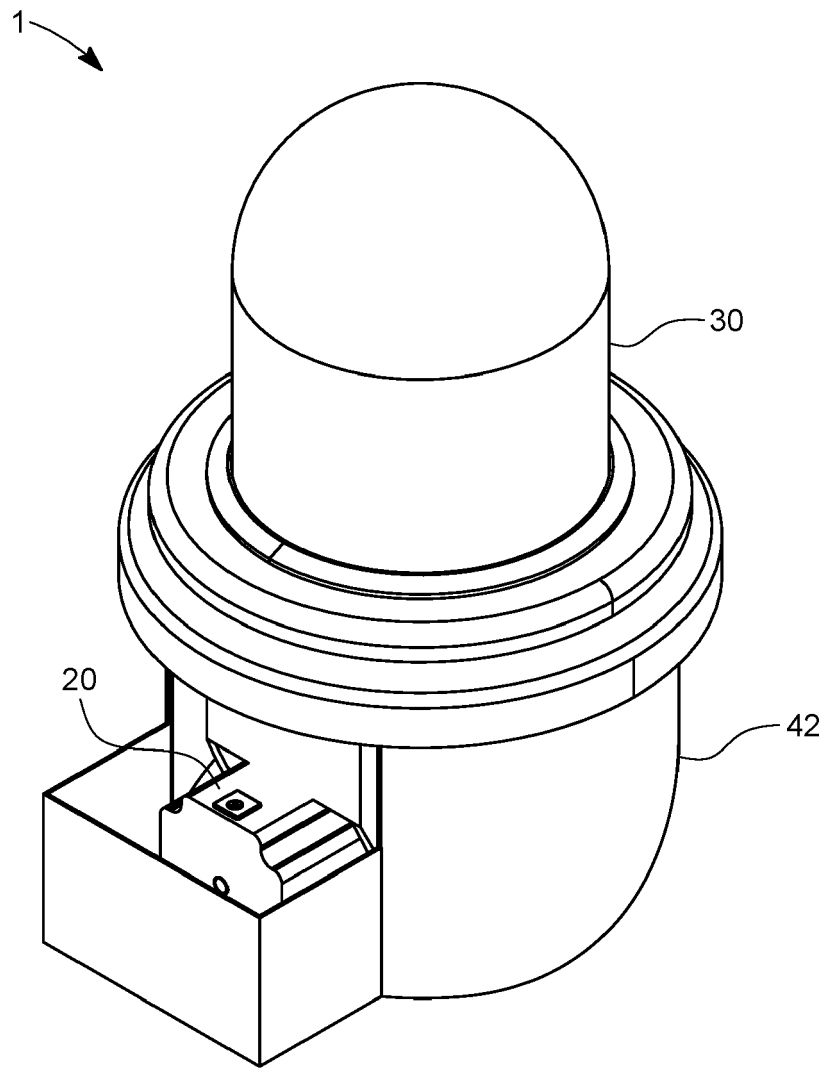


FIG. 1

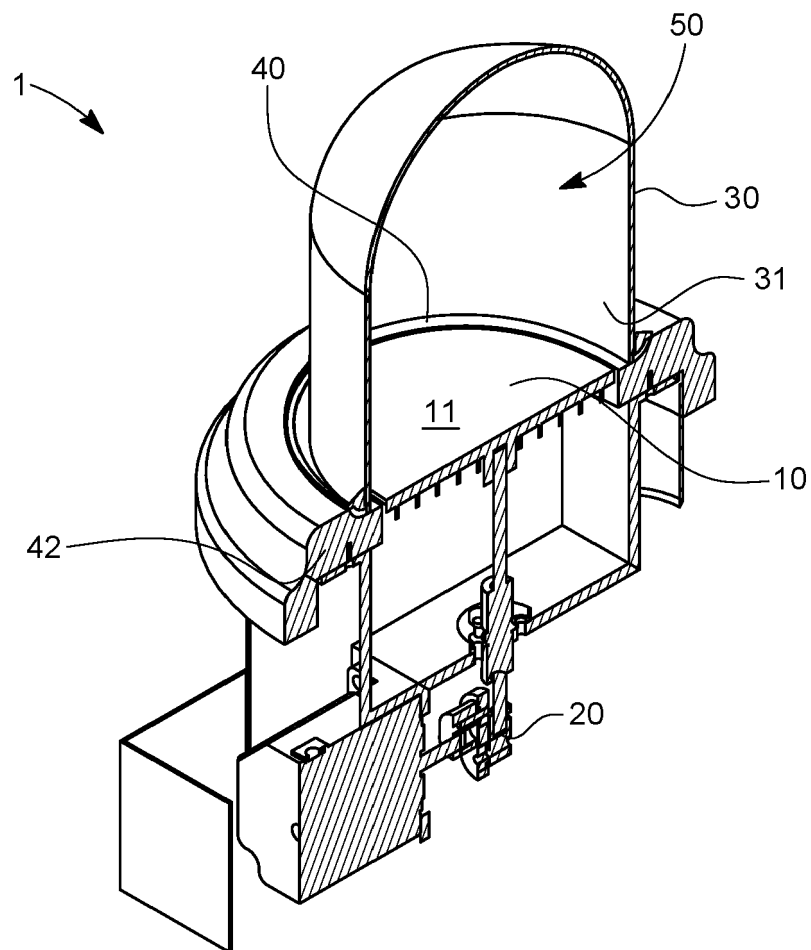


FIG. 2

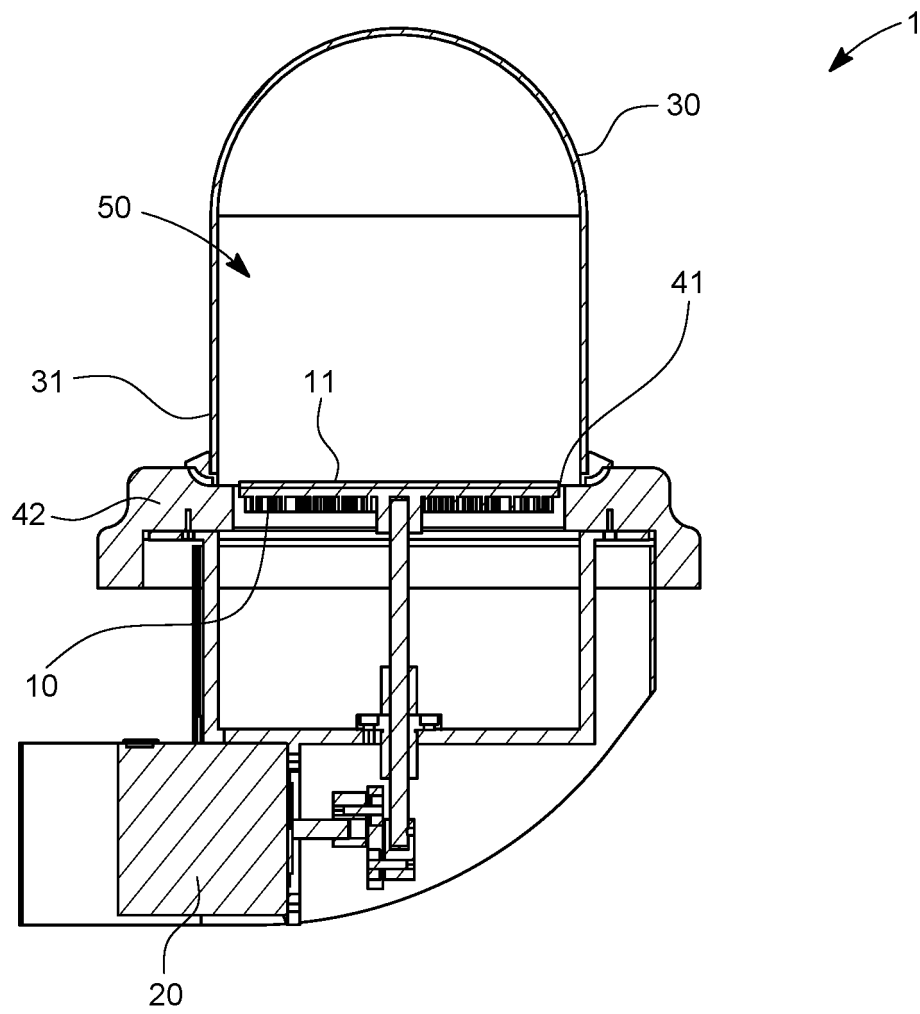


FIG. 3



EUROPEAN SEARCH REPORT

Application Number

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EPO FORM 1503 03:82 (P04C01)

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A	----- US 2 511 092 A (ASHLEMAN ADOLPH E) 13 June 1950 (1950-06-13) * column 3, line 9 - column 4, line 49; figures 1-2 *	2	ADD. A63F9/24
X	----- US 9 227 134 B1 (ROTTIER ERIC MICHAEL [US] ET AL) 5 January 2016 (2016-01-05) * Figure 8 and corresponding passages in the description *	1, 3, 6-9	
A	----- US 2010/056257 A1 (KIDO KATSUHIRO [JP] ET AL) 4 March 2010 (2010-03-04) * paragraphs [0098] - [0100]; figures 3, 4 *	1-9	
A	----- WO 2021/069867 A1 (TCS JOHN HUXLEY EUROPE LTD [GB]) 15 April 2021 (2021-04-15) * page 10, line 14 - page 12; figures *	1-9	TECHNICAL FIELDS SEARCHED (IPC) A63F
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 23 September 2022	Examiner Bagarry, Damien
CATEGORY OF CITED DOCUMENTS 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 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			

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

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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
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