TITLE OF INVENTION: CORD CONTROL APPARATUS AND METHOD

Technical Field

[0001] Various embodiments relate to a cord control apparatus and method for controlling, including holding or releasing, a cord which may be used in sporting or non-sporting activities.

Background

[0002] Cords or ropes may be used in many sport related activities, especially in the adventure sports industry. The control of the cords, especially holding and releasing, is an important aspect that is to be carried out in a safe and efficient manner.

[0003] One specific adventure sport of interest is bungy jumping, which may also be known as bungee jumping.

[0004] In bungy jumping, a person jumps off from a jump location (for example, a bridge, a building, and so on) to which the person (jumper) is attached by a large elastic cord. The cord may be referred to as a bungy cord or a bungy rope. When the person (jumper) jumps, the cord extends downwardly toward a ground. Due to the elasticity of the cord, the cord stretches up to its maximum after which the jumper may fly upwards as the cord recoils, and continues to oscillate (bounce up and down) until the kinetic energy in the cord is substantially dissipated. Commercial operations of the sport of bungy jumping have existed for the last 30 years.

[0005] The size of a bungy jump is determined by the minimum safe clearance available between the jump location and the environement therebelow (for example, ground, water, and so on). The size of the bungy jump in turn determines the length of the bungy cord, and with increased length comes increased weight. In order to ensure minimal force inflicted on the bungy jumper, bungy cords are fabricated to be used within specific weight ranges. Lighter jumpers get thinner cords, whilst heavier jumpers get thicker cords. As a result, some of the heaviest and longest cords being used can weight up to 100 kilograms (kg).

[0006] One danger in bungy jumping is the bungy cord itself. The bungy cord is connected at one end to a fixed structure at/of the jump location and at the other end to the bungy jumper. During a bungy jump, the cord and its connection points have sufficient momentum to cause serious injury to the bungy jumper or even death. So it is critical that the position of the cord relative to the jumper is controlled. This is

accomplished by hauling part of the cord, which may be long and heavy, up to the jump position, holding the cord securely while awaiting jumper to jump, and releasing the cord at a very precise time after the jumper has jumped. Perfect timing of this release is critical to the jumper's safety. As the weight (length) of the bungy cord increases, perfectly timing the release becomes more difficult. The weight of the cord can cause fatigue to a human operator facilating the jump, leading to mis-timing of release and the eventual failure of the operator to effectively control the cord.

[0007] One common solution is for the human operator to stand on the cord, but this becomes more difficult to do effectively as the cord gets heavier. Standing on the cord could also potentially damage and compromise the integrity of the cord therefore causing safety issues.

[0008] In view of the above and other issues, it is imperative to be able to appropriately-time release of the cord, especially at larger bungy jump sites, and relieve operator fatigue, both of which to ensure safety of bungy jumpers.

Summary

[0009] According to one aspect, a cord control apparatus comprises:

a fixed frame;

a movable frame rotatably coupled to the fixed frame and further coupled thereto via a first biasing element to biase the movable frame to an upward position, the movable frame includes a gripper mechanism coupled to the movable frame via a second biasing element to biase the gripper mechanism to an ungrip position in which the grip mechanism is unconstricted to release a portion of a cord arranged at the grip mechanism; and

a control lever coupled to the second biasing element and actuatable to overcome the second biasing element to move the grip mechanism from the ungrip position to a grip position in which the grip mechanism is constricted to hold the portion of the cord arranged at the grip mechanism.

[0010] In some embodiments, the movable frame is actuatable by a combined weight of a remaining portion of the cord and an object coupled thereto, to overcome the first biasing element to rotate from the upward position to a downward position during which the combined weight of the remaining portion of the cord and the object is further operable to overcome a force applied by the actuated control lever on the grip mechanism to move the grip mechanism from the grip position to the ungrip position to release the portion of the cord.

[0011] In some embodiments, the grip mechanism includes a plurality of grip rollers which are coupled to the second biasing element and arranged to provide a channel therebetween for accommodating the portion of the cord, wherein in the grip position, the grip rollers are configured to constrict the channel, and wherein in the ungrip position, the grip rollers are configured to unconstrict the channel.

[0012] In some embodiments, the control lever is coupled to the second biasing element by a cable, wherein an actuation of the control lever is configured to pull the cable to urge the grip rollers towards each other.

[0013] In some embodiments, the control lever is foot-operated.

[0014] In some embodiments, the control lever is arranged remote from the movable frame.

[0015] In some embodiments, the fixed frame is integral with a bungy jump location.

[0016] In some embodiments, the movable frame further includes a guide mechanism configured to guide any portion of the cord entering or exiting the channel.

[0017] In some embodiments, the guide mechanism includes at least one guide roller rotatably coupled to the movable frame, wherein a rotation axis of the at least one guide roller is non-parallel to a rotation axis of the grip mechanism.

[0018] In some embodiments, the at least one guide roller includes a plurality of guide rollers arranged at opposed sides of the movable frame.

[0019] In some embodiments, the cord is a bungy cord.

[0020] According to one aspect, a cord control method comprises:

allowing biasing of a movable frame, which is rotatably coupled to a fixed frame and further coupled thereto via a first biasing element, to an upward position;

allowing biasing of a grip mechanism, which is coupled to the movable frame via at least a second biasing element, to an ungrip position in which the grip mechanism is unconstricted;

arranging a portion of a cord at the unconstricted grip mechanism;

actuating a control lever to overcome the second biasing element to move the grip mechanism from an ungrip position to a grip position in which the grip mechanism is constricted, and causing the grip mechanism to hold the portion of the cord;

allowing free falling of an object which is coupled to a remaining portion of the cord;

allowing at least one of:

releasing the control lever to move the grip mechanism from the grip position to the ungrip position, and causing the grip mechanism to release the portion of the cord; or

actuating, by a combined weight of the remaining portion of the cord and the object, the movable frame to overcome the first biasing element, and causing the movable frame to rotate from the upward position to a downward position.

[0021] In some embodiments, after actuating the movable frame to overcome the first biasing element, and causing the movable frame to rotate from the upward position to the downward position, the method further comprises:

using the combined weight of the remaining portion of the cord and the object, overcoming a force applied by the actuated control lever on the grip mechanism, and causing the grip mechanism to move from the grip position to the ungrip position to release the portion of the cord; and/or

using the combined weight of the remaining portion of the cord and the object, thinning the portion of the cord and causing the thinned portion of the cord to be removable from the grip mechanism which is in the grip position.

[0022] In some embodiments, the method further comprises: removing or allowing removal by falling away of the portion of the cord from the grip mechanism.

[0023] In some embodiments, the method further comprises: guiding, by a guide mechanism arranged on the movable frame, any portion of the cord entering or exiting the channel.

Brief Description of the Drawings

[0024] In the drawings, like reference characters generally refer to like parts throughout the different views. The drawings are not necessarily to scale, emphasis instead generally being placed upon illustrating the principles of the invention. In the following description, various embodiments of the invention are described with reference to the following drawings, in which:

[0025] Figure 1A shows a schematic front view of a cord control apparatus wherein its grip mechanism is in a release position, according to some embodiments.

[0026] Figure 1B shows a schematic side view of Figure 1A.

[0027] Figure 1C shows a schematic front view of a control lever housing of a cord control apparatus wherein its control lever is unactuated, according to some embodiments.

[0028] Figure 1D shows a schematic side view of Figure 1C.

[0029] Figure 2A shows a schematic front view of the cord apparatus of Figure 1A wherein the grip mechanism is in a hold position, according to some embodiments.

[0030] Figure 2B shows a schematic side view of Figure 2A.

[0031] Figure 2C shows a schematic front view of the control lever housing of Figure 1A wherein its control lever is actuated, according to some embodiments.

[0032] Figure 3A shows a schematic front view of the cord apparatus of Figure 1A in an upward position and having a cord portion arranged at the grip mechanism which is in the hold position.

[0033] Figure 3B is a schematic side view of Figure 3A.

[0034] Figure 4A shows a schematic front view of the cord apparatus of Figure 1A in a downward position and having a cord portion arranged at the grip mechanism which in the hold position.

[0035] Figure 4B is a schematic side view of Figure 4A.

[0036] Figure 5A shows a schematic front view of the cord apparatus of Figure 1A in a downward position and having a cord portion removed from the grip mechanism.

[0037] Figure 5B is a schematic side view of Figure 5A.

[0038] Figure 6A is a schematic rear view of a cord control apparatus and shows a see-through view of its grip mechanism (represented by dash lines) in the hold position, according to some embodiments.

[0039] Figure 6B is a schematic rear view of the cord control apparatus of Figure 6A and shows a see-through view of its grip mechanism (represented by dash lines) in the release position, according to some embodiments.

[0040] Figure 7 is a flow chart illustrating a method for cord control, according to some embodiments.

Detailed Description

[0041] The following detailed description refers to the accompanying drawings that show, by way of illustration, specific details and embodiments in which the invention may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention. Other embodiments may be utilized and structural, logical, and electrical changes may be made without departing from the scope of the invention. The various embodiments are not necessarily mutually exclusive, as some embodiments can be combined with one or more other embodiments to form new embodiments.

[0042] Embodiments described in the context of one of the methods or devices are analogously valid for the other methods or devices. Similarly, embodiments described in the context of a method are analogously valid for a device, and vice versa.

[0043] Features that are described in the context of an embodiment may correspondingly be applicable to the same or similar features in the other embodiments. Features that are described in the context of an embodiment may correspondingly be applicable to the other embodiments, even if not explicitly described in these other embodiments. Furthermore, additions and/or combinations and/or alternatives as described for a feature in the context of an embodiment may correspondingly be applicable to the same or similar feature in the other embodiments.

[0044] In the context of various embodiments, the articles “a”, “an” and “the” as used with regard to a feature or element include a reference to one or more of the features or elements.

[0045] In the context of various embodiments, the term “substantially” may include “exactly” and a reasonable variance.

[0046] As used herein, the term “and/or” includes any and all combinations of one or more of the associated listed items.

[0047] As used herein, the phrase of the form of “at least one of A or B” may include A or B or both A and B. Correspondingly, the phrase of the form of “at least one of A or B or C”, or including further listed items, may include any and all combinations of one or more of the associated listed items.

[0048] In the context of various embodiments, the phrases “configured to”, “arranged to”, “adapted to”, “constructed and arranged to” may be used interchangeably.

[0049] In the context of various embodiments, the term “control” and its related terms may refer to hold and/or release; the term “coupled” may mean connected whether direct or indirect, be in contact with, attached or secured to; the term “grip” and its related terms may mean hold or grab; the term “allow” and its related terms may mean permit or provide for; the term “release” and its related terms may mean remove grip, not gripping, unhold, not holding.

[0050] Various embodiments may provide a cord control apparatus. For example, the cord control apparatus may provide a quick release of a bungy cord during bungy jump. Such quick release of the bungy cord may be initiated by a human operator, or automatically by the cord control apparatus, or by both.

[0051] The cord control apparatus will be described with reference to the accompanying Figures which are illustrative only and may be suitably modified in other embodiments.

[0052] The cord control apparatus comprises a fixed frame 100 and a movable frame 120 (see Figures 1A and 1B). The fixed frame 100 may be fixedly coupled to a physical stucture or integrally formed with the physical structure. Preferably, the fixed frame 100 is to be arranged at or near the edge of the physical structure. Such physical structure may refer to a bungy jump location, such as a bridge, platform, building, etc, or part thereof. The movable frame 120 is rotatably coupled to the fixed frame 100, such as via one or more hinges 102, to allow rotation of the movable frame 120 among a plurality of positions including an upward position (see Figures 1B, 2B, 3B) and a downward position (see Figures 4B, 5B). The movable frame 120 is further coupled to the fixed frame 100 via a first biasing element 104, which may comprise at one or more springs or resilient members, to biase the movable frame 120 to the upward position.

[0053] The movable frame 120 includes a grip mechanism which is configured to move at least between a hold or grip position (Figures 2A, 6A) and a release or ungrip position (Figure 1A, 6B). In the hold position, the grip mechanism provides a constricton for holding or grabbing a portion of a cord (may alternatively be referred to as a “cord portion” 304) arranged at the grip mechanism, e.g. along its channel 124 to impede movement of the cord portion 304. In the release position, the grip mechanism is unconstricted or removes the constriction for unholding or releasing the cord portion 304 to unimpede movement of the cord portion 304. The cord 300 (see Figure 3B) comprises the cord portion 304 (which is arranged at the grip mechnism or its channel 124) and a remaining portion of the cord (may alternatively be referred to as a “remaining cord portion” 302, 306). The remaining cord portion 304 comprises an upper cord portion 302 extending from one end of the cord portion 304 and a lower cord portion 306 extending from the opposite end of the cord portion 304.

[0054] The grip mechanism is coupled to the movable frame 120 via a second biasing element 112 (see Figures 6A, 6B), which may comprise one or more springs or resilient members, to biase the grip mechanism to the release position (see Figure 6B). The grip mechanism may comprise a plurality of grip rollers 122 arranged at a spaced-apart relation to provide a channel 124 therebetween for accomodating a cord portion 304 (see Figures 3A, 4A). In the release position (see Figure 6B), the grip rollers 122 are unactuated and hence the channel 124 is unconstricted to allow a cord arranged therein to be able to move or slide along. In order to move from the release position to the hold position (see Figure 6A), the second biasing element 112 has to be overcome such as by actuating a control lever 210 .

[0055] The control lever 210 (see Figures 6A, 6B, 1C, 1D, 2C, 2D) is coupled to the second biasing element 112. Such coupling may be provided by a cable 202, other

equivalent connection. The control lever 210 may be a pedal, e.g. a foot-operated pedal to be actuated by depressing the pedal and unactuated by releasing the pedal. The control lever 210 may be further rotatably coupled, such as by at least one hinge 204, to a control lever housing 200 (see Figures 1C, 1D, 2C, 2D). The control lever housing 200 may be arranged remote from or adjacent to the movable frame 120.

[0056] An actuation of the control lever 210 is configured to apply a sufficient force to overcome or unbiase the second biasing element 112. In particular, when the foot pedal is depressed (see Figures 2C, 2D), the cable 202 is rotated around the hinge. Due to coupling of the cable 202 to the second biasing element 112 which is in turn coupled to guide rollers 202, this rotation of cable 202 pulls or urges the grip rollers 122 towards each other and thus causing the grip mechanism to move from the release position to the hold position (see Figure 6A). In this hold position, the grip rollers 122 are urged towards each other and hence constrict the channel 124; and thus the grip mechanism holds or grips the cord portion 304 arranged in the channel 124. This gripping may include applying pressure to the sides of the cord portion 304 by the grip rollers 122 and/or at most partially enclosing the cord portion 304 by the grip rollers 122. If the control lever 210 remains actuated, the grip mechanism remains in the hold position and the cord portion 304 remains engaged in place.

[0057] A release of the actuated control lever 210 is configured to remove the unbiasing force, applied on the second biasing element 112, to allow the second biasing element 112 to return to its biased position (see Figure 6B). In particular, a release of the control lever 210 is configured to loosen or relax the cable 202 which in turn allows the grip rollers 122 to move away from each other and thus causing the grip mechanism to move from the hold position to the release position. In the release position, the grip rollers 122 are moved away from each other and hence unconstrict or remove the consticton in the channel 124; and thus the grip mechanism releases the cord portion 304 arranged in the channel 124. This releasing may include removing force applied by the grip rollers 122 on the sides of the cord portion and/or unenclosing the cord portion 304 by the grip rollers 122. This releasing may take place when the movable frame 120 is in the upward position.

[0058] As described in the foregoing, the movable frame 120 is biased to the upward position (see Figures 1B, 2B, 3B) via the first biasing element 104. If a cord portion 304 is arranged at the grip mechanism, e.g. along its channel 124, the movable frame 120 would remain in the upward position if a combined weight of the remaining cord portion 302, 306 and any object (not shown) coupled thereto is within a predetermined value or limit which does not overcome nor unbiased the first biasing element 104. However, if

the combined weight of the remaining cord portion 302, 306 and any object coupled thereto exceeds the predetermined limit, the combined weight applies a net force which overcomes or unbiases the first biasing element 104 to rotate the movable frame 120 from the upward position to the downward position (i.e. progression from Figure 3B to 4B).

[0059] During the downward position, if the control lever 210 is released or unactuated and hence the grip mechanism is in the release position and unconstricted, the cord portion 304 is free from being held by the grip mechanism and thus may be removed from the channel 124 by allowing it to fall away from the channel 124 (see Figures 5A and 5B).

[0060] On the other hand, during the downward position (see Figures 4A, 4B), if the control lever 210 remains actuated and hence the grip mechanism is in the hold position and constricted, the combined weight of the remaining cord portion 302, 306 and any object coupled thereto applies a downward force which may overcome a lateral force applied by the actuated control lever 210 on the grip mechanism, including grip rollers 122, and thus forcibly moves the grip mechanism from the hold position to or towards the release position to allow the cord portion 304 to be pulled out and fall away from the grip mechanism (see Figures 5A and 5B) due to weight and gravity. Additionally or alternatively, the cord portion 304 may be stretched, and hence thinned, due to the combined weight of the remaining cord portion 302, 306 and the object coupled to and also elastic nature of the cord 300. Accordingly, the thinned stretched cord portion 304 may pass through the grip rollers 122 and fall away from the grip mechanism (see Figures 5A and 5B).

[0061] The above-described mechanism of automatic rotation of the movable frame 120 from the upward position to the downward position (i.e. progression from Figure 3B to Figure 4B) and automatic removal of the cord portion 304 from the grip mechanism (i.e. progression from Figure 4B to Figure 5B) may be referred to as fail-safe mechanism.

[0062] The movable frame 120 may further comprise one or more guides (see Figures 1A, 1B, 3A, 3B, 4A, 4B) configured to guide movement of any portion of the cord,which enters and/or exits channel 124, over the edge of the movable frame 120. The guide(s) may be provided by guide rollers 126 rotatably coupled to the movable frame 120. This way, the cord may move or slide along the channel 124 with zero or minimal resistance against the movable frame 120 and parts thereof, thereby protecting and preserving the integrity of the cord. Axes of the guide rollers 126 may be non-parallel to the axes of the grip rollers 122. The guide rollers 126 may comprise a material having low coefficient of friction, e.g. polytetrafluoroethylene material which may be marketed under Teflon™.

[0063] It is to be appreciated that modifications to the foregoing may be made in other embodiments.

[0064] In one example, the guide(s) may be provided by non-rotatable elements which may have low coefficients of friction, e.g. polytetrafluoroethylene material which may be marketed under Teflon™. In another example, the guide(s) may be omitted.

[0065] In one example, the control lever housing may be arranged adjacent to the movable frame.

[0066] In one example, the aforementioned guide rollers 126 may be replaced by a single guide roller in combination with a non-rotatable element which may have low coefficients of friction. However, the single roller and non-rotatable element are actuatable to provide constriction and unconstriction to respectively hold and release a cord portion.

[0067] In one example, the guide rollers may comprise more than two guide rollers wherein two or more guide rollers are actuatable to provide constriction and unconstriction to respectively hold and release a cord portion.

[0068] The aforementioned examples may be combined in certain other examples where appropriate.

[0069] Figure 7 shows a flow chart illustrating a method for cord control. The method will be described with reference to bungy jumping but may be suitably adapted to other activities.

[0070] In block 702, the cord control apparatus of the present disclosure is provided, e.g. installed, at a bungy jump location. A description of the features of the cord control apparatus will not be repeated to avoid obscuring the description of the method.

[0071] In block 704, prior to each instance of bungy jumping, the cord control apparatus, particularly the movable frame, is allowed to be biased to an upward position while the grip mechanism is allowed to be biased to a release position, i.e. the control lever is unactuated (see Figures 1A, 1B, 1C and 1D).

[0072] In block 706, while the grip mechanism is in the release position (see Figures 1C, 1D) and while the movable frame is in the upward position (see Figures 1A, 1B), a portion of a cord (cord portion) is arranged at the grip mechanism, more specifically in the unconstricted channel. The cord portion may be arranged in the grip mechanism by a human operator. A remaining portion of the cord (remaining cord portion) may be coupled to an object, e.g. bungy jumper, during this, earlier, or later stage as appropriate.

[0073] In block 708, while the movable frame is in the upward position, the control lever is actuated (see Figures 2C and 2D), e.g. by human operator, to activate the grip mechanism to grip or hold the cord portion (see Figures 3A, 3B). In particular, the

actuated control lever applies a force to overcome the second biasing element to move the grip mechanism from the release position to the hold position, which results in constricting the channel and holding the portion of the cord by the grip mechanism or, more particularly, its grip rollers. At this time, the cord portion is engaged in place while at least some of the remaining cord portion may hang from the movable frame.

[0074] In block 710, the object, e.g. bungy jumper, which is coupled to the remaining cord portion, e.g. a free end of the lower cord portion which is distal from the cord portion, is allowed to free fall while the control lever remains actuated, i.e. the grip mechanism is in the hold position, and while the movable frame remains in the upward position.

[0075] In block 712, one or more of the following may be performed or may take place, depending on whether or not the control lever is released in a timely manner .

[0076] In a first possible scenario, the operator releases the actuated control lever at an appropriate time, e.g. prior to rotation of the movable frame from the upward position to the downward position. In particular, while the movable frame is in the upward position, the control lever 210 may be released to move the grip mechanism from the hold position to the release position, thus releasing the cord portion. Upon release of the cord portion, it may be removed from the movable frame by sliding along the channel towards the falling bungy jumper due to gravity pull and/or by an operator directly picking it from the channel and/or throw it out of the channel. This sliding may include guiding the cord portion and at least some of the remaining cord portion by guide(s), e.g. guide roller or other non-rotatable guide.

[0077] Alternatively, in a second possible scenario, the movable frame rotates to the downward position before or without releasing of the actuated control lever by the operator (see Figures 4A and 4B). In particular, while the control lever remains actuated, a combined weight of the remaining cord portion and the object, e.g. bungy jumper, coupled thereto breaches a predetermined limit to generate a net force sufficient to overcome the first biasing element to rotate the movable frame from the upward position to the downward position. The net force is due to weight of the cord and the bungy jumper after he has fallen a certain distance which exerts a pull on the cord. At this downward position, if the control lever is now released to move the grip mechanism to the release position, the cord portion is released and free to be removed or falls away from the grip mechanism. On the other hand, at this downward position, if the actuated control lever remains unreleased, the weight of the remaining cord portion and bungy jumper overcomes a force applied by the actuated control lever on the grip mechanism, thus causing the grip mechanism to forcibly move from the hold position to or towards

the release position; and/or the cord portion is stretched due to the weight of the remaining cord portion and bungy jumper and also due to the elastic nature of the cord, thus causing the cord portion to thin. The stretched thinned cord portion may fall away from the grip mechanism even if the grip mechanism may still be in the hold position (see Figures 5A and 5B).

[0078] Embodiments of the invention provide several advantages at least as follows:

[0079] The cord control apparatus provides a human operator the ability to hold and release a cord at a desired time without causing physical strain or fatigue to him.

[0080] In the event the human operator fails to release the cord in a timely manner after a bungy jumper has jumped, the cord control apparatus provides a fail-safe mechanism to ensure the cord will be released at an appropriate time or before the unreleased cord poses an increased risk to the safety of the bungy jumper. This fail-safe mechanism is provided by allowing the movable frame to rotate from the upward position to the downward position when the combined weight of the remaining cord portion and bungy jumper exceeds a predetermined level which, firstly, overcomes the first biasing element to rotate the movable frame to the downward position and, secondly, forcibly moves the grip mechanism from a hold position to or towards a release position to release the cord portion and/or stretches or thins the cord portion to allow the thinned cord portion fall out of the grip mechanism. In other words, the fail-safe mechanism is activated to release the cord portion automatically when a predetermined force or pressure on the cord is reached.

[0081] The fail-safe mechanism substantially reduces dependence on the human operator to release the cord at the appropriate time. As would be appreciated, premature release of the cord may cause entanglement of the cord with the jumper while overly late release of the cord may damage the cord and/or impede the jump.

[0082] The control lever allows force or pressure on the cord portion to be applied by a human operator remotely instead of requiring the human operator to directly apply force or pressure to the cord for the aforesaid holding and timed-release. In particular, the control lever may be foot-operated which pulls a cable which in turn controls the guide mechanism to hold or release the cord portion. Hence, the human operator is not required to stand on the cord and therefore does not cause damage to the delicate rubber material of the cord. It is to be appreciated that while the operator may still hold another portion of the cord to ensure that the cord does not get caught on other object(s) and/or the operator may throw the cord in a certain direction at an appropriate time, the remote control capability provided by the control lever allows for better and safer control without causing fatigue to the operator.

[0083] Use of grip roller(s) to hold and release a cord portion allows the cord to be released quickly without hindrance and damage. Furthermore, the grip roller(s) do not completely enclose the cord portion being held, i.e. in the hold position, so that a quick escape from the grip roller(s) may be provided by the fail-safe mechanism in the event the human operator mis-times or overly delays the cord release.

[0084] While the invention has been particularly shown and described with reference to specific embodiments, it should be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention as defined by the appended claims. The scope of the invention is thus indicated by the appended claims and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced.

CLAIMS

1. A cord control apparatus comprising:

a fixed frame;

a movable frame rotatably coupled to the fixed frame and further coupled thereto via a first biasing element to biase the movable frame to an upward position, the movable frame includes a gripper mechanism coupled to the movable frame via a second biasing element to biase the gripper mechanism to an ungrip position in which the grip mechanism is unconstricted to release a portion of a cord arranged at the grip mechanism; and

a control lever coupled to the second biasing element and actuatable to overcome the second biasing element to move the grip mechanism from the ungrip position to a grip position in which the grip mechanism is constricted to hold the portion of the cord arranged at the grip mechanism.

2. The cord control device of claim 1, wherein the movable frame is actuatable by a combined weight of a remaining portion of the cord and an object coupled thereto, to overcome the first biasing element to rotate from the upward position to a downward position during which the combined weight of the remaining portion of the cord and the object is further operable to overcome a force applied by the actuated control lever on the grip mechanism to move the grip mechanism from the grip position to the ungrip position to release the portion of the cord.

3. The cord control device of any one of claims 1 to 2, wherein the grip mechanism includes a plurality of grip rollers which are coupled to the second biasing element and arranged to provide a channel therebetween for accommodating the portion of the cord, wherein in the grip position, the grip rollers are configured to constrict the channel, and wherein in the ungrip position, the grip rollers are configured to unconstrict the channel.

4. The cord control device of claim 3, wherein the control lever is coupled to the second biasing element by a cable, wherein an actuation of the control lever is configured to pull the cable to urge the grip rollers towards each other.

5. The cord control device of any one of claims 1 to 4, wherein the control lever is foot-operated.

6. The cord control device of any one of claims 1 to 5, wherein the control lever is arranged remote from the movable frame.

7. The cord control device of any one of claims 1 to 6, wherein the fixed frame is integral with a bungy jump location.

8. The cord control device of any one of claims 1 to 7, wherein the movable frame further includes a guide mechanism configured to guide any portion of the cord entering or exiting the channel.

9. The cord control device of claim 8, wherein the guide mechanism includes at least one guide roller rotatably coupled to the movable frame, wherein a rotation axis of the at least one guide roller is non-parallel to a rotation axis of the grip mechanism.

10. The cord control device of claim 9, wherein the at least one guide roller includes a plurality of guide rollers arranged at opposed sides of the movable frame.

11. The cord control device of any one of claims 1 to 10, wherein the cord is a bungy cord.

12. A cord control method comprising:

allowing biasing of a movable frame, which is rotatably coupled to a fixed frame and further coupled thereto via a first biasing element, to an upward position;

allowing biasing of a grip mechanism, which is coupled to the movable frame via at least a second biasing element, to an ungrip position in which the grip mechanism is unconstricted;

arranging a portion of a cord at the unconstricted grip mechanism;

actuating a control lever to overcome the second biasing element to move the grip mechanism from an ungrip position to a grip position in which the grip mechanism is constricted, and causing the grip mechanism to hold the portion of the cord;

allowing free falling of an object which is coupled to a remaining portion of the cord;

allowing at least one of:

releasing the control lever to move the grip mechanism from the grip position to the ungrip position, and causing the grip mechanism to release the portion of the cord; or

actuating, by a combined weight of the remaining portion of the cord and the object, the movable frame to overcome the first biasing element, and causing the movable frame to rotate from the upward position to a downward position.

13. The cord control method of claim 12 wherein after actuating the movable frame to overcome the first biasing element, and causing the movable frame to rotate from the upward position to the downward position, the method further comprises:

using the combined weight of the remaining portion of the cord and the object, overcoming a force applied by the actuated control lever on the grip mechanism, and causing the grip mechanism to move from the grip position to the ungrip position to release the portion of the cord; and/or

using the combined weight of the remaining portion of the cord and the object, thinning the portion of the cord and causing the thinned portion of the cord to be removable from the grip mechanism which is in the grip position.

14. The cord control method of any one of claims 12 to 13, further comprising:

removing or allowing removal by falling away of the portion of the cord from the grip mechanism.

15. The cord control method of any one of claims 12 to 14, further comprising:

guiding, by a guide mechanism arranged on the movable frame, any portion of the cord entering or exiting the channel.