

RECOVERY DEVICE FOR RETRIEVING A CORD, A RECEIVING DEVICE AND A METHOD FOR THE SAME

Technical Field

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[0001] Various embodiments relate to a recovery device for retrieving a cord having one end portion coupled to a receiving device, a receiving device for receiving a recovery device for retrieving a cord, and a method of retrieving a cord.

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Background

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

15 [0003] One specific adventure sport of interest is bungee jumping, which may also be known as bungee jumping.

[0004] In bungee jumping, a person jumps off from a tall structure (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 bungee cord or a bungee 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 bungee jumping have existed for the last 30 years.

25 [0005] When the jumper (still attached to a bungee cord) ceases to oscillate (bounce up and down) by more than a few meters, the bungee jump may be deemed completed.

[0006] Once the bungee jump is completed, a bungee jump recovery system may be activated to retrieve the cord. This process may be referred to as a “bungee jump recovery” or “bungee jump recovery”.

30 [0007] The bungee jump recovery may also mean by which the jumper is recovered after the bungee jump is completed. There may be two means by which to recover the jumper,

either by lifting up to the original jump location, or by lowering down to an area below the original jump location.

[0008] A lifting bungy jump recovery system may involve using a rope attached to a winch to raise the jumper back the original jump position. A simplest means may be to lower a rope down to the jumper, who attaches the rope to himself, and then the rope may be pulled up by the winch, thereby lifting the rope back up to the original jump position.

[0009] Typically, instructions on the bungy jump recovery may be communicated to the jumper before the start of a bungy jump. Hand signals and verbal communications may also be used during and/or after the jump. However, under stressful situations (for example, after the bungy jumping), the jumper may sometimes forget the instructions that were given earlier. In some extreme situations, the jumper may be immobilized by fear incurred during the jump. There may also be instances where the jumper may be injured or may lose consciousness and fail to perform the instructions.

[0010] Thus, there is a need for an apparatus for retrieving or recovering the cord to eliminate or at least minimize dependence on the jumper to correctly and safely connect a retrieval or recovery or retrieving rope to the jumper upon the completion of the bungy jump. Further, the amount of time required for recovery of the cord and the jumper may be reduced, thereby increasing the profit capacity, especially on busy days with increased number of jumpers.

Summary

[0011] According to an embodiment, a recovery device for retrieving a cord having one end portion coupled to a receiving device is provided. The recovery device may include a coupling component having an opening configured to accommodate a portion of the cord for movement of the coupling component along the cord, wherein at least a portion of the coupling component is adapted for magnetically coupling to at least a portion of the receiving device, wherein the coupling component comprises a retrieving arrangement configured to facilitate movement of the coupling component in a direction toward an opposite end portion of the cord.

[0012] According to an embodiment, a receiving device for receiving a recovery device for retrieving a cord is provided. The receiving device may include a central core; and a padding arrangement encasing at least part of the central core, wherein at least a portion of the central core is adapted for magnetically coupling to at least a portion of the recovery device, wherein the receiving device is coupleable toward one end portion of the cord.

[0013] According to an embodiment, an apparatus for retrieving a cord is provided. The apparatus may include a recovery device and a receiving device.

[0014] According to an embodiment, a method of retrieving a cord having one end portion and an opposite end portion is provided. The method may include movably coupling a recovery device to the opposite end portion of the cord; moving the recovery device to a receiving device at the one end portion of the cord and bringing the recovery device into magnetic coupling with the receiving device; and exerting a pulling force on a retrieving rope coupled to the recovery device to retrieve the recovery device along with the receiving device toward the opposite end portion of the cord.

Brief Description of the Drawings

[0015] 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:

[0016] FIG. 1A shows a schematic cross-sectional view of a recovery device for retrieving a cord, according to various embodiments.

[0017] FIG. 1B shows a schematic cross-sectional view of a receiving device for receiving a recovery device for retrieving a cord, according to various embodiments.

[0018] FIG. 1C shows a schematic cross-sectional view of an apparatus for retrieving a cord, according to various embodiments.

[0019] FIG. 1D shows a flow chart illustrating a method of retrieving a cord, according to various embodiments.

[0020] FIG. 2A shows a schematic drawing illustrating snapshot instances of a process of bungy jumping, in accordance with various embodiments.

[0021] FIGS. 2B and 2C show schematic drawings illustrating snapshot instances of a cord retrieval process thereafter, according to one embodiment.

5 [0022] FIG. 3A shows a top perspective view of an exemplary recovery device, in accordance with one embodiment.

[0023] FIG. 3B shows a bottom perspective view of the exemplary recovery device of FIG. 3A.

10 [0024] FIG. 4A shows a perspective view of an exemplary receiving device, in accordance with one embodiment.

[0025] FIG. 4B shows an exploded view of the exemplary receiving device of FIG. 4A.

[0026] FIG. 5A shows an expanded perspective view of a central core of FIG. 4B.

[0027] FIG. 5B shows a top schematic view of the central core of FIG. 5A.

[0028] FIG. 5C shows a side schematic view of the central core of FIG. 5A.

15 [0029] FIG. 5D shows a cross-sectional schematic view seen from a line B of FIG. 5C.

[0030] FIG. 5E shows a cross-sectional schematic view seen from a line A of FIG. 5B.

[0031] FIG. 6A shows a schematic drawing of a side view illustrating the recovery device of FIG. 3A moving toward the receiving device of FIG. 4A along a cord, in accordance with one embodiment.

20 [0032] FIG. 6B shows a side cross-sectional view of FIG. 6A.

[0033] FIG. 6C shows a schematic drawing of a side view illustrating the recovery device moving toward the receiving device along the cord with misalignment therebetween, in accordance with one embodiment.

25 [0034] FIG. 6D shows a schematic drawing of a side view illustrating the recovery device and the receiving device magnetically coupled to each other for the cord retrieval process, in accordance with one embodiment.

Detailed Description

30 [0035] 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
5 some embodiments can be combined with one or more other embodiments to form new embodiments.

[0036] 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.

[0037] 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
10 in the context of an embodiment may correspondingly be applicable to the same or similar feature in the other embodiments.

[0038] 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.

[0039] In the context of various embodiments, the term “substantially” may include “exactly” and a reasonable variance.

[0040] In the context of various embodiments, the term “about” or “approximately” as applied to a numeric value encompasses the exact value and a reasonable variance.

[0041] As used herein, the term “and/or” includes any and all combinations of one or
25 more of the associated listed items.

[0042] 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.

[0043] Various embodiments may provide a bungee jump recovery unit or a bungee jump recovery system. For example, the bungee jump recovery unit or the bungee jump recovery system may recover the jumper by lifting up to an original jump location.

5 [0044] Various embodiments may provide a bungee jump recovery unit that may provide a quick, consistent and safe connection to a bungee jumper after a bungee jump is completed by use of high-powered magnets. The unit may connect a winch rope to the jumper so that the jumper may be lifted up to an original jump position.

[0045] The bungee jump recovery unit in accordance with various embodiments may use magnetic force as the main means of attachment, instead of a mechanical connection,
10 which may be used in a conventional mechanical recovery system.

[0046] The bungee jump recovery unit in accordance with various embodiments may involve the use of fewer moving parts as compared to a conventional mechanical recovery system. The bungee jump recovery unit in accordance with various embodiments may advantageously be less vulnerable to adverse weather conditions (for example, cold
15 weather) or mechanical failures.

[0047] The bungee jump recovery unit in accordance with various embodiments may be quicker or more convenient to set up and break and take apart.

[0048] The bungee jump recovery unit in accordance with various embodiments may have a lower failure rate compared to known recovery systems.

20 [0049] FIG. 1A shows a schematic cross-sectional view of a recovery device 100 for retrieving a cord 110 having one end portion coupled to a receiving device 120, according to various embodiments. For example, the recovery device 100 may be for retrieving the cord 110 together with the receiving device 120 coupled toward the one end portion of the cord 110. The recovery device 100 includes a coupling component 102 having an
25 opening 104 configured to accommodate a portion of the cord 110 for movement of the coupling component 102 (or effectively, the recovering device 100) along the cord 110, as represented by a dotted line 112. At least a portion of the coupling component 102 is adapted for magnetically coupling to at least a portion of the receiving device 120, as represented by the dotted line 112 through to a dotted line 114. The coupling component
30 102 includes a retrieving arrangement 106 configured to facilitate movement of the coupling component 102 in a direction toward an opposite end portion of the cord 110.

The opening 104 may be arranged in proximity to the retrieving arrangement, as represented by a line 108.

[0050] In the context of various embodiments, the term “retrieving” may also refer to recovering, hauling, winching, pulling, or lifting.

5 [0051] The term “coupled” may mean connected, be in contact with, attached or secured to.

[0052] The term “opening” may refer to an aperture, an orifice, a hole, or a gap.

[0053] In the context of various embodiments, the phrase “magnetically coupling” may refer to magnetic coupling or magnetic connection or magnetically attracting or magnetically securing. For example, “magnetically coupling” may mean that a magnetic
10 force may be between a permanent magnet and a ferromagnetic element, or between a permanent magnet and another permanent magnet.

[0054] The phrase “accommodating a portion of the cord” may refer to encircling or surrounding the portion of the cord 110 within the opening 104. For example, the opening
15 104 may include a through-hole along an axial center of the coupling component 102 and the accommodated portion of the cord 110 may be free from contact with at least a part of a wall of the through-hole. The cord 110 may be extended along a direction substantially parallel to the axial center of the coupling component 102. This way, the coupling component 102 may move along the cord 110 with zero or minimal resistance against
20 each other; thereby preserving the integrity of the cord 110.

[0055] For example, the movement of the coupling component 102 along the cord 110 may refer to a sliding movement of the coupling component 102 along the cord 110.

[0056] In the context of various embodiments, the phrase “one end portion of the cord” may refer to a distal end portion of the cord 110. The one end portion of the cord 110
25 may mean the one end (or tip) of the cord 110 or any portion in close proximity to the one end of the cord 110.

[0057] The phrase “an opposite end portion of the cord” may refer to the end portion of the cord 110 extended away from the distal end portion of the cord 110, or an end portion of the cord 110 that may be furthest relative to the distal end portion of the cord 110. The
30 opposite end portion of the cord 110 may mean the opposite end (or tip) of the cord 110 or any portion in close proximity to the opposite end of the cord 110. For example, if the

opposition end portion of the cord 110 is held at a height away from a ground and the cord 110 is allowed to extend freely in a downward or vertical direction toward the ground, the distal end portion of the cord 110 may be referred to as the bottom end portion of the cord 110, and the opposite end portion of the cord 110 may be referred to as the top end portion of the cord 110.

[0058] In the context of various embodiments, the term “toward one end portion of the cord” may mean “substantially near one end point of the cord”.

[0059] In the context of various embodiments, the term “toward an opposite end portion of the cord” may mean substantially near one end point of the cord 110 extended away from the distal end portion of the cord 110, or substantially near one end point of the cord 110 that may be furthest relative to the distal end portion of the cord 110.

[0060] In the context of various embodiments, the phrase “facilitate movement of the coupling component in a direction toward an opposite end portion of the cord” may refer to enabling or allowing the coupling component 102 to move to a position that lies on substantially the same plane of the opposite end portion of the cord 110. For example, if the opposition end portion of the cord 110 is held at a height away from a ground and the cord 110 is allowed to extend freely in a downward or vertical direction toward the ground, the plane of the opposite end portion of the cord 110 may be substantially parallel to the ground. In this case, the phrase “facilitate movement of the coupling component in a direction toward an opposite end portion of the cord” may refer to the coupling component 102 moving upwardly away from the ground to a position substantially at or near the height of the opposite end portion of the cord 110 that may be also be referred to as an original (jump) position or a starting position. The original (jump) position or the starting position may also be a recovered position, which may be of close proximity to the original (jump) position or the starting position substantially at or near the height of the opposite end portion of the cord 110.

[0061] In other words, various embodiments may relate to the recovery device 100 for retrieving the cord 110, for example, a bungee cord or a bungee rope. The receiving device 120 may be attached to one end portion of the cord 110. For example, after the cord 110 has been extended from an opposite end portion of the cord 110, the recovery device 100 may be placed around a portion of the cord 110 at the opposite end portion of the cord

110. The recovery device 100 may move or may be lowered to the receiving device 120, and may couple to the receiving device 120 by magnetic means. When the recovery device 100 and the receiving device 120 are coupled to each other, a retrieving arrangement 106 may be used to move or lift the recovery device 100 along with the receiving device 120 back to a position at or substantial near the opposite end portion of the cord 110, which is the recovered position. By doing so, the cord retrieval process may be carried out automatically without the jumper's intervention.

[0062] In various embodiments, the coupling component 102 may further include a first member; and a second member coupleable to the first member, wherein the first member and the second member are arranged to move relative to each other between a closed configuration and an open configuration, wherein in the closed configuration, the first member and the second member are arranged to move toward each other to form the opening 104 to accommodate the portion of the cord 110; wherein in the open configuration, the first member and the second member are arranged to move away from each other to receive or release the portion of the cord 110.

[0063] In other words, in the closed configuration, the opening 104 may form a closed loop, while in the open configuration, the opening 104 may form an opened loop where the first member and the second member may be arranged to move away from each other to provide an inlet/outlet to receive or release the portion of the cord 110.

[0064] In one example, the first member may be stationary while the second member may move relative to the first member.

[0065] In another example, the second member may be stationary while the first member may move relative to the second member.

[0066] In yet another example, both the first member and the second member may move with respect to each other.

[0067] In various embodiments, the first member may be arranged to pivot relative to the second member.

[0068] In other words, the first member may move relative to the second member via a pivot point. For example, the pivot point may be a hinge. In this example, the coupling component 102 may function similarly to a clamp, and the first member and the second member may function similarly to the arms of the clamp.

[0069] In a different example, the coupling component 102 may function similarly to an open-ended enclosure with an overlapping flap or a snap-back flap, where the first member may be the flap and the second member may be the open-ended enclosure. For example, the first member and the second member may be of different dimensions, and
5 the coupling component 102 may function similarly to a carabiner.

[0070] In yet another example, the coupling component 102 may function similarly to an open-ended enclosure with a removable lid or doorway, where the first member may be the removable lid or doorway and the second member may be the open-ended enclosure.

[0071] Having the first member and the second member arranged to move relative to
10 each other may be useful, for example, in a bungee jumping process. This may be due to the fact that the way a bungee cord (e.g., 110) is rigged as well as the way a bungee platform layout is arranged. Under these conditions, there may simply be insufficient space around where the bungee cord 110 may be attached to the platform (at the original jump location) to allow for attachment before bungee jumping. In other words, after a
15 jumper has jumped off the platform, there may be no way of getting the recovery device 100 around the bungee cord 110 except to have the first member and the second member of the recovery device 100 openable.

[0072] In other examples, the recovery device 100 may include a third member or more to form a closed loop in the closed configuration. Although it may be possible to divide
20 the circular shape into more than two parts (first member and second member), such a design may require more complex parts.

[0073] In various embodiments, the first member and the second member may further be arranged to releasably secure to each other.

[0074] In various embodiments, the coupling component 102 may further include a
25 locking mechanism to releasably secure the first member and the second member in the closed configuration.

[0075] For example, the locking mechanism may include a locking pin.

[0076] In the context of various embodiments, the term “lock” may interchangeably be referred to as secure, bolt or latch.

30 [0077] In various embodiments, each of the first member and the second member may include a non-metallic body.

[0078] For example, the first member may include a plastic body and similarly, the second member may also include a plastic body. The body of the first member may be of the same material as the body of the second member. In some embodiments, the body of the first member may be of a different material to the body of the second member. Other
5 suitable materials may be used, with the main purpose that the material allows for protection and preservation of the integrity of the cord 110 (for example, the rubber of the bungy cord) from friction against a ferromagnetic element (e.g., a steel plate) or a permanent magnet (e.g., a neodymium magnet), and/or anything or any parts of the coupling component 102 that may damage the cord 110.

[0079] The first member and the second member in the closed configuration may form a circular shape. It may be appreciated and understood that although the circular shape may advantageously be most efficient in terms of size and weight, other shapes may also be formed in different embodiments.

[0080] In various embodiments, each of the first member and the second member may
15 include a ferromagnetic element, wherein the respective ferromagnetic element is disposed on a surface of the first member and on a surface of the second member, wherein the respective surfaces are arranged to contact the receiving device 120. The ferromagnetic element may be a light-weight and structurally strong material such that the weight of the receiving end 120 may be minimized. This, in turn, may minimize the
20 adverse effect of an impact on a jumper at the receiving end 120.

[0081] In other embodiments, each of the first member and the second member includes a permanent magnet, wherein the respective permanent magnet is disposed on a surface of the first member and on a surface of the second member, wherein the respective surfaces are arranged to contact the receiving device 120.

[0082] In various embodiments, the ferromagnetic element or the permanent magnet may be disposed on other (additional) surfaces of the first member and/or the second member. However, it should be understood and appreciated that the ferromagnetic element or the permanent magnet may not be disposed on one or more surface(s) of the first member and/or the second member that may render possible damage to the cord 110.

[0083] In some embodiments, the ferromagnetic element or the permanent magnet may
30 be embedded within the first member and/or the second member. In such cases, the

embedment may be dimensioned in a manner such that the magnetically coupling force between the coupling component 102 and the receiving device 120 may be sufficiently strong to perform the cord retrieval.

[0084] In various embodiments, the portion of the coupling component 102 may include a permanent magnet. In some examples, the permanent magnet of the coupling component 102 may be for magnetically coupling to another permanent magnet of the receiving device 120. In one example, the permanent magnet of the coupling component 102 may be of the same material as the other permanent magnet of the receiving device 120. In a different example, the permanent magnet of the coupling component 102 may be of different material from the other permanent magnet of the receiving device 120. In other examples, the permanent magnet of the coupling component 102 may be for magnetically coupling to a ferromagnetic element of the receiving device 120.

[0085] For example, the portion of the coupling component 102 may include a neodymium magnet.

[0086] In various embodiments, the portion of the coupling component 102 may include a ferromagnetic element adapted for magnetic coupling to the portion of the receiving device 120. In other words, the ferromagnetic element may be adapted to magnetically couple to the portion of the receiving device 120. For example, the ferromagnetic element of the coupling component 102 may be for magnetically coupling to a permanent magnet of the receiving device 120.

[0087] For example, the portion of the coupling component 102 may include a steel plate.

[0088] The recovery device 100 in accordance with various embodiments may further include a guide arrangement coupled to the coupling component 102, wherein the guide arrangement is configured to guide the movement of the coupling component 102 along the cord 110.

[0089] In various embodiments, the guide arrangement may include a guide member, e.g., roller ball.

[0090] For example, the roller ball may have a diameter of about 2 cm, or about 3 cm, or about 4 cm, or about 5 cm. For example, the roller ball may have a diameter in a range of about 2.5 cm to about 5 cm. The roller balls may be a standard sized roller ball or a custom sized roller ball. The roller ball may be sufficiently sized to provide guidance of

the coupling component 102 along the cord 110. The roller ball may be of a spherical shape, or a cylindrical shape, or any other shape suitable for providing guidance of the coupling component 102 along the cord 110. The roller ball may be made of plastic, or rubber, or any other material suitable for providing guidance of the coupling component 102 along the cord 110.

[0091] The guide member may be in contact with the accommodated portion of the cord 110.

[0092] The recovery device 100 in accordance with various embodiments may include at least two guide members, or at least three guide members, or at least four guide members, or at least five guide members, or at least six guide members, at least seven guide members, or at least eight guide members. Each guide member may be positioned at substantially equal distance from a neighbouring or adjacent guide member.

[0093] The guide members may be disposed on at least a surface of the first member and/or at least a surface of the second member, wherein the respective surfaces are arranged to avoid contact with the receiving device 120.

[0094] The guide members may be disposed on a surface of the first member and/or a surface of the second member, wherein the respective surfaces are opposite to the surfaces on which the ferromagnetic element or the permanent magnet may be disposed.

[0095] In various embodiments, the retrieving arrangement 106 may include a ring configured to receive a retrieving rope.

[0096] For example, the retrieving rope may be attached or connected or tied to the ring. The retrieving rope may be referred to as a retrieval rope or a recovery rope or a winch rope.

[0097] In the context of various embodiments, the term “ring” may interchangeably be referred to as an eyebolt, or an eyelet.

[0098] In various embodiments, the ring may be coupled to the coupling component 102. For example, the ring may be welded to the coupling component 102.

[0099] In other embodiments, the ring may be an integral part of the ferromagnetic element. For example, the ring may be shaped from the ferromagnetic element (e.g., the steel plate).

[0100] The ring may be of any shape. For example, the ring may be of a regular polygonal shape, such as, a circular shape, an elliptical shape, a triangular shape, a square shape, or a rectangular shape. The ring may also be of an irregular shape.

5 [0101] In various embodiments, the coupling component 102 may include at least two rings, or at least three rings, or at least four rings. Each ring may be positioned at substantially equal distance from a neighbouring or adjacent ring.

[0102] The ring may be disposed on at least a surface of the first member and/or at least a surface of the second member, wherein the respective surfaces are arranged to avoid contact with the receiving device 120.

10 [0103] FIG. 1B shows a schematic cross-sectional view of a receiving device 120 for receiving a recovery device 100 for retrieving a cord 110, according to various embodiments. The receiving device 120 includes a central core 122; and a padding arrangement 124 encasing at least part of the central core 122, as represented by a line 126. At least a portion of the central core 122 is adapted for magnetically coupling to at
15 least a portion of the recovery device 100, as represented by the dotted line 114 through to the dotted line 112. The receiving device 120 is coupleable toward one end portion of the cord 110, as represented by the dotted line 114.

[0104] In the context of various embodiments, the term “encasing” may refer to covering, enclosing, encapsulating, or surrounding.

20 [0105] The term “retrieving” and the phrases “magnetically coupling”, “one end portion of the cord”, “toward one end portion of the cord” may be described in similar context as described above.

[0106] In various embodiments, the central core 122 may include an aluminum plate. For example, the aluminum plate may be magnesium infused aluminum plate.

25 [0107] In other embodiments, the central core 122 may include a plate made of an alloy that provides a high strength-to-weight ratio.

[0108] The receiving device 120 may be for receiving the recovery device 100 moving from an opposite end portion of the cord 110 toward the receiving device 120 at the one end portion of the cord 110.

30 [0109] The phrase “opposite end portion of the cord” may be described in similar context as described above.

[0110] In various embodiments, the central core 122 may include a permanent magnet. In some examples, the permanent magnet of the central core 122 may be for magnetically coupling to another permanent magnet of the recovery device 100. In one example, the permanent magnet of the central core 122 may be of the same material as the other permanent magnet of the recovery device 100. In a different example, the permanent magnet of the central core 122 may be of different material from the other permanent magnet of the recovery device 100. In other examples, the permanent magnet of the central core 122 may be for magnetically coupling to a ferromagnetic element of the recovery device 100.

[0111] For example, the permanent magnet may include a neodymium magnet.

[0112] In various embodiments, the central core 122 may include at least two permanent magnets, or at least three permanent magnets, or at least four permanent magnets. Each permanent magnet may be positioned at substantially equal distance from a neighbouring or adjacent permanent magnet.

[0113] In various embodiments, the central core 122 may further include at least two spacers arranged across the permanent magnet for compensating movement of the recovery device 100 to provide a constant magnetic attraction between the recovery device 100 and the receiving device 120. The term “constant” may mean consistent or continuing. The phrase “magnetic attraction” may also be referred to as a magnetic attraction force.

[0114] In other embodiments, the central core 122 may include a ferromagnetic element adapted for magnetic coupling to the portion of the recovery device 100. For example, the ferromagnetic element of the central core 122 may be for magnetically coupling to a permanent magnet of the recovery device 100.

[0115] For example, the ferromagnetic element may include a steel plate.

[0116] In various embodiments, the central core 122 may include at least two ferromagnetic elements, or at least three ferromagnetic elements, or at least four ferromagnetic elements. Each ferromagnetic element may be positioned at substantially equal distance from a neighbouring or adjacent ferromagnetic element.

[0117] In various embodiments, the central core 122 may further include at least two spacers arranged across the ferromagnetic element for compensating movement of the

recovery device 100 to provide a constant magnetic attraction between the recovery device 100 and the receiving device 120.

[0118] The one or more permanent magnet(s) or the one or more ferromagnetic element(s) may be coupled to the aluminum plate (e.g., the central core 122).

5 **[0119]** As described above, two spacers may be arranged across a permanent magnet, or a ferromagnetic element. For example, the central core 122 may include multiple spacers of up to four spacers. In the case of multiple spacers, each spacer may be arranged between the multiple permanent magnets or between the multiple ferromagnetic elements.

10 **[0120]** In various embodiments, the spacers arranged across the permanent magnet or the ferromagnetic element may be for compensating movement and flexing of the recovery device 100 so that a constant magnetic attraction may be achieved between the recovery device 100 and the receiving device 120.

[0121] The spacers may be made of an elastic material, for example, rubber.

15 **[0122]** The central core 122 with at least one of the one or more permanent magnet(s) or the one or more ferromagnetic element(s) may form a planar structure.

[0123] In various embodiments, the central core 122 may further include an alignment element configured to facilitate an orientation of the receiving device 120 relative to an orientation of the recovery device 100 for providing constant magnetic coupling
20 therebetween.

[0124] In context of various embodiments, the term ‘constant’ may mean consistent or substantially evenly distributed.

[0125] In various embodiments, the alignment element may be arranged along a central axis of the receiving device 120. For example, the alignment element may be a cone
25 structure.

[0126] In cross section, the cone structure may have a parabolic curve that connects the maximum outer diameter at the cone base to the maximum outer diameter at the “point” or tip of the cone. The outer diameter of the cone base may be a few millimeters smaller than the interior diameter of the recovery device 100 (or the opening 104). This may
30 allow for proper alignment of magnetically coupling between the recovery device 100 and the receiving device 120. The outer diameter of the “point” may need to be slightly

larger (for example, about 5 mm) than the thickest possible bungy cord (of about 50 mm). The parabolic curve may provide a smooth connection of the receiving device 120 to the recovery device 100.

5 [0127] In various embodiments, the padding arrangement 124 may include a first padding portion and a second padding portion, wherein the central core 122 is arranged between the first padding portion and the second padding portion.

10 [0128] The first padding portion may include a frame having a first padding opening for accommodating the cord 110; a first padding spacer having a first padding spacer opening for accommodating the cord 110, and a plurality of exposure openings for positioning over the permanent magnet(s), or the ferromagnetic element(s); and a first padding sleeve having a first padding sleeve opening for accommodating the cord 110, and a plurality of sleeve exposure openings for positioning over the permanent magnet(s), or the ferromagnetic element(s). The frame may be arranged between the first padding spacer and the first padding sleeve.

15 [0129] The frame may be made of a foam material, for example, a standard polyethylene foam. The first padding spacer may be made of an elastic material, for example, high density polyethylene foam. The first padding sleeve may be made of plastic, for example, a vinyl coated polyester fabric.

20 [0130] The second padding portion may include a second padding spacer having a second padding spacer opening for accommodating the cord 110, and a plurality of recesses for receiving the permanent magnet(s), or the ferromagnetic element(s); and a second padding sleeve having a second padding sleeve opening for accommodating the cord 110. The second padding sleeve may be arranged over the second padding spacer.

25 [0131] The second padding spacer may be made of an elastic material, for example, high density polyethylene foam. The second padding sleeve may be made of plastic, for example, a vinyl coated polyester fabric.

[0132] In the context of various embodiments, the term “accommodating” may mean encircling or surrounding.

30 [0133] FIG. 1C shows a schematic cross-sectional view of an apparatus 140 for retrieving a cord (e.g. 110), according to various embodiments. The apparatus 140 may include the recovery device 100 in accordance with various embodiments and the receiving device

120 in accordance with various embodiments. The recovery device 100 and the receiving device 120 may be magnetically coupleable to each other, as represented by a line 142 so as to work in cooperation with each other.

[0134] FIG. 1D shows a flow chart 160 illustrating a method of retrieving a cord (e.g., 110) having one end portion and an opposite end portion, according to various embodiments. In other words, a method for retrieving a cord having one end portion and an opposite end portion may be provided. In FIG. 1D, at 162, a recovery device (e.g., 100) is movably coupled to the opposite end portion of the cord 110. At 164, the recovery device 100 is moved to a receiving device (e.g., 120) at the one end portion of the cord 110 and the recovery device 100 is brought into magnetic coupling with the receiving device 120. At 166, a pulling force is exerted on a retrieving rope coupled to the recovery device 100 to retrieve the recovery device 100 along with the receiving device 120 toward the opposite end portion of the cord 110.

[0135] The recovery device and the receiving device may include or may involve the same or like elements or components as those of the recovery device 100 and the receiving device 120 of FIGS. 1A and 1B, respectively, and as such, the same numerals are assigned and the like elements may be as described in the context of the the recovery device 100 and the receiving device 120 of FIGS. 1A and 1B, respectively, and therefore the corresponding descriptions may be omitted here.

[0136] In the context of various embodiments, the term “retrieving” and the phrases “magnetic coupling”, “one end portion of the cord”, “opposite end portion of the cord”, “toward the opposite end portion of the cord” may be described in similar context as described above.

[0137] The term “movably coupled” may mean attached to (or attachable to) and movable along. In other words, for example, the recovery device 100 with the retrieving rope may be placed over the opposite end portion of the cord 110 and may be movable along the cord 110.

[0138] The term “moves” in relation to the recovery device 100 may also mean being lowered.

[0139] The phrase “the recovery device is brought into magnetic coupling with the receiving device” may also mean that the recovery device 100 and the receiving device 120 may be magnetically coupled or secured to each other.

5 [0140] The phrase “a pulling force is exerted on a retrieving rope” or “exerting a pulling force on a retrieving rope” may also mean applying a pulling force on the retrieving rope, or lifting the retrieving rope.

[0141] In various embodiments, prior to movably coupling the recovery device 100 to the opposite end portion of the cord 110, the retrieving rope may be coupled to a retrieving arrangement 106 of the recovery device 100.

10 [0142] In various embodiments, movably coupling the recovery device 100 to the opposite end portion of the cord 110 may include accommodating a portion of the cord 110 within an opening 104 of a coupling component 102 of the recovery device 100.

[0143] In various embodiments, the coupling component 102 may further include a first member; and a second member coupleable to the first member, wherein the first member and the second member are arranged to move relative to each other between a closed configuration and an open configuration, wherein in the closed configuration, the first member and the second member are arranged to move toward each other to form the opening 104 to accommodate the portion of the cord 110; wherein in the open configuration, the first member and the second member are arranged to move away from each other to receive or release the portion of the cord 110. The method 160 may further include releasably securing the first member and the second member.

20 [0144] In various embodiments, the method 160 may further include guiding the movement of the coupling component 102 along the cord 110.

[0145] While the method described above is illustrated and described as a series of steps or events, it will be appreciated that any ordering of such steps or events are not to be interpreted in a limiting sense. For example, some steps may occur in different orders and/or concurrently with other steps or events apart from those illustrated and/or described herein. In addition, not all illustrated steps may be required to implement one or more aspects or embodiments described herein. Also, one or more of the steps depicted

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30 herein may be carried out in one or more separate acts and/or phases.

[0146] An example of the method of retrieving the cord (e.g., 110), for example, a bungee cord, in accordance with various embodiments will be described as follow.

[0147] FIG. 2A shows a schematic drawing 200 illustrating snapshot instances of a process of bungee jumping, while FIGS. 2B and 2C show schematic drawings 220, 240 illustrating snapshot instances of a cord retrieval process thereafter, in accordance with various embodiments.

[0148] The recovery device and the receiving device may include or may involve the same or like elements or components as those of the recovery device 100 and the receiving device 120 of FIGS. 1A and 1B, respectively, and as such, the same numerals are assigned and the like elements may be as described in the context of the the recovery device 100 and the receiving device 120 of FIGS. 1A and 1B, respectively, and therefore the corresponding descriptions are omitted here.

[0149] In the process of bungee jumping, the receiving device 120 may firstly be coupled to or attached to a jumper 202 at the one end 204 (or one end portion) of the cord 110. The receiving device 120 may be positioned at the foot of a jumper 202. The jumper 202 may be positioned at a platform 206 at a starting position (or may also be referred to as an original (jump) position). The opposite end 208 (or the opposite end portion) of the cord 110 may be secured to an underlying surface of the platform 206 relative to a top-lying surface of the platform 206 on which the jumper 202 may be positioned at the starting position, or secured to other suitable parts of the platform 206.

[0150] As shown in the schematic drawing 200 of FIG. 2A, the receiving device 120 may be referred to as a “Jumper End”. The “Jumper End” may be fixed to the end (e.g., 204) of the bungee cord 110.

[0151] At instance (i), the jumper 202 may jump or move off the platform 206 to perform the bungee jump. At instance (ii), the cord 110 may extend away from the platform 206 and toward a ground. The ground may be land or water. At instance (iii), when the cord 110 extends fully and is substantially at equilibrium (where the jumper 202 has stopped bouncing and is ready to be recovered, or where the cord 110 is only oscillating for a few meters, for example, about 1 m or less in an up-and-down motion), the bungee jump may be deemed completed.

[0152] One end 210 of a retrieving rope 212 (e.g., a winch rope) may be coupled to the retrieving arrangement 106 of the recovery device 100. The other (opposite) end 214 of the retrieving rope 212 may be attached to a winch 216 or a pulley system to facilitate the cord retrieval.

5 [0153] FIG. 2B shows a schematic drawing 220 illustrating snapshot instances of feeding or lowering the retrieving rope 212 to the jumper 202. When the bungee jump is completed, the recovery device 100 may be placed over the opposite end 208 (or the opposite end portion) of the cord 110 so that a portion of the cord 110 is accommodated within the opening 104 of the coupling component 102 of the recovery device 100, for
10 example, by a bungee operator 222, as shown in instance (iv). The recovery device 100 may also be referred to as a “Recovery End”. At instance (iv), the “Recovery End” may be opened and subsequently clamped around the bungee cord 110.

[0154] The recovery device 100 may be lowered toward the receiving device 120 coupled to the one end 204 (or the one end portion) of the cord 110 at the foot of the
15 jumper 202. In other words, at instance (v), the “Recovery End” may be lowered down the entire length of the bungee cord 110 by the winch rope 212.

[0155] Upon reaching the one end 204 (or one end portion) of the cord 110, the recovery device 100 and the receiving device 120 may secure to each other by magnetic coupling. This is to say, the “Recovery End” may connect with the “Jumper End” as in instance
20 (vi).

[0156] FIG. 2C shows a schematic drawing 240 illustrating snapshot instances of retrieving the retrieving rope 212 along with the jumper 202. The retrieving rope 212 may then be pulled or lifted upwardly toward a recovered position which may be near or at the starting position at the platform 206. The winch 216, via the winch rope 212, may pull the
25 jumper 202 back up to the original (jump) location/position, at instances (vii) and (viii). At the recovered position (instance (ix)), the recovery device 100 may be removed from the cord 110 and the jumper 202 may be released from the receiving device 120 and the cord 110, for example, with the assistance of the bungee operator 222; thereby allowing the cord 110 to be retrieved and attached to a next jumper at the starting position.

30 [0157] It may be appreciated that when the recovery device 100 is magnetically coupled to the receiving device 120 with the cord 110 extended toward the ground, the magnetic

attraction between the recovery device 100 and the receiving device 120 may be effective in a direction along a pulling direction which the cord 110 extends. This magnetic attraction may be sufficiently strong to maintain the magnetic coupling between the recovery device 100 and the receiving device 120 throughout the cord retrieval process.

5 [0158] At the recovered position (e.g., instance (ix)), the recovery device 100 may be removed from the receiving device 120 by laterally sliding the recovery device 100 relative to the receiving device 120. In other words, the sliding movement may be in a direction perpendicular to the pulling direction as mentioned above. This magnetic attraction may be insufficiently strong to maintain the magnetic coupling between the
10 recovery device 100 and the receiving device 120 during the removal (lateral sliding movement) of the recovery device 100 from the receiving device 120. This may allow the easy removal of the recovery device 100 from the receiving device 120.

[0159] In summary, prior to commencing a bungee jump, the “Jumper End” or receiving device 120 may be attached to the same end 204 (or same end portion) of the bungee cord
15 110 as the bungee jumper 202. After the bungee jump is finished, the “Recovery End” may be attached to the bungee cord 110. Using the winch 216, the “Recovery End” may be lowered down the entire length of the cord 110 to secure to the “Jumper End”. Once secured or connected, the bungee jumper 202 may be lifted by the winch 216 back up to the original jump position or other post-recovery position proximate to the original jump
20 position.

[0160] An example of the recovery device (e.g., 100) for retrieving the cord (e.g., 110), for example, a bungee cord, in accordance with various embodiments, at the “Recovery End” will be described as follow.

[0161] FIG. 3A shows a top perspective view 300 of an exemplary recovery device (e.g.,
25 100), while FIG. 3B shows a bottom perspective view 320 of the exemplary recovery device, in accordance with one embodiment.

[0162] The recovery device 302 may include or may involve the same or like elements or components as those of the recovery device 100 of FIG. 1A, and as such, the like elements may be as described in the context of the the recovery device 100 of FIG. 1A,
30 and therefore the corresponding descriptions are omitted here.

[0163] As shown in FIGS. 3A and 3B, the recovery device (or the “Recovery End”) 302 may be made up of a plastic body 304, steel plates 306, roller balls 322 and eyebolts 324.

[0164] The plastic body 304 may include or consist of two half circles that overlap and fit together, making a full circle. The two pieces (or the two half circles) may be hinged (by
5 a hinge 308) on one side to allow for opening and closing of the the two pieces. The opposite side may provide a locking pin 310 to prevent accidental opening. Upon completion of a bungee jump, the plastic body 304 may be opened, slipped over a bungee cord (e.g., 110) and lowered down the cord 110 to the jumper (e.g., 202).

[0165] Once recovery of the bungee jumper is completed, the locking pin 310 may be
10 unlocked and the “Recovery End” 302 may be removed from the bungee cord. The plastic body 304 may provide a framework to anchor other components and may protect the bungee cord 110 from damage.

[0166] Two similarly shaped half circles of about 16 mm steel plate 306 may be set into the underside of the plastic body 304. These steel plates 306 may provide sufficient
15 amount of attraction for the magnets of the “Jumper End” to safely hold the bungee jumper when he is being recovered. The steel plates 306 may also provide the main structure from which a winch rope (e.g., 212) may be anchored.

[0167] The top of the “Recovery End” 302 may be provided with eight roller balls 322 that may also help to protect the bungee cord 110 from damage and minimize friction
20 when lowering the recovery device 302 down the bungee cord 110.

[0168] The eyebolts 324 may provide attachment points for the winch rope (e.g., 212), which may be used to lift the bungee jumper back to original (jump) position.

[0169] In a different example (not shown in FIGS. 3A and 3B), for the “Recovery End” 302, the roller balls (e.g., 322) may be integrated with the steel plate 306. For example,
25 custom designed roller balls (e.g., 322) and the attachment points (e.g., 324) for the winch rope (e.g., 212) may be directly connected to the steel plate 306 by welding. In an alternative example, instead of welding, the attachment points (e.g., 324) may be integrally formed from the steel plate 306. The custom designed roller balls (e.g., 322) may include a housing within which the roller balls (e.g., 322) rotate, and the housing
30 may be integrally formed from the steel plate 306. In other words, the attachment points

(e.g., 324) and the housing of the custom designed roller balls (e.g., 322) may be formed out of a single piece of sheet steel.

[0170] An example of the receiving device (e.g., 120) for retrieving the cord (e.g., 110), for example, a bungy cord, in accordance with various embodiments, at the “Jumper End” will be described as follow.

[0171] FIG. 4A shows a perspective view 400 of an exemplary receiving device (e.g., 120), while FIG. 4B shows an exploded view 420 of the exemplary receiving device, in accordance with one embodiment.

[0172] The receiving device 402 may include or may involve the same or like elements or components as those of the receiving device 120 of FIG. 1B, and as such, the like elements may be as described in the context of the the receiving device 120 of FIG. 1B, and therefore the corresponding descriptions are omitted here.

[0173] As shown in FIGS. 4A and 4B, the receiving device (or the “Jumper End”) 402 may be considered or provided as three distinct groups or sections, namely, the central core (section) 422, the outer padding section 424 and the alignment cone (section) 426.

[0174] The outer padding section 424 may include an overlying part of a top sleeve 428, a foam or cushion body 430 and a spacer 432, as well as an underlying part of a receiving spacer 434 and a bottom sleeve 436. The foam or cushion body 430 may include a standard polyethylene foam, which may be used for protecting a jumper (e.g., 202) from side impact with the central core (section) 422. Each of the spacer 432 and the receiving spacer 434 may include a high density polyethylene foam, which may be used for protecting the jumper (e.g., 202) from impact with the central core (section) 422. Each of the top sleeve 428 and the bottom sleeve 436 may be made of a vinyl coated polyester fabric, which may be used for protecting the foams from wear and tear, and may further used for securing or locking all the layers (the cushion body 430, the spacer 432, the central core (section) 422, and the receiving spacer 434) therewithin. More specifically, the top sleeve 428 may fit tightly around the cushion body 430 that surrounds the central core (section) 422. The top sleeve 428 may also be connected or attached to the bottom sleeve via four velcro tabs 438. The cushion body 430 may fit tightly around the spacer 432 that surrounds the central core (section) 422. The central core (section) 422 may fit tightly into or between the spacer 432 and the receiving spacer 434, but may not be

secured to the spacer 432 and the receiving spacer 434. The receiving spacer 434 may be secured to the bottom sleeve 436 via two velcro tabs 440 inside or through a centre hole of the bottom sleeve 436 and via four velcro tabs 442 extending from the side toward the top of the bottom sleeve 436. The outer padding section 424 may protect the bungy jumper (e.g., 202) from an injury while bungy jumping. The overlying part and the underlying part may be described in similar context with the first padding portion and the second padding portion, respectively, as mentioned above.

[0175] The cone (section) 426 may be an important part of the apparatus for retrieving the cord 110 (wherein the apparatus may be referred to as a Bungy Jump Recovery Unit). The primary purpose of the cone 426 may facilitate the orientation of the steel plates 306 of the “Recovery End” 302 directly over the magnets 504 (FIG. 5A) of the “Jumper End” 402. Without this cone (section), it may be difficult to obtain a continuing or constant magnetic attraction between the recovery device 302 and the receiving device 402.

[0176] An example of the central core (section) 422 may be further described with respect to FIGS. 5A to 5E. FIG. 5A shows an expanded perspective view 500 of the central core 422. FIG. 5B shows a top view 520 of the central core 422. FIG. 5C shows a side view 540 of the central core 422. FIG. 5D shows a cross-sectional view 560 seen from a line B of FIG. 5C. FIG. 5E shows a cross-sectional view 580 seen from a line A of FIG. 5B.

[0177] As seen in FIG. 5A, the central core (section) 422 of the “Jumper End” 402 may include or consist of an aluminum plate 502, four magnets or more specifically, neodymium magnets 504, and rubber spacers 508.

[0178] The aluminum plate 502 may be the main structural element of the “Jumper End” 402. The aluminum plate 502 may need to have a sufficiently strong structure to withstand up to 200 kg of weight, but may also be sufficiently light-weighted so as not to affect the bungy jumper’s safety. For example, the aluminum plate 502 may be made of magnesium infused aluminum (Fusplate 5052).

[0179] The four neodymium magnets 504 may be bolted to the aluminum plate 502 and may provide an attraction force (magnetic coupling) between the “Jumper End” 402 and the “Recovery End” 302. The magnets 504 of the “Jumper End” 402 may be attracted to the steel plate 306 of the “Recovery End” 302. The temporary connection by magnetic

force may be sufficiently strong to safely hold the bungee jumper as the winch rope (e.g., 212) lifts him back up to the original (jump) position, but nevertheless, may be easily removable once the recovery operation is completed. The reason why this may be possible is that the magnets 504 may be strong when force is applied perpendicularly, but only have a fraction of that strength when resisting parallel forces (sliding). When the recovery has finished, the locking pin 302 may be removed from the “Recovery End” 302 and the recovery device 302 may open via the hinge bolt 308. Once opened, there may be sufficient mechanical advantage to easily separate the two components (half circles of the recovery device 302) and reset for a next bungee jumper.

[0180] Each magnet 504 may be circular having a diameter of about 60 mm. This structure of the magnet 504 may be based on a working load limit for the heaviest possible bungee jumper that may be allowed for commercial jumping. In other examples, the magnet may be of a different shape and/or a different dimension. Custom shaped and sized magnets may also be used.

[0181] As seen in FIG. 5B and FIG. 5D, the central core 422 of the “Jumper End” 402 may include four rubber spacers 508 for the magnets 504. Each rubber spacer 508 for the magnet 504 may be about 15 mm thick (FIG. 5E). The magnet’s spacers 508 may compensate for movement and flexing of the “Recovery End” 302 so that a constant magnetic attraction may be achieved.

[0182] FIG. 6A shows a schematic drawing of a side view 600 illustrating the recovery device 302 moving toward the receiving device 402 along the cord (e.g., 110). FIG. 6B shows a side cross-sectional view 620 of FIG. 6A.

[0183] As shown in FIGS. 6A and 6B, the cord 110 may be extended from the original (jump) location/position 602 toward the bungee jumper at 604.

[0184] All the components, for example, the eye bolts 324 for connection to a winch rope (not shown in FIGS. 6A and 6B), the roller balls 322, and the steel plate 306 may be mounted on the plastic body 304 of the recovery device 302.

[0185] The roller balls 322 may guide the descent of the recovery device 302 and protect the soft rubber of the bungee cord 110.

[0186] The steel plate 306 used for magnetic attraction (magnetically coupling) may be about 16 mm thick.

[0187] At 606, the “Recovery End” 302 may be lowered down the bungy cord 110 until the “Recovery End” 302 connects with the “Jumper End” 402.

[0188] The cone 426 may be bolted around the bungy cord 110 and attached to the “Jumper End” 402. The high-powered magnets 504 may be used for connection to the steel plate 306 of the “Recovery End” 302.

[0189] FIG. 6C shows a schematic drawing of a side view 640 illustrating the recovery device 302 moving toward the receiving device 402 along the cord 110 with misalignment therebetween.

[0190] As shown in FIG. 6C, when the “Recovery End” 302 is lowered down the bungy cord 110 until the “Recovery End” 302 contacts the “Jumper End” 402 at 642, the “Recovery End” 302 may be misaligned with respect to the “Jumper End” 402. When misaligned, the steel plate 306 may not come into contact with the magnets 504. In such a case of misalignment 644, the cone 426 may redirect the “Recovery End” 302 into a correct orientation with the “Jumper End” 402 through an opening 646 (e.g., in similar context to the opening 104 of the recovery device 100 of FIG. 1A).

[0191] FIG. 6D shows a schematic drawing of a side view 660 illustrating the recovery device 302 and the receiving device 402 magnetically coupled to each other for the cord retrieval process.

[0192] As shown in FIG. 6D, with the use of the cone 426 to obtain correct or proper alignment 662 between the “Recovery End” 302 and the “Jumper End” 402, the cone 426 passes through the opening 646 of “Recovery End” 302, and the steel plate 306 may come into contact with the magnets 504. Maximum strength of the magnetic connection may be achieved under a condition of proper alignment between the “Recovery End” 302 and the “Jumper End” 402 as shown in FIG. 6D.

[0193] FIGS. 2A to 2C and FIGS. 6A to 6D may illustrate the most appropriate way to use the recovery device 100, 302 and the receiving device 120, 402 for a bungy jumper’s recovery, after a bungy jump is completed.

[0194] It may be appreciated that in any circumstances where the bungy jumper’s weight (or two or more jumpers) exceeds 100 kg, the conditions and design requirements presented in the exemplary recovery device 302 and the exemplary receiving device 402 may exceed the maximum safe working load.

[0195] The materials that may be used in the examples above may be the most appropriate ones taking into consideration the strength of the magnetic coupling, the weight of the devices 302, 402 and the jumper 202, as well as the durability of the cord 110 and the various components of the devices 302, 402.

5 **[0196]** 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
10 and range of equivalency of the claims are therefore intended to be embraced.

CLAIMS

1. A recovery device for retrieving a cord having one end portion coupled to a receiving device, the recovery device comprising:

5 a coupling component having an opening configured to accommodate a portion of the cord for movement of the coupling component along the cord,

wherein at least a portion of the coupling component is adapted for magnetically coupling to at least a portion of the receiving device,

10 wherein the coupling component comprises a retrieving arrangement configured to facilitate movement of the coupling component in a direction toward an opposite end portion of the cord.

2. The recovery device of claim 1, wherein the coupling component further comprises

15 a first member; and

a second member coupleable to the first member,

wherein the first member and the second member are arranged to move relative to each other between a closed configuration and an open configuration,

20 wherein in the closed configuration, the first member and the second member are arranged to move toward each other to form the opening to accommodate the portion of the cord;

wherein in the open configuration, the first member and the second member are arranged to move away from each other to receive or release the portion of the cord.

25 3. The recovery device of claim 2, wherein the first member is arranged to pivot relative to the second member.

4. The recovery device of claim 2 or 3, wherein the first member and the second member are further arranged to releasably secure to each other.

5. The recovery device of any one of claim 2 to 4, wherein the coupling component further comprises a locking mechanism to releasably secure the first member and the second member in the closed configuration.

5 6. The recovery device of any one of claims 2 to 5, wherein each of the first member and the second member comprises a non-metallic body.

7. The recovery device of any one of claims 2 to 6, wherein each of the first member and the second member comprises a ferromagnetic element, wherein the respective
10 ferromagnetic element is disposed on a surface of the first member and on a surface of the second member, wherein the respective surfaces are arranged to contact the receiving device.

8. The recovery device of any one of claims 2 to 6, wherein each of the first member
15 and the second member comprises a permanent magnet, wherein the respective permanent magnet is disposed on a surface of the first member and on a surface of the second member, wherein the respective surfaces are arranged to contact the receiving device.

20 9. The recovery device of any one of claims 1 to 6, wherein the portion of the coupling component comprises a permanent magnet.

10. The recovery device of claim 9, wherein the portion of the coupling component
25 comprises a neodymium magnet.

11. The recovery device of any one of claims 1 to 6, wherein the portion of the coupling component comprises a ferromagnetic element adapted for magnetic coupling to the portion of the receiving device.

30 12. The recovery device of claim 11, wherein the portion of the coupling component comprises a steel plate.

13. The recovery device of any one of claims 1 to 12, further comprising a guide arrangement coupled to the coupling component, wherein the guide arrangement is configured to guide the movement of the coupling component along the cord.

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14. The recovery device of claim 13, wherein the guide arrangement comprises a roller ball.

15. The recovery device of any one of claims 1 to 14, wherein the retrieving arrangement comprises a ring configured to receive a retrieving rope.

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16. A receiving device for receiving a recovery device for retrieving a cord, the receiving device comprising:

a central core; and

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a padding arrangement encasing at least part of the central core,

wherein at least a portion of the central core is adapted for magnetically coupling to at least a portion of the recovery device,

wherein the receiving device is coupleable toward one end portion of the cord.

17. The receiving device of claim 16, wherein the central core comprises a permanent magnet.

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18. The receiving device of claim 17, wherein the central core further comprises at least two spacers arranged across the permanent magnet for compensating movement of the recovery device to provide a constant magnetic attraction between the recovery device and the receiving device.

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19. The receiving device of claim 16, wherein the central core comprises a ferromagnetic element adapted for magnetic coupling to the portion of the recovery device.

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20. The receiving device of any one of claims 16 to 19, wherein the central core further comprises an alignment element configured to facilitate an orientation of the receiving device relative to an orientation of the recovery device for providing constant magnetic coupling therebetween.

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21. The receiving device of claim 20, wherein the alignment element is arranged along a central axis of the receiving device.

22. The receiving device of any one of claims 16 to 21, wherein the padding arrangement comprises a first padding portion and a second padding portion, wherein the
10 central core is arranged between the first padding portion and the second padding portion.

23. An apparatus for retrieving a cord, the apparatus comprising a recovery device as claimed in any one of claims 1 to 15 and a receiving device as claimed in any one of
15 claims 16 to 22.

24. A method of retrieving a cord having one end portion and an opposite end portion, the method comprising:

movably coupling a recovery device to the opposite end portion of the cord;
20 moving the recovery device to a receiving device at the one end portion of the cord and bringing the recovery device into magnetic coupling with the receiving device;
and

exerting a pulling force on a retrieving rope coupled to the recovery device to retrieve the recovery device along with the receiving device toward the opposite end
25 portion of the cord.

25. The method of claim 24 further comprising:

prior to movably coupling the recovery device to the opposite end portion of the cord, coupling the retrieving rope to a retrieving arrangement of the recovery device.

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26. The method of claim 24 or 25, wherein movably coupling the recovery device to the opposite end portion of the cord comprises accommodating a portion of the cord within an opening of a coupling component of the recovery device.

5 27. The method of claim 26,

wherein the coupling component further comprises a first member; and a second member coupleable to the first member, wherein the first member and the second member are arranged to move relative to each other between a closed configuration and an open configuration, wherein in the closed configuration, the first member and the
10 second member are arranged to move toward each other to form the opening to accommodate the portion of the cord; wherein in the open configuration, the first member and the second member are arranged to move away from each other to receive or release the portion of the cord; and

wherein the method further comprises releasably securing the first member and
15 the second member.

28. The method of claim 26 or 27, further comprising guiding the movement of the coupling component along the cord.

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