A climbing assisting equipment includes a rope transmitting device and a slow-descending device. The rope transmitting device includes a rope member and a rope reeling member. The slow-descending device has a transmission member connected between the rope member and a generator. When the rope member is pulled down, the generator is driven by the rope reel member via the transmission means to generate electrical power to a generator load, and to thus reduce a descending speed of the rope member by a resistant moment to the generator.
CLIMBING ASSISTING EQUIPMENT

FIELD OF THE INVENTION

[0001] The present invention relates to a sport climbing equipment, and more particularly to a climbing assisting equipment.

BACKGROUND OF THE INVENTION

[0002] Climbing, which is a prevalent activity suitable for all ages, is helpful for improving body softness, coordination, strength, attention, enterprise, confidence, and equilibratory sense. Sport climbing, as compared with traditional climbing, is safer and more accessible and becomes a mainstream climbing activity as the traditional climbing is dangerous and difficult. In areas or countries such as Europe, USA, and Canada, the artificial climbing wall is widely distributed indoors and outdoors.

[0003] When doing sport climbing on artificial climbing wall, a climber is usually fastened with a rope. The rope is used for preventing the climber from falling down and for helping the climber to be grounded after the climbing, but the climber has to operate the retracting and releasing of the rope during the climbing. For a climber who only wants to enjoy the pleasure of the climbing or is a beginner, it is a cumbersome work for the climber to operate the rope and spends his/her strength and spirit. Therefore, it will thus reduce his/her interest.

[0004] In view of the reason, there is a sport climbing equipment used for replacing manpower in rope release. However, since a conventional sport climbing equipment in a prior art always releases the rope in a constant speed regardless of an instantaneous falling speed or a descending speed of the climber, it thus tends to cause the climber be hurt, and it finally still needs an operator to handle the sport climbing equipment.

SUMMARY OF THE INVENTION

[0005] Accordingly, it is an object of the present invention to provide a climbing assisting equipment to automatically adjust a descending speed of the rope to assist the climber.

[0006] The present invention provides a climbing assisting equipment comprising a rope transmitting device including a rope member and a rope reel member connected with the rope member to retract or to release the rope member; and a slow-descending device including a transmission member, a generator, and a generator load, the transmission member being connected between the rope reel member and the generator, wherein when the rope member is pulled down from the rope reel member, the generator is driven by the rope reel member via the transmission member and generates electrical power to the generator load to thus reduce a descending speed of the rope member by a resistant moment applied from the generator load to the generator.

[0007] According to an embodiment of the present invention, the rope reel member includes a rotary shaft, the rotary shaft is provided to retract or to release the rope member by rotation.

[0008] According to an embodiment of the present invention, the rotary shaft has a side wall portion on the rotary shaft to block at a lateral side of the rope member.

[0009] According to an embodiment of the present invention, the climbing assisting equipment further comprises a regulating device including a weight sensor and a load adjust-

ment wherein the weight sensor is provided to sense a weight of a climber, the load adjustment is connected between the weight sensor and the generator load to adjust the generator load according to the weight of the climber.

[0010] According to an embodiment of the present invention, the generator load is provided in proportion to a weight of a climber.

[0011] According to an embodiment of the present invention, the generator has a one-way input shaft, the one-way input shaft is rotated and driven by the rope reel member via the transmission member, when the rope member is pulled down from the rope reel member, the one-way input shaft is turned in a positive direction to drive the generator to generate electrical power, and when the rope member is retracted by the rope reel member, the one-way input shaft is turned in a reverse direction and to lead that the generator generates no electrical power.

[0012] According to an embodiment of the present invention, the climbing assisting equipment further comprises a suspension device, wherein the suspension device is connected between the rope transmitting device and a fixed object, such that the rope transmitting device has a displacement generated by a loading on the rope member, the transmission member is a clutch member, and accordingly when the displacement is larger than a reference displacement, the rope reel member is moved together with the generator via the clutch member, and when the displacement is not larger than the reference displacement, the clutch member is moved to release the rope reel member from the generator.

[0013] According to an embodiment of the present invention, the suspension device includes a receiving member and a resilience member, the receiving member is connected to the rope transmitting device, and the resilience member is connected resiliently between the fixed object and the receiving member for being lengthened/shortened according to the loading on the rope member.

[0014] Accordingly to an embodiment of the present invention, the clutch member includes a first gear connected with the rope reel member and a second gear connected with the generator, when the displacement is larger than the reference displacement, the first gear is moved to engage with the second gear.

[0015] By means of technical means of the present invention, the climbing assisting equipment can automatically adjust the descending speed of the rope member to help the climber descending comfortably and safely with a decreasing speed regardless the climber is falling down or is descending.

In a further embodiment, the climbing assisting equipment can adjust the resistant moment to the generator according the weight of the climber, so as to slow down the descending speed corresponding to the different weight climbers.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The structure and the technical means adopted by the present invention to achieve the above and other objects can be best understood by referring to the following detailed description of the preferred embodiments and the accompanying drawings.

[0017] FIG. 1 is a schematic diagram of a climbing assisting equipment according to an embodiment of the present invention;

[0018] FIG. 2 is a schematic diagram of the climbing assisting equipment in a situation where a climber is climbing up according to the embodiment of the present invention;
FIG. 3 is a schematic diagram of a climbing assisting equipment in a situation where a climber is descending according to another embodiment of the present invention; FIG. 4 is a schematic diagram of a climbing assisting equipment in a situation where a climber is climbing up according to another embodiment of the present invention; and FIG. 5 is a schematic diagram of the climbing assisting equipment in a situation where a climber is descending according to another embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Please refer to FIGS. 1 to 3. FIG. 1 is a schematic diagram of a climbing assisting equipment according to an embodiment of the present invention; FIG. 2 is a schematic diagram of the climbing assisting equipment in a situation where a climber is climbing up according to the embodiment of the present invention; and FIG. 3 is a schematic diagram of a climbing assisting equipment in a situation where a climber is descending according to another embodiment of the present invention.

As shown in FIGS. 1 to 3, a climbing assisting equipment 100 according to an embodiment of the present invention includes a rope transmitting device 1, a slow-descending device 2, and a regulating device 3.

The rope transmitting device 1 includes a rope member 11 and a rope reel member 12. The rope reel member 12 is connected with the rope member 11 to retract or release the rope member 11. In this embodiment, the rope reel member 12 includes a case body 120, a rotary shaft 121, and two side wall portions 122a and 122b. The rotary shaft 121 is supported by bearings 121a and 121b in the case body 120 for being rotated, the rope member 11 is connected to the rotary shaft 121 to thus be retracted/released to/from the rotary shaft 121 when the rotary shaft 121 is being rotated. The side wall portions 122a and 122b are provided at both lateral sides of the rope member 11 to prevent rope member 11 from disordering during being retracted/released and to maintain the rope member 11 to be operated between the side wall portions 122a and 122b.

The slow-descending device 2 includes a transmission member 21, a generator 22, and a generator load 23. The transmission member 21 is connected between the rope reel member 12 and the generator 22. The transmission member 21 in this embodiment includes a shaft gear 211 and a generator gear 212, wherein the shaft gear 211 is connected with the rotary shaft 121, the generator gear 212 is connected with the generator 22, and shaft gear 211 is engaged with the generator gear 212 so that the generator 22 can be driven by the rope reel member 12.

The generator 22 is provided with a one-way input shaft 221 connected to the gear shaft 212. When the rope member 11 is pulled down from the rope reel member 12, the one-way input shaft 221 is turned in a positive direction to drive the generator 22 to generate electrical power to the generator load 23. On the contrary, when the rope member 11 is retracted by the rope reel member 12, the one-way input shaft 221 is turned in a reverse direction without generating electrical power by the generator 22.

In the case that the generator load 23 has a constant load value, higher the rotation speed of the generator 22 is, the resistant moment (moment force) to against the generator 22 is larger. The resistant moment will suppress the rotation of the one-way input shaft 221 to thus reduce the descending speed of the rope member 11 via the transmission member 21.

With above structure, when the rope member 11 is retracted by the rope reel member 12, the rotary shaft 121 drives the transmission member 21 to turn the one-way input shaft 221 being rotated in a reverse direction so that the generator is idle without any rotation. When a climber is falling down or is descending, the rope member 11 is pulled down from the rope reel member 12 and the one-way input shaft 211 of the generator 22 is turned in a positive direction by the rope reel member 12 via the transmission member 21, to thus drive the generator 22 to generate electrical power to the generator load 23. And, higher the descending speed is, the rotation speed of the generator 22 is increased, and thus the larger resistant moment will be generated. The resistant moment will reduce the descending speed of the rope member 11, so that the descending speed of the climber is slowed down. Then, the slow down of the climber will decrease the resistant moment. Finally, when the terminal descending speed as a constant descending value when the descending moment and the resistant moment is balanced in final. Since the descending speed is slowed down to reach the final constant descending value, the climber will not feel uncomfortable during descending.

The regulating device 3 includes a weight sensor 31 and a load adjustment 32. The weight sensor 31 is provided to sense the weight of a climber. The weight sensor 31 in this embodiment is an electronic weighing scale means disposed in the ground for sensing an original weight W of a climber C before the climber C fastens the rope member 11. The load adjustment 32 is connected between the weight sensor 31 and the generator load 23 and is used for receiving the weight W of the climber C from the weight sensor 31 and for adjusting the generator load 23 according to the weight W. The load adjustment 32 usually adjusts the generator load 23 to be in proportion to the weight W of the climber C.

Based on the reason that larger generator load 23 is, the resistant moment to the generator 22 is increased, therefore a desired deceleration speed for different weight climbers can be calibrated and adjusted by means of adjusting the generator load 23 according to the weight W of the climber C.

Please refer to FIGS. 4 and 5. FIG. 4 is a schematic diagram of a climbing assisting equipment in a situation where a climber is climbing up according to another embodiment of the present invention; and FIG. 5 is a schematic diagram of the climbing assisting equipment in a situation where a climber is descending according to another embodiment of the present invention. The elements of climbing assisting equipment 100e in this embodiment are similar to those in the above embodiment. The same elements in this embodiment are labeled with the same reference numbers as in the above embodiment, and the detail descriptions for the same elements will be omitted as appropriate.

In this embodiment, the climbing assisting equipment 100e further includes a suspension device 4. The suspension device 4 is connected between the rope transmitting device 1 and a fixed object F, such that the rope transmitting device 1 has a displacement H generated by a loading on the rope member 11. The suspension device 4 in this embodiment includes a receiving member 41 and a resilience member 42. The receiving member 41 is connected to the rope transmitting device 1, the resilience member 42 is connected resiliently between the fixed object F and the receiving member 41 to hold the rope transmitting device 1 and to be lengthened/
shortened according to the loading on the rope member 11. In such structure, when a certain loading is provided on the rope member 11, the rope transmitting device 1 is pulled by a tension force generated by the loading to move downward. A relation between the displacement H and the tension force can be determined by an elastic coefficient of the resilience member 42.

[0033] Further, a transmission member 21 a of the slow-descending device 2 in this embodiment is a clutch member. The clutch member includes a first gear 213 connected with the rope reel member 12 and a second gear 214 connected with the generator 22. The first gear 213 is provided to move along with the rope transmitting device 1. When the displacement H is larger than the reference displacement, the first gear 213 is moved to engage with the second gear 214 such that the rope reel member 12 can drive the generator 22 to generate electrical power. On the contrary, when the displacement H is not larger than the reference displacement, the first gear 213 is separated from the second gear 214 to thus release the rope reel member 12 from the generator 22.

[0034] With above structure, when the rope member 11 is retracted by the rope reel member 12, the loading on the rope member 11 is relatively small, such that the clutch member is moved to release the rope reel member 12 from the generator 22. When the climber is descending, the loading on the rope member 11 is relatively large due to the weight of the climber C applied to the rope member 11, such that the clutch member is moved to make the generator 22 to be driven by the rope reel member 12 to generate electrical power to the generator load 23 to thus reduce the descending speed of the rope member 11.

[0035] The above description should be considered as only the discussion of the preferred embodiments of the present invention. However, a person having ordinary skill in the art may make various modifications to the present invention. Those modifications still fall within the spirit and scope defined by the appended claims.

What is claimed is:

1. A climbing assisting equipment, comprising:
   a rope transmitting device including a rope member and a rope reel member connected with the rope member to retract or to release the rope member; and
   a slow-descending device including a transmission member, a generator, and a generator load, the transmission member being connected between the rope reel member and the generator, wherein when the rope member is pulled down from the rope reel member, the generator is driven by the rope reel member via the transmission member and generates electrical power to the generator load to thus reduce a descending speed of the rope member by a resistant moment applied from the generator load to the generator.

2. The climbing assisting equipment as claimed in claim 1, wherein the rope reel member includes a rotary shaft, the rotary shaft is provided to retract or to release the rope member by rotation.

3. The climbing assisting equipment as claimed in claim 2, wherein the rotary shaft has a side wall portion on the rotary shaft to block at a lateral side of the rope member.

4. The climbing assisting equipment as claimed in claim 1, further comprising a regulating device including a weight sensor and a load adjustment, wherein the weight sensor is provided to sense a weight of a climber, the load adjustment is connected between the weight sensor and the generator load to adjust the generator load according to the weight of the climber.

5. The climbing assisting equipment as claimed in claim 1, wherein the generator load is provided in proportion to a weight of a climber.

6. The climbing assisting equipment as claimed in claim 1, wherein the generator has a one-way input shaft, the one-way input shaft is rotated and driven by the rope reel member via the transmission member, when the rope member is pulled down from the rope reel member, the one-way input shaft is turned in a positive direction to drive the generator to generate electrical power, and when the rope member is retracted by the rope reel member, the one-way input shaft is turned in a reverse direction and to lead that the generator generates no electrical power.

7. The climbing assisting equipment as claimed in claim 1, further comprising a suspension device, wherein the suspension device is connected between the rope transmitting device and a fixed object, such that the rope transmitting device has a displacement generated by a loading on the rope member, the transmission member is a clutch member, and accordingly when the displacement is larger than a reference displacement, the rope reel member is moved together with the generator via the clutch member, and when the displacement is not larger than the reference displacement, the clutch member is moved to release the rope reel member from the generator.

8. The climbing assisting equipment as claimed in claim 7, wherein the suspension device includes a receiving member and a resilience member, the receiving member is connected to the rope transmitting device, and the resilience member is connected resiliently between the fixed object and the receiving member for being lengthened/shortened according to the loading on the rope member.

9. The climbing assisting equipment as claimed in claim 7, wherein the clutch member includes a first gear connected with the rope reel member and a second gear connected with the generator, when the displacement is larger than the reference displacement, the first gear is moved to engage with the second gear.