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Linear retractable cable lock

Abstract

A linear retractable cable lock comprises a retractable cable lock that is presented in a linear configuration, adapted for mounting, for example in a recreational vehicle bumper, to a vehicle frame, in a truck bed. The cable can be extended for use in securing and locking items, and then retracted when not in use, with the cable conveniently housed inside the bumper, in the bed or to the frame, providing a useful device but not detracting from the appearance of the vehicle when not being use.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS (1) This application claims benefit of U.S. Provisional Patent Application Ser. No. 63/527,873, filed Jul. 20, 2023, entitled LINEAR RETRACTABLE CABLE LOCK.

BACKGROUND

(1) This disclosure relates to a property securement device and, more particularly, to a vehicle mountable personal property securement device comprising a linear retractable cable lock, mountable, for example, to or in a vehicle bumper, in truck bed, to a vehicle frame, or the like.

(2) Cables and locks may be known for assisting securement of personal property such as bicycles, motorcycles, coolers, camping gear, etc., to a large, heavy, and/or immovable object. U.S. Pat. No. 7,428,833, entitled VEHICLE MOUNTABLE PERSONAL PROPERTY LOCK ASSEMBLY, shows a device mounted to, for example, a vehicle bed, with retractable cable to allow locking of items to the vehicle.

(3) Recreational vehicle users are typical types of persons needing such protection, but where to mount the assembly to a recreational vehicle presents issues.

SUMMARY

(4) In accordance with the disclosure, a securement device employs a retractable cable mechanism in a linear package that is adapted for mounting inside a bumper portion of a recreational vehicle, to a vehicle frame, in a truck bed, as examples. The cable can be extended for use in securing and locking items, and then retracted when not in use, with the cable conveniently housed inside a bumper, in a bed or to a frame, providing a useful device but not detracting from the appearance of the vehicle when not being use.

(5) The subject matter of the present technology is particularly pointed out and distinctly claimed in the concluding portion of this specification. However, both the organization and method of operation, together with further advantages and embodiments thereof, may best be understood by

reference to the following description taken in connection with accompanying drawings wherein like reference characters refer to like elements.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. **1** is a perspective view of a linear retractable cable lock in accordance with the disclosure installed in a bumper of a recreational vehicle;

(2) FIG. **2** is a perspective view of the linear retractable cable lock of FIG. **1**, in a partially extended state;

(3) FIG. **3** is a perspective view showing installation of the linear retractable cable lock into the vehicle bumper;

(4) FIG. **4**A is a perspective view of the device in a retracted state, before being installed in a bumper;

(5) FIG. **4**B is a top view of the view of FIG. **4**A;

(6) FIG. **4**C is a side view of the view of FIG. **4**A;

(7) FIG. **4**D is a right end view of the view of FIG. **4**A;

(8) FIG. **5**A is a perspective view of the device in a retracted state with the case removed;

(9) FIG. **5**B is a top view of the view of FIG. **5**A;

(10) FIG. **5**C is a side view of the view of FIG. **5**A;

(11) FIG. **6**A is a perspective view that illustrates the configuration of the components when the cable is fully extended;

(12) FIG. **6**B is a side view of FIG. **6**A;

(13) FIG. **7** is a sectional view taken along line **7**-**7** of FIG. **4**C;

(14) FIG. **8** is a sectional view taken along line **8**-**8** of FIG. **4**C;

(15) FIG. **9**A is a perspective view illustrating the retraction prevention device;

(16) FIG. **9**B is a side view of the retraction prevention device;

(17) FIG. **9**C is a top view of the retraction prevention device in the direction of arrow **44** in FIG. **9**A;

(18) FIG. **9**D is a sectional view of the retraction prevention device taken along line D-D of FIG. **9**C;

(19) FIG. **10**A is a top view of the device with a first alternative retraction control configuration;

(20) FIG. **10**B is a side view of the device of FIG. **10**A;

(21) FIG. **10**C is a sectional view taken along line C-C of FIG. **10**A;

(22) FIG. **10**D is a sectional view taken along line D-D of FIG. **10**C;

(23) FIG. **10**E is a sectional view taken along line E-E of FIG. **10**C;

(24) FIG. **11**A is a perspective partial cutaway view of a bumper with the device mounted therein;

(25) FIG. **11**B is a side partial cutaway view of a bumper with the device mounted therein;

(26) FIG. **11**C is a sectional view of a bumper with the device mounted therein taken along line C-C of FIG. **11**B;

(27) FIG. **11**D is a sectional view of a bumper with the device mounted therein taken along line D-D of FIG. **11**B;

(28) FIG. **12** is a perspective view of an alternative mounting method to a frame of a recreational vehicle;

(29) FIG. **13** is a perspective of another alternative mounting method in the bed of a pickup;

(30) FIG. **14**A is a top view of the device with a second alternative retraction control configuration;

(31) FIG. **14**B is a side view of the device of FIG. **14**A;

(32) FIG. **14**C is a sectional view taken along line C-C of FIG. **14**A;

(33) FIG. **14**D is an sectional view of the region D of FIG. **14**C, illustrating the retraction control

engaged to prevent retraction;
(34) FIG. **15**A is a top view of the device of FIG. **14**A, illustrating how to disengage the second alternative retraction control configuration;
(35) FIG. **15**B is a side view of the device of FIG. **15**A;
(36) FIG. **15**C is a sectional view taken along line C-C of FIG. **15**A;
(37) FIG. **15**D is an sectional view of the region D of FIG. **15**C, illustrating the retraction control when disengaged, to allow retraction.

DETAILED DESCRIPTION

(38) The system according to a preferred embodiment of the present disclosure comprises a retractable cable lock that is presented in a linear configuration.
(39) Referring to FIG. **1**, a perspective view of a linear retractable cable lock **10** in accordance with the disclosure installed in a bumper **12** of a recreational vehicle **14**. In the particular configuration, the bumper **12** has a hollow interior and components of the cable lock are substantially contained within the interior of the bumper. Externally, the only visible components of the cable lock that might suggest its presence is the end **16** of the cable **18** and a retraction actuator **20**, which extend from the outside of an end cap **22** that covers the opening into the interior of the bumper.
(40) Referring to FIG. **2**, a view of the configuration of FIG. **1**, but with the cable **18** partially extended. The cable is extended by pulling it out of the interior of the bumper, in the general direction of arrow **24**. As the cable is extended, the retractable cable lock device ensures that the cable does not retract unintentionally, so the extended cable portion remains extended, until such time as the user operates the retraction actuator, whereupon the device will pull the cable back into the interior of the bumper.
(41) Referring to FIG. **3**, a perspective view showing installation of the linear retractable cable lock into the vehicle bumper, the cable lock may be provided as a modular unit that is adapted to be inserted into the interior of the bumper or removed in the direction of arrow **26**. End cap **22** is formed to fit securely within the bumper and provide closure to the exterior.
(42) The operation of the device may be better understood beginning with reference to FIGS. **4**A-**4**D, which are a perspective, top, side and right end view of the device in a retracted state, before being installed in a bumper. The device is provided with a case **28** containing the components thereof, which enables the entire device to be easily inserted to the interior of the bumper when installing.
(43) FIG. **5**A is a perspective view of the device in a retracted state with the case removed, FIGS. **5**B and **5**C being top and side views thereof. The cable end **16** is mounted to a first end of cable **18**, with the cable end positioned outside the exterior face of end cap **22**, and the cable passing through a cable opening **25** (not visible) in the end cap. The cable extends a distance (within the interior of the case) and is received by a pulley wheel **30**, the cable wrapping around the wheel at a top thereof and traversing around the wheel to exit at the bottom of the wheel, to extend back towards the end cap, the distal end **42** of the cable being secured to at the interior face of the case **28**. Wheel **30** is rotationally mounted in a frame **32**, the frame carrying a rider wheel **34** extended beyond the edge of the wheel **30** toward the direction of the end cap. The frame holds the rider wheel such that the bottom of the wheel is below the plane of the periphery of the pulley, and cable **18** rides under the lower portion of the rider wheel. At an end of the case **28** opposite from the position of the rider wheel, a mount **36** is connected to a rotary constant force spring **38**, and the constant force spring is fixed, in this particular embodiment by being wrapped about a spool **40** which rotates on shaft **41** which is held in place attached to case **28**. As the cable approaches an exit hole in cap **22** to the exterior of the case, it passes through a **20** retraction prevention device **44**, which operates to hold the cable in an extended position until released, as discussed hereinbelow.
(44) In operation, the device **10** is mounted inside the bumper **12** (for example). When a user desires to use the cable to secure items, such as by passing the cable through portions of bicycles, motorcycles, camping gear, etc. and securing the cable and the items with a lock, the user pulls the

cable in the direction of arrow **24**, causing the cable to rotate around pulley wheel **30**, while the pulley wheel **30** rotates. Rider wheel **34** travels along the cable, and the frame **32** moves towards the end cap **22**, while constant force spring **38** extends. Retraction prevention device **44** allows the cable to extend outwardly, but grips the cable when extension movement stops, so that the action of the constant force spring does not pull the cable back from the extension position. However, operation of retraction actuator **44** releases the grip of the retraction prevention device on the cable, so that the force of the spring causes the pulley frame to be pulled back and thereby retracting the cable into the case **28**. FIG. **6** illustrates the configuration of the components when the cable is fully extended. In this state, the spring **38** is fully extended, and is exerting a retraction force in the direction of arrow **25**. However, the cable is kept in the extended state by the operation of retraction prevention device **44**, or by other means as discussed hereinbelow. Rider wheel **34** provides an advantage of keeping the cable from running into the interior edge of the case **28** which could potentially cause the cable to bind.

(45) Referring now to FIG. **7**, a sectional view taken along line **7**-**7** of FIG. **4**C, the placement of the components of the device inside case **28** may be observed. FIG. **8** is a sectional view taken along line **8**-**8** of FIG. **4**C, but as if the case has been inserted into a substantially square cross-section shaped bumper **12** (the view is rotated 45 degrees so that the device is oriented to match the view of FIG. **7**, but in use, the device is in an angled orientation inside the bumper).

(46) FIGS. **9**A-**9**D illustration the details the retraction prevention device **44** and its interaction with the cable to maintain the cable in an extracted state and prevent unintended retraction, but allowing retraction when desired. FIG. **9**A is a perspective view illustrating the retraction prevention device, which mounts to end cap **22** or other suitable end to the case **28**, where the cable **18** passes through an opening in cap **22** to the exterior. The cable is engaged by a cam **46** which is part of device **44**, mounted for rotation about axis **48**, urged in direction **52** toward end cap **22** by spring **50**. Retraction actuator **20** passes through the end cap from the exterior and interacts with the cam at a face opposite the spring. The cam has a rider portion that interacts with the cable, angled upwardly from the interior toward the direction of the opening in the end cap that the cable passes through. In operation, the spring urges the cam so as to engage with the cable, to prevent inward retraction of the cable. However, the angled interaction with the cable allows the cable to be pulled outwardly, but on stopping of extraction force, the cam grips the cable and stops it from retracting. Pushing the retraction actuator **20** in the direction of arrow **54** rotates the bottom of the cam rearwardly, such that the upper portion of the cam moves away from interaction with the cable, thus allowing the cable to retract.

(47) A first alternative manner of maintaining the cable in the extracted state is illustrated in connection with FIGS. **10**A-**10**E. In this configuration, instead of use of a retraction actuator **20**, the opening in the end cap is slightly off of alignment with the cable as it comes off the pulley, providing a slight bias to the cable as it comes into the opening such that frictional interaction with the cable and the opening in the end cap will grip the cable sufficiently to prevent retraction in absence of the user feeding the cable inwardly to urge the cable to retract.

(48) Referring to FIGS. **14**A-**14**D and FIGS. **15**A-**15**D, a second alternative and preferred configuration for maintaining the cable in the extracted state when so desired is shown and described.

(49) The top and side views of FIGS. **14**A, **14**B, **15**A and **15**B are similar to those of FIGS. **10**A and **10**B. However, internally, the configuration is different at the interior of the device at the exit hole in cap **22**′ where the cable exits the case **28**′. In this configuration, just above opening of the exit hole, a magnet **51** is mounted on the inner face of cap **22**′. Frame **32**′ that carries rider wheel **34**′ is suitably made of a ferromagnetic material that is strongly attracted to magnets, whereby when the cable is fully extended in the direction of arrow **56**, the frame **32**′ is adjacent the magnet **51**, and the magnet attracts and holds the frame in position with the cable in the fully extended position, so that the cable will not retract under the effect of the constant force spring **38**′.

(50) Once a user is ready to have the cable retract, the user moves the cable inwardly to the case in the direction of arrow **58**, which causes the frame **32**′ to be pushed away from engagement by the magnet **51**, and once moved a sufficient distance **60** away from the magnet so that the magnet will no longer engage with the frame **32**′, the constant force spring **38**′ is then able to retract the cable into the interior of the case **28**′.
(51) FIG. **11**A-**11**D further illustrate the installation of the device in a bumper. As seen in the partially cut away views in FIGS. **11**A and **11**B, the device fits at an angle within the square profile bumper. This maximizes the available size of the device and components.
(52) FIG. **12** is a perspective view of an alternative mounting method to a frame of a recreational vehicle. In this mounting, the case **28** is attached to the frame of the vehicle, oriented front to back of the vehicle in this particular illustration, and
(53) FIG. **13** is a perspective of another alternative mounting method in the bed of a pickup, wherein the case **28** is secured to a side wall of the pickup bed **15**, for example.
(54) In accordance with the invention, an improved retractable cable lock is provided in a linear configuration, for mounting within a bumper, to a vehicle frame, to a pickup bed, or the like.
(55) While a preferred embodiment of the technology has been shown and described, it will be apparent to those skilled in the art that many changes and modifications may be made without departing from the broader aspects. The appended claims are therefore intended to cover all such changes and modifications as fall within the true spirit and scope of the technology.

Claims

1. A retractable cable lock, comprising: a case having a length and having an extensible cable therein for linear extension and retraction from the case; and a retraction mechanism for urging the cable to retract into the case, further comprising a mechanism for maintaining the extensible cable in an extended position despite the retraction mechanism's urging, wherein said mechanism for maintaining the extensible cable in an extended position comprises a fixed magnet positioned in said case.
2. The retractable cable lock according to claim 1, further comprising a pulley within said case around which said cable travels, from a securement point, around the pulley and to an exit opening in said case.
3. The retractable cable lock according to claim 2, wherein said pulley is adapted to travel within said case along a portion of the length thereof.
4. The retractable cable lock according to claim 3, wherein said retraction mechanism comprises a constant force spring fixed in position relative to said case, and attached to said pulley, for urging said pulley toward a retraction position.
5. A retractable cable lock, comprising: a case having a length and having an extensible cable therein for linear extension and retraction from the case; and a retraction mechanism for urging the cable to retract into the case, further comprising a pulley within said case around which said cable travels, from a securement point, around the pulley and to an exit opening in said case, wherein said pulley is adapted to travel within said case along a portion of the length thereof, further comprising a mechanism for maintaining the extensible cable in an extended position despite the retraction mechanism's urging, wherein said mechanism for maintaining the extensible cable in an extended position comprises a fixed magnet positioned in said case for securing said pulley against traveling in absence of a user's interaction.
6. The retractable cable lock according to claim 5, wherein said retraction mechanism comprises a constant force spring fixed in position relative to said case, and attached to said pulley, for urging said pulley toward a retraction position.
7. A retractable cable lock, comprising: a vehicle bumper having a length and having an extensible cable therein for linear extension and retraction from the bumper; and a retraction mechanism for

urging the cable to retract into the bumper further comprising a mechanism for maintaining the extensible cable in an extended position despite the retraction mechanism's urging, wherein said mechanism for maintaining the extensible cable in an extended position comprises a fixed magnet positioned in said case.

8. The retractable cable lock according to claim 7, further comprising a pulley within said bumper around which said cable travels, from a securement point, around the pulley and to an exit opening in said bumper.

9. The retractable cable lock according to claim 8, wherein said pulley is adapted to travel within said bumper along a portion of the length thereof.

10. The retractable cable lock according to claim 9, wherein said retraction mechanism comprises a constant force spring fixed in position relative to said bumper, and attached to said pulley, for urging said pulley toward a retraction position.

11. A retractable cable lock, comprising: a vehicle bumper having a length and having an extensible cable therein for linear extension and retraction from the bumper; and a retraction mechanism for urging the cable to retract into the bumper, further comprising a pulley within said bumper around which said cable travels, from a securement point, around the pulley and to an exit opening in said bumper, wherein said pulley is adapted to travel within said bumper along a portion of the length thereof further comprising a mechanism for maintaining the extensible cable in an extended position despite the retraction mechanism's urging, wherein said mechanism for maintaining the extensible cable in an extended position comprises a fixed magnet positioned in said case for securing said pulley against traveling in absence of a user's interaction.

12. The retractable cable lock according to claim 11, wherein said retraction mechanism comprises a constant force spring fixed in position relative to said bumper, and attached to said pulley, for urging said pulley toward a retraction position.

13. A retractable cable lock, comprising: a case having a length and having an extensible cable therein for linear extension and retraction from the case; and a carriage adapted to travel within said case along a portion of the length thereof, said carriage having a pulley and a rider wheel, wherein said cable is received by said pulley to travel around a portion thereof, said rider wheel guiding said cable to travel around said pulley and keeping said cable from rubbing against an interior wall of said case.

14. The retractable cable lock according to claim 13, wherein said carriage travels along the portion of the length of the case as said cable extends and retracts from the case.

15. The retractable cable lock according to claim 13, wherein the positioning of said rider wheel on said carriage is such that a bottom position of the rider wheel is below a plane of a periphery of the pulley.

16. A retractable cable lock, comprising: a case having a length and having an extensible cable therein for linear extension and retraction from the case; and a translatable carriage within said case, said carriage having a pulley around which said cable travels, from a securement point and to an exit opening in said case; said translatable carriage further having a rider wheel for guiding said cable to said pulley and for keeping said cable from rubbing against an interior wall of said case.

17. The retractable cable lock according to claim 16, wherein said translatable carriage travels along the portion of a length of the case as said cable extends and retracts from the case.

18. The retractable cable lock according to claim 16, wherein said translatable carriage positions said rider wheel such that a bottom position of the rider wheel is below a plane of a periphery of the pulley.