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(54) SHUTTLE FOR A CLIMBING PROTECTION SYSTEM

SCHIFFCHEN FÜR EIN KLETTERSCHUTZSYSTEM

NAVETTE POUR SYSTÈME ANTI-CHUTE

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Description

FIELD

[0001] The present disclosure relates to rope grabs or shuttles for a climbing protection system for preventing a user of a ladder, a platform or the like from falling. Such shuttles are guided along an elongate support member, typically a cable, and grip the cable if a user falls. These shuttles have a guiding mechanism for the cable and often have a rotatably mounted clamping lever which has a cam at a first end facing the cable and an anchor point at a second end protruding from the casing of the shuttle.

BACKGROUND

[0002] Climbing protection systems usually consist of an elongate member, for example a wire cable, and a following fall arrester guided on the cable, which is hereafter called a rope grab or shuttle. The cable can be fastened to a structure or the like by means of cable and attachments, a cable tensioner and fastening devices. A user of the climbing protection system is connected by means of a full body harness to the shuttle which follows the user. The full body harness is usually connected to a clamping lever of the shuttle which, if a user falls, ensures that the shuttle grips the cable of the climbing protection system, in order to thus prevent the free fall of the user.

[0003] A shuttle of the type described above is generally known, to which it is also possible to fasten a carabineer which connects a user's full body harness to the shuttle. In order to attach the shuttle to, or separate it from, the cable, a closing lever is released and a clamping lever, to which the carabineer is fastened, is swiveled upwards. If the user falls, a clamping jaw of the clamping lever is pressed against the cable. Furthermore, when the shuttle is used, the clamping jaw closes the gap along the guiding mechanism of the shuttle.

[0004] One example of such a shuttle was offered for sale under the product name S.K.C. by Antec (now Sperian Fall Protection), 35-37 rue de la Bidauderie, BP334, 18103 Vierzon, France. A carabineer, which connects a user's full body harness to the shuttle, is fastened in an eye at one end of a clamping lever. The clamping lever is rotatably mounted in the shuttle and is swiveled in the event of a fall by the pull exerted on it by the full body harness, with the result that the cam of the clamping lever presses against the cable guided in the guiding mechanism of the shuttle and the shuttle grips the cable. Furthermore, when the shuttle is used, the clamping lever closes a gap along the guiding mechanism, which must be opened to attach the shuttle to the cable. In addition, when the shuttle is used, the gap is closed by a plastic lever which has to be folded back first before the shuttle can be removed from the cable. In order to prevent inadvertent release of the shuttle from the cable, the carabineer must be separated from the shuttle, as otherwise the clamping lever cannot be swiveled far enough to free the gap.

[0005] A problem with shuttles for a climbing protection system of the types described above is that they are not always suitable for use in a climbing protection system the cable of which is secured to a structure or the like by intermediate supports or bracket, as the shuttle cannot be moved over such intermediate supports. The shuttle must be passed manually over such intermediate supports.

[0006] US 2007/0119653 A1 describes a climbing protection system consisting of a cable tensioned by several intermediate supports and a fall arrest device/shuttle that can be moved along the cable. The fall arrest device has a U-shaped member, which encloses the cable of the climbing protection device, and a holder cam, which is rotatably mounted. In the event of a fall, the cable is clamped between the holder cam and the U-shaped member, with the result that the fall arrest device is locked in place on the cable. The fall arrest device can be removed from or attached to the cable at any time. For this purpose two mechanisms which are independent of each other must be actuated. The two mechanisms are arranged so that they cannot be actuated with one hand.

[0007] AU 2008/300650 B2 shows another example of a climbing protection device similar to the above-described devices, but having a locking or blocking plate that is spring biased to a position that reduces a gap through which the cable can be inserted and/or removed into engagement with the shuttle, and provides a user actuated button that releases this plate so that a user can move the plate to a position that opens the gap, thereby allowing a cable to be removed from engagement with the shuttle or inserted into engagement with the shuttle.

[0008] WO2016093850 discloses another example of a shuttle wherein a blocking plate is actuated between closed and open positions by a clamping lever as the clamping lever moves from a free position to an opening position, with a locking lever being provided to prevent movement of the clamping lever to the opening position. The blocking plate prevents removal of an elongate support member, such as a cable, from the shuttle when the blocking plate is in the closed position.

[0009] WO2015/044141 discloses a safety clamp for use in a fall arrest system comprising a body portion formed with a plate section having a plane, and a plate portion having a plane. The body portion and the plate portion together define a passage for receiving a safety rail, and the plate portion is pivotable relative to the body portion between a first and a second position. The first position is wherein the plane of the plate portion is at an angle relative to the plane of the plate section such that the passage is open along its length to enable a safety rail to be inserted into, or removed from, the passage, at any location along the length of the safety rail. The second position is wherein the plane of the plate portion is substantially parallel to the plane of the body portion such that a safety rail can be retained within the passage.

[0010] US2015114752 discloses an anti-inversion member mounted on the frame of a shuttle for movement between a closed position wherein the anti-inversion member blocks the elongate support member from being received into the guide structure and an open position wherein the anti-inversion member does not block the elongate support member from being received in the guide structure.

[0011] US5265696 discloses an anti-inversion mechanism.

[0012] While each of the above-described devices are suitable for their intended purpose, there is always room for improvement. For example, there is a continuing desire to further simplify such shuttles with respect to assembly and parts. As another example, there is a continuing desire to simplify the operation of such shuttles. By way of further example, there is a desire to prevent such shuttles from being loaded onto an elongate support member in an inverted fashion by an unobservant or untrained user.

SUMMARY

[0013] The invention is set out in accordance with the appended claims. In accordance with the invention, a shuttle for a climbing protection system is provided wherein the shuttle can be connected to a user and is guided along a cable, rope, or other elongate support member as the user climbs and grips the elongate support member in response to the user falling. The shuttle includes a frame, a guide structure on the frame and configured to receive an elongate support member and to guide the shuttle along the elongate support member as a user attached to the shuttle climbs, and a clamping member mounted on the frame for movement between a free position wherein the shuttle can move freely along the elongate support member received in the guide structure and a clamping position wherein the clamping member engages against the elongate support member in the guide structure to resist movement of the shuttle relative to the elongate support member. The clamping member is configured to move from the free position to the clamping position in response to a downward movement by the user attached to the shuttle. The clamping member in the free position blocks removal of the elongate support member from the guide structure. The shuttle further includes a blocking member mounted on the frame for movement between a closed position blocking removal of the elongate support member from the guide structure and an open position where the blocking member does not block removal of the elongate support member from the guide structure. The clamping member is movable to an opening position from the free position. The clamping member in the opening position does not block removal of the elongate support member in the open position, and the clamping member operably engages the blocking member to move the blocking member from the closed position to the open position as the clamping member is moved from the free position to the opening position.

[0014] In one feature, the blocking member is mounted on the frame to pivot between the closed and open positions.

[0015] As one feature, the blocking member includes a wheel configured to engage against the elongate support member in the guide structure with the blocking member in the closed position.

[0016] According to one feature, the blocking member further includes a carrier mounting the wheel for rotation, the carrier being pivot mounted to the frame.

[0017] According to the invention, the shuttle further includes an anti-inversion member mounted on the frame for movement between a closed position wherein the anti-inversion member blocks the elongate support member from being received into the guide structure and an open position wherein the anti-inversion member does not block the elongate support member from being received in the guide structure.

[0018] The anti-inversion member is mounted on the frame to pivot between the closed and open positions of the anti-inversion member.

[0019] According to the invention, the clamping member in the opening position engages a first surface of the anti-inversion member to maintain the anti-inversion member in the open position with the shuttle in a desired orientation relative to gravity, and the clamping member in the opening position engages a second surface of the anti-inversion member to maintain the anti-inversion member in the closed position with the shuttle in an non-desired orientation relative to gravity.

[0020] In one feature, the clamping member includes a connection feature configured to receive a connector for attaching a user to the shuttle, and the connection feature is located so that a connector received therein engages against the frame to prevent the clamping member from moving to the opening position as the clamping member is moved from the free position toward the opening position.

[0021] As one feature, the clamping member includes a clamping surface that engages the elongate support member received in the guide structure with the clamping member in the clamping position, the connection feature is spaced from the clamping surface, and the clamping member is pivot mounted to the frame at a location between the connection feature and the clamping surface.

[0022] According to one feature, the clamping member is a clamping lever mounted on the frame to pivot between the free, clamping, and opening positions.

[0023] In one feature, the clamping member comprises a surface that engages a surface on the blocking member to move the blocking member between the closed and open positions as the clamping member moves between the free and opening positions.

[0024] As one feature, the blocking member is biased toward the closed position of the blocking member.

[0025] According to one feature, the clamping member comprises a damping feature configured to undergo per-

manent deformation in response to a fall of a user attached to the shuttle.

[0026] In one feature, the frame comprises two plate members located on opposite sides of the locking, clamping and blocking members, with one of the two plate members being a single piece that defines the guide structure.

[0027] Other features and advantages will become apparent from a review of the entire specification, including the appended claims and drawings. In this regard, it should be understood that a shuttle according to this disclosure may include any of the above-described features, including any combination of the above-described features.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028]

Fig. 1 is a side elevation view of a fall protection system including a shuttle according to this disclosure, with a clamping member/lever of the shuttle shown in a "free" position wherein the shuttle can be moved along an elongate support member;

Fig. 2 is a view similar to Fig. 1, but showing a frame component in phantom for purposes of illustration, and showing the clamping member in a clamping or gripping position wherein the elongate member is gripped by the clamping member to prevent downward movement of the shuttle along the elongate support member;

Figs. 3 and 4 are views similar to Fig. 2, but showing the clamping member as it moves from the free position to an opening position; and

Fig. 5 is a view similar to Fig. 4, but showing the shuttle in an inverted condition wherein the shuttle is inverted relative to gravity in comparison to its desired orientation shown in Figs. 1-4.

DETAILED DESCRIPTION

[0029] With reference to Fig. 1, a fall protection system 10 is shown and includes an elongate support member 12 in the form of a wire cable 12 being anchored to a support structure, such as a wall or structural beam (not shown), by a support bracket (not shown), and a rope grab or shuttle 20 that can be connected to a user so as to protect the user in the event of a fall. The shuttle 20 can be connected to a user by any suitable connector, such as for example a carabineer 21, and is guided along the cable 12 as the user connected to the shuttle 20 climbs in the upward direction, such as indicated by the arrow "A" in Fig. 1, which is generally opposite the direction of the force of gravity in the environment in which the fall protection system 10 is being employed. It should be appreciated that there are many forms of elongate members 12 and support brackets that are known in the art and are suitable within the scope of this disclosure for use with a shuttle 20 according to this disclosure. Accordingly, the details of the elongate member 12 and the support bracket are not critical to an understanding of the shuttle 20 as disclosed herein and will not be described in further detail.

[0030] As best seen in Figs. 1-5, the shuttle 20 includes a frame, shown generally at 22, a guide structure 24 on the frame, a clamping member 26 mounted on the frame 22, a blocking member 28 mounted on the frame 22, and an anti-inversion member 30 mounted on the frame 22. The guide structure 24 is configured to receive the elongate support member 12 and to guide the shuttle 20 along the elongate support member 12 as a user attached to the shuttle 20 climbs. In this regard, in the illustrated embodiment, the guide structure 24 has an elongate, semicylindrical channel 31 that conforms to the outer surface shape of the elongate member 12, which is cylindrical for the illustrated cable 12.

[0031] The clamping member 26 is mounted to the frame 22 for movement between a free position shown in Fig. 1 wherein the shuttle 20 can move freely along the length of the elongate support member 12 and a clamping position shown in Fig. 2 wherein the clamping member 26 engages against the elongate support member 12 in the guide structure 24 to resist or prevent movement of the shuttle 20 relative to the elongate support member 12, thereby arresting the fall of a user. In this regard, the clamping member 26 is configured to move from the free position shown in Fig. 1 to the clamping position shown in Fig. 2 in response to a downward fall (as indicated by arrow "B" in Fig. 2) by a user attached to the shuttle 20.

[0032] The blocking member 28 is mounted on the frame 22 for movement between a closed position shown in Figs. 1 and 2 blocking removal of the elongate support member 12 from the guide structure 24 and an open position shown in Figs. 4 and 5 where the blocking member 28 does not block removal of the elongate member 12 from the guide structure 22. In this regard, with reference to Figs. 1 and 2, in the illustrated embodiment, the blocking member 28 includes a grooved wheel 32 that engages against the elongate support member 12 for rolling contact therewith with the blocking member 28 in the closed position. In this regard, it may be desirable for the groove of the wheel 32 to have a shape that conforms to the outer surface shape of the elongate member 12, which is cylindrical for the illustrated cable 12. In the illustrated embodiment, the blocking member 28 is biased toward the closed position by a spring (not shown). In the open position shown in Figs. 4 and 5, the wheel 32 is disengaged from the elongate support member 12 and spaced therefrom by a sufficient distance to allow the removal of the elongate member 12 from the guide structure 24.

[0033] The anti-inversion member 30 is mounted on the frame 22 for movement between a closed position shown in Fig. 5 wherein the anti-inversion member 30 prevents the elongate support member 12 from being loaded into the guide structure 24 and the shuttle 20, and

an open position shown in Fig. 4 wherein the anti-inversion member 30 does not block the elongate support member 12 from being received in the guide structure 24 and the shuttle 20.

[0034] The clamping member 26 is mounted so that it is also moveable to an opening position shown in Fig. 4 from the free position shown in Fig. 2. In this regard, it can be seen that a connector received in the clamping member 26, such as the carbineer 21 shown in Figs. 1 and 2, will prevent movement of the clamping member 26 from the free position shown in Fig. 2 to the opening position in Fig. 4 because the connector 21 will engage against the frame 22, thereby preventing movement of the clamping member 26 to the opening position shown in Fig. 4, or even the intermediate position shown in Fig. 3. As the clamping member 26 moves from the free position shown in Fig. 2 to the opening position shown in Fig. 4, the clamping member 26 is operably engaged with the blocking member 28 to move the blocking member 28 from the closed position shown in Figs. 1 and 2 to the open position shown in Fig. 4 as the clamping member 26. In this regard, a surface 34 of the clamping member 26 engages a surface 35 of the blocking member 28, as shown in Fig. 3, to move the blocking member 28 to the open position shown in Fig. 4.

[0035] Having broadly described the structure and operational features of the shuttle 20, each of the specific components 22, 24, 26, 28 and 30 of the illustrated embodiment will be described in more detail below. However, it should be understood that the illustrated embodiment and associated details describe only one of many contemplated configurations capable of meeting the structural and operational features described above.

[0036] In the illustrated embodiment, the frame 24 is composed of two plate structures 36 and 37 that are joined together with suitable fasteners 38 that pass through corresponding cylindrical posts or spacers 40 of the frame 24. The plate structure 36 is a one-piece structure and defines the guide structure 24 and its channel 31. Such frames are known and are shown, for example, in International Appln. No. PCT/US14/69906, filed December 12, 2014. It should be appreciated that the frame plates 36 and 37 can be formed using any suitable means and material, such as being formed metal plate or a suitable molded structural material. It should be further appreciated that there are many possible alternate constructions for the frame 24 that are contemplated within the scope of this disclosure and may be desirable depending on the particular environment for the fall protection system 10.

[0037] As best seen in Figs. 2 and 3, the clamping member 26 of the illustrated embodiment is a clamping lever 41 and includes a cam end 42 having a clamping surface 44 that engages the elongate support member 12 and an anchor or connection feature in the form of a circular eye 46 that is spaced from the clamping surface 44 and configured for connection to a user using any suitable means, such as for example, the carabineer 21 that is inserted through an opening 47 of the connection feature 46. In the illustrated embodiment, the clamping member 26 includes an optional damping feature, shown generally at 48, which allows the connection feature 46 to move relative to the remainder of the clamping member 26 and the shuttle 20 via permanent deformation of the damping feature 48. Such damping features are known and are described in more detail in WO 2008/046446 A1. Intermediate the clamping surface 44 and the connection feature 46, the clamping member 26 is pivot mounted to the frame 22 using any suitable means, such as a cylindrical journal feature on the post 40A that passes through a bearing bore formed in the clamping member 26, as best seen in Fig. 3. This allows the clamping member 26 to pivot relative to the frame 22 between the clamping position, the free position, and the opening position.

[0038] The blocking member 28 includes a carrier 50 that mounts the wheel 32 for rotation and defines the surface 35. The carrier 50 is mounted on the frame 22 to pivot between the closed and open positions. In this regard in the illustrated embodiment, a cylindrical journal feature on the post 40B extends through a bore formed in the carrier 50. The carrier includes an arm or finger 54 that defines the surface 35, and a grooved arm 56 that extends on both sides of the wheel 32, with an axle 58 extending through the wheel 32 to mount the wheel 32 for rotation.

[0039] The anti-inversion member 30 is mounted to pivot between the closed position and open position using any suitable pivot mount, such as a cylindrical journal feature on the post 40C of the frame 22 received within a bearing bore formed in the anti-inversion member 30. As best seen in Fig. 4, the anti-inversion member 30 includes a surface 60 that engages with a surface 62 of the clamping member 26 to move the anti-inversion member 30 to a position wherein it will not block removal of the elongate member 12 from the guide structure 24. In this regard, it should be appreciated that the surface 60 is shaped to provide the appropriate movement of the anti-inversion member 30 as it is engaged by the surface 62 of the clamping member 26 moving from the free position to the opening position shown in Fig. 4. As best seen in Fig. 5, the surface 60 is pivoted away from contact with the surface 62 of the clamping member 26 when the shuttle 20 is inverted relative to gravity (i.e., positioned upside-down), this allows another surface 64 of the anti-inversion member to be engaged by the surface 62 of the clamping member 26 so that the clamping member 26 moves the anti-inversion member 30 to the closed position blocking the insertion of an elongate member 12 into the shuttle 20 and the guide structure 24. In this regard, it should be understood that the center of mass of the anti-inversion member 30 is located relative to the pivot mount location of the post 40C so that the force of gravity causes the anti-inversion member 30 to assume the orientation shown in Figs. 1-4 when the shuttle 20 is in its desired position relative to gravity, and then to assume the opposite orientation (with the center of mass

positioned closer to the blocking member 28) when the shuttle 20 is positioned upside-down (inverted) as shown in Fig. 5. The same is true for the clamping member 26, which has its center of mass positioned relative to pivot mount location of the post 40A so that gravity forces the clamping member 26 to the position shown in Fig. 5.

[0040] It should be appreciated that by providing the shuttle 20 with a clamping member 26 and a blocking member 28 at opposite ends of the guide structure 24 to prevent removal of the elongate support member 12 from the guide structure 24, the connection of the shuttle 20 to the elongate support structure 12 is very secure, especially since both entries of the elongate support member 12 into the shuttle 20 are secured. It should further be appreciated that the operation of the shuttle 20 is simplified by preventing movement of the clamping member 26 to the opening position in a condition wherein the shuttle 20 is connected to a user via a connector 21, but allowing simple removal of the shuttle 20 from the elongate support member 12 when a connector 21 is not present with a simple pivot motion of the clamping member 26 to the opening position, thereby locating both the clamping member 26 and the blocking member 28 so that they allow removal of the elongate support member 12 from the shuttle 20 and the support structure 24. It should further be appreciated that cooperation of the anti-inversion member 30 with the clamping member 26 again provides a simplified user experience by placing the shuttle 20 in a condition wherein the shuttle 20 cannot be loaded onto the elongate support member 12 when the shuttle 20 is in the inverted (upside-down) orientation. Last, it should be appreciated that the disclosed shuttle 20 provides a simplified assembly with a minimum of moving parts and components.

[0041] It should be understood that any embodiments described herein are illustrative of the structure and operational features of the shuttle 20 and this disclosure contemplates that the shuttle 20 can be provided in other forms and configurations. By way of example, while the clamping, blocking and anti-inversion members 26, 28 and 30 have been shown as being mounted for pivoting movement between their operating positions, other mountings and movements are possible. By way of further example, while the illustrated embodiment shows a particular configuration for the pivot mounting of each of the clamping, blocking and anti-inversion members 26, 28 and 30, any suitable pivot mounting can be utilized. As yet a further example, while the frame 22 has been shown as being constructed from two plate structures 36 and 37, it is possible for the frame to be composed of something other than plate structures, or more than or fewer than the illustrated plate structures. As yet a further example, while the illustrated embodiment shows certain specific shapes for each of the components 22, 24, 26, 28 and 30, it should be understood that other shapes are possible and can provide the above-described features for the shuttle 20. Accordingly, it should be understood that no limitations are intended unless they are expressly recited in one of the appended claims.

Claims

1. A shuttle (20) for a climbing protection system (10) wherein the shuttle (20) can be connected to a user and is guided along a cable, rope, or other elongate support member (12) as the user climbs and grips the elongate support member (12) in response to the user falling, the shuttle (20) comprising:

a frame (22);
a guide structure (24) on the frame (22) and configured to receive an elongate support member (12) and to guide the shuttle (20) along the elongate support member (12) as a user attached to the shuttle (20) climbs;
a clamping member (26) mounted on the frame (22) for movement between a free position wherein the shuttle (20) can move freely along the elongate support member (12) received in the guide structure (24) and a clamping position wherein the clamping member (26) engages against the elongate support member (12) in the guide structure (24) to resist movement of the shuttle (20) relative to the elongate support member (12), the clamping member (26) configured to move from the free position to the clamping position in response to a downward movement by the user attached to the shuttle (20);
a blocking member (28) mounted on the frame (22) for movement between a closed position blocking removal of the elongate support member (12) from the guide structure (24) and an open position where the blocking member (28) does not block removal of the elongate support member (12) from the guide structure (24); and
wherein the clamping member (26) is movable to an opening position from the free position, the clamping member (26) in the free position blocks removal of the elongate support member (12) from the guide structure, the clamping member (26) in the opening position does not block removal of the elongate support member (12), and the clamping member (26) operably engages the blocking member (28) to move the blocking member (28) from the closed position to the open position as the clamping member (26) is moved from the free position to the opening position;
characterized in that the shuttle further comprises an anti-inversion member (30) mounted on the frame (22) for movement between a closed position wherein the anti-inversion member (30) blocks the elongate support member (12) from being received into the guide structure

(24) and an open position wherein the anti-inversion member does not block the elongate support member (12) from being received in the guide structure (24);
wherein the anti-inversion member (30) is mounted on the frame (22) to pivot between the closed and open positions of the anti-inversion member (30); and
wherein the clamping member (26) in the opening position engages a first surface (60) of the anti-inversion member (30) to maintain the anti-inversion member (30) in the open position with the shuttle (20) in a desired orientation relative to gravity, and the clamping member (26) in the opening position engages a second surface (64) of the anti-inversion member (30) to maintain the anti-inversion member (30) in the closed position with the shuttle (20) in an non-desired orientation relative to gravity.

2. The shuttle (20) of claim 1 wherein the blocking member (28) is mounted on the frame (22) to pivot between the closed and open positions.

3. The shuttle (20) of any of the preceding claims wherein the blocking member (28) comprises a wheel (32) configured to engage against the elongate support member (12) in the guide structure (24) with the blocking member (28) in the closed position.

4. The shuttle (20) of claim 3 wherein the blocking member (28) further comprises a carrier (50) mounting the wheel (32) for rotation, the carrier (50) being pivot mounted to the frame.

5. The shuttle (20) of any of the preceding claims wherein the clamping member (26) comprises a connection feature (46) configured to receive a connector (21) for attaching a user to the shuttle (20), and the connection feature (46) is located so that a connector (21) received therein engages against the frame (22) to prevent the clamping member (26) from moving to the opening position as the clamping member (26) is moved from the free position toward the opening position.

6. The shuttle (20) of claim 5 wherein the clamping member (26) comprises an clamping surface (44) that engages the elongate support member (12) received in the guide structure (24) with the clamping member (26) in the clamping position, the connection feature (46) is spaced from the clamping surface (44), and the clamping member (26) is pivot mounted to the frame (22) at a location between the connection feature (46) and the clamping surface (44).

7. The shuttle (20) of any of the preceding claims wherein the clamping member (26) is a clamping lever (41) mounted on the frame (22) to pivot between the free, clamping, and opening positions.

8. The shuttle (20) of any of the preceding claims wherein the clamping member (26) comprises a surface (34) that engages a surface (35) on the blocking member (28) to move the blocking member (28) between the closed and open positions as the clamping member (26) moves between the free and opening positions.

9. The shuttle (20) of any preceding claim wherein the blocking member (28) is biased toward the closed position of the blocking member (28).

10. The shuttle (20) of any of the preceding claims wherein the clamping member (26) comprises a damping feature (48) configured to undergo permanent deformation in response to a fall of a user attached to the shuttle (20).

11. The shuttle (20) of any preceding claim wherein the frame (22) comprises two plate members (36,37) located on opposite sides of the locking, clamping and blocking members (26,28,30), with one of the two plate members (36,37) being a single piece that defines the guide structure (24).

Patentansprüche

1. Schiffchen (20) für ein Kletterschutzsystem (10), wobei das Schiffchen (20) mit einem Benutzer verbunden sein kann und entlang eines Kabels, Seils oder eines anderen länglichen Trägerelements (12) geführt wird, wenn der Benutzer klettert und das längliche Trägerelement (12) als Reaktion auf den Sturz des Benutzers ergreift, wobei das Schiffchen (20) umfasst:

einen Rahmen (22);
eine Führungsstruktur (24) an dem Rahmen (22), die konfiguriert ist, um ein längliches Trägerelement (12) aufzunehmen und das Schiffchen (20) entlang des länglichen Trägerelements (12) zu führen, wenn ein an dem Schiffchen (20) befestigter Benutzer klettert;
ein Klemmelement (26), das an dem Rahmen (22) angebracht ist, um sich zwischen einer freien Position, wobei sich das Schiffchen (20) frei entlang des in der Führungsstruktur (24) aufgenommenen länglichen Trägerelements (12) bewegen kann, und einer Klemmposition zu bewegen, wobei das Klemmelement (26) gegen das längliche Trägerelement (12) in der Führungsstruktur (24) in Eingriff geht, um einer Bewegung des Schiffchens (20) relativ zu dem länglichen Trägerelement (12) zu widerstehen, wobei das

Klemmelement (26) konfiguriert ist, um sich als Reaktion auf eine Abwärtsbewegung des am Schiffchen (20) befestigten Benutzers von der freien Position in die Klemmposition zu bewegen;
ein Blockierelement (28), das an dem Rahmen (22) angebracht ist, um sich zwischen einer geschlossenen Position, die das Entfernen des länglichen Trägerelements (12) von der Führungsstruktur (24) blockiert, und einer offenen Position, in der das Blockierelement (28) das Entfernen des länglichen Trägerelements (12) von der Führungsstruktur (24) nicht blockiert, zu bewegen; und
wobei das Klemmelement (26) von der freien Position in eine Öffnungsposition bewegbar ist, das Klemmelement (26) in der freien Position das Entfernen des länglichen Trägerelements (12) von der Führungsstruktur blockiert, wobei das Klemmelement (26) in der Öffnungsposition das Entfernen des länglichen Trägerelements (12) nicht blockiert, und das Klemmelement (26) betriebsmäßig das Blockierelement (28) in Eingriff nimmt, um das Blockierelement (28) von der geschlossenen Position in die offene Position zu bewegen, wenn das Klemmelement (26) von der freien Position in die Öffnungsposition bewegt wird;
dadurch gekennzeichnet, dass das Schiffchen ferner ein Anti-Inversionselement (30) umfasst, das an dem Rahmen (22) angebracht ist, um zwischen einer geschlossenen Position, wobei das Anti-Inversionselement (30) verhindert, dass das längliche Trägerelement (12) in der Führungsstruktur (24) aufgenommen wird, und einer offenen Position bewegt zu werden, wobei das Anti-Inversionselement nicht blockiert, dass das längliche Trägerelement (12) in der Führungsstruktur (24) aufgenommen wird;
wobei das Anti-Inversionselement (30) an dem Rahmen (22) angebracht ist, um zwischen der geschlossenen und der offenen Position des Anti-Inversionselements (30) zu schwenken; und
wobei das Klemmelement (26) in der Öffnungsposition eine erste Fläche (60) des Anti-Inversionselements (30) in Eingriff nimmt, um das Anti-Inversionselement (30) in der offenen Position mit dem Schiffchen (20) in einer gewünschten Ausrichtung relativ zur Schwerkraft zu halten, und das Klemmelement (26) in der Öffnungsposition eine zweite Fläche (64) des Anti-Inversionselements (30) in Eingriff nimmt, um das Anti-Inversionselement (30) in der geschlossenen Position mit dem Schiffchen (20) in einer unerwünschten Ausrichtung relativ zur Schwerkraft zu halten.

2. Schiffchen (20) nach Anspruch 1, wobei das Blockierelement (28) an dem Rahmen (22) angebracht ist, um zwischen der geschlossenen und der offenen Position zu schwenken.

3. Schiffchen (20) nach einem der vorhergehenden Ansprüche, wobei das Blockierelement (28) ein Rad (32) umfasst, das konfiguriert ist, um gegen das längliche Trägerelement (12) in der Führungsstruktur (24) mit dem Blockierelement (28) in der geschlossenen Position in Eingriff zu gehen.

4. Schiffchen (20) nach Anspruch 3, wobei das Blockierelement (28) ferner einen Träger (50) umfasst, an dem das Rad (32) drehbar angebracht ist, wobei der Träger (50) schwenkbar an dem Rahmen angebracht ist.

5. Schiffchen (20) nach einem der vorhergehenden Ansprüche, wobei das Klemmelement (26) ein Verbindungsmerkmal (46) umfasst, das konfiguriert ist, um einen Verbinder (21) zum Befestigen eines Benutzers an dem Schiffchen (20) aufzunehmen, und das Verbindungsmerkmal (46) so positioniert ist, dass ein darin aufgenommener Verbinder (21) gegen den Rahmen (22) in Eingriff geht, um zu verhindern, dass sich das Klemmelement (26) in die Öffnungsposition bewegt, wenn das Klemmelement (26) von der freien Position in Richtung der Öffnungsposition bewegt wird.

6. Schiffchen (20) nach Anspruch 5, wobei das Klemmelement (26) eine Klemmfläche (44) umfasst, die das in der Führungsstruktur (24) aufgenommene längliche Trägerelement (12) mit dem Klemmelement (26) in der Klemmposition in Eingriff nimmt, das Verbindungsmerkmal (46) von der Klemmfläche (44) beabstandet ist, und das Klemmelement (26) an einer Position zwischen dem Verbindungsmerkmal (46) und der Klemmfläche (44) schwenkbar am Rahmen (22) angebracht ist.

7. Schiffchen (20) nach einem der vorhergehenden Ansprüche, wobei das Klemmelement (26) ein Klemmhebel (41) ist, der an dem Rahmen (22) angebracht ist, um zwischen der freien, der Klemm- und der Öffnungsposition zu schwenken.

8. Schiffchen (20) nach einem der vorhergehenden Ansprüche, wobei das Klemmelement (26) eine Fläche (34) umfasst, die mit einer Fläche (35) an dem Blockierelement (28) in Eingriff geht, um das Blockierelement (28) zwischen der geschlossenen und der offenen Position zu bewegen, wenn sich das Klemmelement (26) zwischen der freien und der Öffnungsposition bewegt.

9. Schiffchen (20) nach einem der vorhergehenden An-

sprüche, wobei das Blockierelement (28) in Richtung der geschlossenen Position des Blockierelements (28) vorgespannt ist.

10. Schiffchen (20) nach einem der vorhergehenden Ansprüche, wobei das Klemmelement (26) ein Dämpfungsmerkmal (48) umfasst, das konfiguriert ist, um als Reaktion auf einen Sturz eines an dem Schiffchen (20) befestigten Benutzers eine dauerhafte Verformung zu erfahren.

11. Schiffchen (20) nach einem der vorhergehenden Ansprüche, wobei der Rahmen (22) zwei Plattenelemente (36, 37) umfasst, die auf entgegengesetzten Seiten des Verriegelungs-, Klemm- und Blockierelements (26, 28, 30) positioniert sind, wobei eines der zwei Plattenelemente (36, 37) ein einzelnes Stück ist, das die Führungsstruktur (24) definiert.

Revendications

1. Navette (20) pour système anti-chute (10) dans laquelle la navette (20) peut être connectée à un utilisateur et est guidée le long d'un câble, d'une corde ou d'un autre élément de support allongé (12) lorsque l'utilisateur grimpe et saisit l'élément de support allongé (12) en réponse à la chute de l'utilisateur, la navette (20) comprenant :

un châssis (22) ;
une structure de guidage (24) sur le châssis (22) et configurée pour recevoir un élément de support allongé (12) et pour guider la navette (20) le long de l'élément de support allongé (12) pendant qu'un utilisateur attaché à la navette (20) grimpe ;
un élément de serrage (26) monté sur le châssis (22) pour un déplacement entre une position libre dans laquelle la navette (20) peut se déplacer librement le long de l'élément de support allongé (12) reçu dans la structure de guidage (24) et une position de serrage dans laquelle l'élément de serrage (26) s'engage contre l'élément de support allongé (12) dans la structure de guidage (24) pour résister au mouvement de la navette (20) par rapport à l'élément de support allongé (12), l'élément de serrage (26) étant configuré pour se déplacer de la position libre à la position de serrage en réponse à un mouvement vers le bas de l'utilisateur attaché à la navette (20) ;
un élément de blocage (28) monté sur le châssis (22) pour un déplacement entre un retrait de blocage en position fermée de l'élément de support allongé (12) depuis la structure de guidage (24) et une position ouverte où l'élément de blocage (28) ne bloque pas le retrait de l'élément de support allongé (12) depuis la structure de guidage (24) ; et
dans laquelle l'élément de serrage (26) peut se déplacer vers une position d'ouverture depuis la position libre, l'élément de serrage (26) dans la position libre bloque le retrait de l'élément de support allongé (12) depuis la structure de guidage, l'élément de serrage (26) dans la position d'ouverture ne bloque pas le retrait de l'élément de support allongé (12), et l'élément de serrage (26) vient en prise de manière fonctionnelle avec l'élément de blocage (28) pour déplacer l'élément de blocage (28) de la position fermée à la position ouverte lorsque l'élément de serrage (26) est déplacé de la position libre à la position d'ouverture ;
caractérisée en ce que la navette comprend en outre un élément anti-inversion (30) monté sur le châssis (22) pour un déplacement entre une position fermée dans laquelle l'élément anti-inversion (30) empêche l'élément de support allongé (12) d'être reçu dans la structure de guidage (24) et une position ouverte dans laquelle l'élément anti-inversion n'empêche pas l'élément de support allongé (12) d'être reçu dans la structure de guidage (24) ;
dans laquelle l'élément anti-inversion (30) est monté sur le châssis (22) pour pivoter entre les positions fermée et ouverte de l'élément anti-inversion (30) ; et
dans laquelle l'élément de serrage (26) en position d'ouverture vient en prise avec une première surface (60) de l'élément anti-inversion (30) pour maintenir l'élément anti-inversion (30) en position ouverte avec la navette (20) dans une orientation souhaitée par rapport à la gravité, et l'élément de serrage (26) en position d'ouverture vient en prise avec une seconde surface (64) de l'élément anti-inversion (30) pour maintenir l'élément anti-inversion (30) en position fermée avec la navette (20) dans une orientation non souhaitée par rapport à la gravité.

2. Navette (20) selon la revendication 1 dans laquelle l'élément de blocage (28) est monté sur le châssis (22) pour pivoter entre les positions fermée et ouverte.

3. Navette (20) selon l'une quelconque des revendications précédentes, dans laquelle l'élément de blocage (28) comprend une roue (32) configurée pour venir en prise contre l'élément de support allongé (12) dans la structure de guidage (24) avec l'élément de blocage (28) en position fermée.

4. Navette (20) selon la revendication 3 dans laquelle l'élément de blocage (28) comprend en outre un support (50) montant la roue (32) pour la rotation, le

support (50) étant monté en pivot sur le châssis.

5. Navette (20) selon l'une quelconque des revendications précédentes dans laquelle l'élément de serrage (26) comprend un élément de raccordement (46) configuré pour recevoir un connecteur (21) pour attacher un utilisateur à la navette (20), et l'élément de raccordement (46) est situé de sorte qu'un connecteur (21) reçu à l'intérieur vient en prise contre le châssis (22) pour empêcher l'élément de serrage (26) de se déplacer vers la position d'ouverture lorsque l'élément de serrage (26) est déplacé de la position libre vers la position d'ouverture.

6. Navette (20) selon la revendication 5 dans laquelle l'élément de serrage (26) comprend une surface de serrage (44) qui vient en prise avec l'élément de support allongé (12) reçu dans la structure de guidage (24) avec l'élément de serrage (26) en position de serrage, l'élément de raccordement (46) est espacé de la surface de serrage (44), et l'élément de serrage (26) est monté en pivot sur le châssis (22) à un emplacement entre l'élément de raccordement (46) et la surface de serrage (44).

7. Navette (20) selon l'une quelconque des revendications précédentes dans laquelle l'élément de serrage (26) est un levier de serrage (41) monté sur le châssis (22) pour pivoter entre les positions libre, de serrage et d'ouverture.

8. Navette (20) selon l'une quelconque des revendications précédentes dans laquelle l'élément de serrage (26) comprend une surface (34) qui vient en prise avec une surface (35) sur l'élément de blocage (28) pour déplacer l'élément de blocage (28) entre les positions fermée et ouverte lorsque l'élément de serrage (26) se déplace entre les positions libre et d'ouverture.

9. Navette (20) selon l'une quelconque des revendications précédentes dans laquelle l'élément de blocage (28) est sollicité vers la position fermée de l'élément de blocage (28).

10. Navette (20) selon l'une quelconque des revendications précédentes dans laquelle l'élément de serrage (26) comprend un élément d'amortissement (48) configuré pour subir une déformation permanente en réponse à une chute d'un utilisateur attaché à la navette (20).

11. Navette (20) selon l'une quelconque des revendications précédentes, dans laquelle le châssis (22) comprend deux éléments de plaque (36, 37) situés sur les côtés opposés des éléments de verrouillage, de serrage et de blocage (26, 28, 30), l'un des deux éléments de plaque (36, 37) étant une seule pièce qui définit la structure de guidage (24).

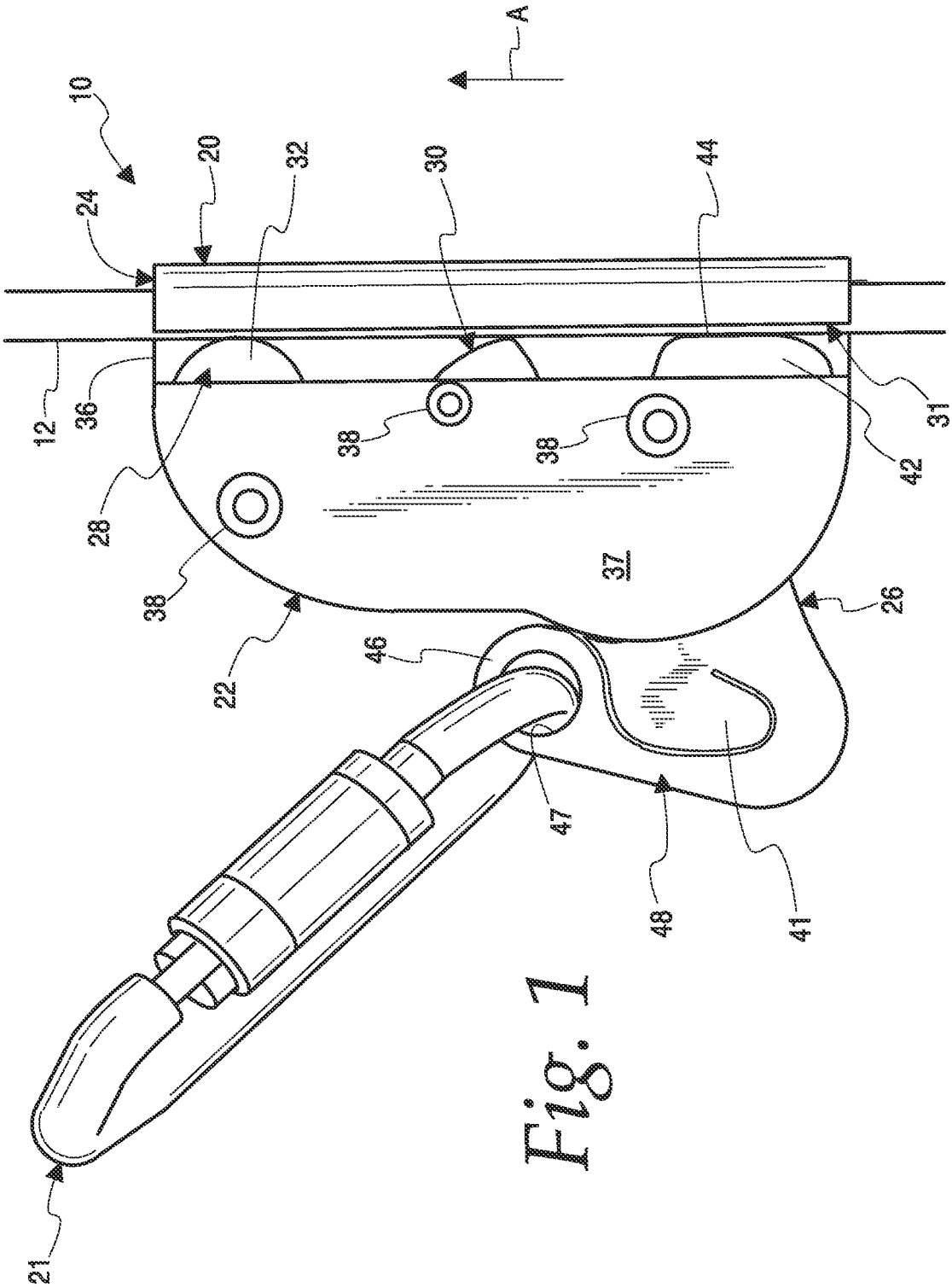
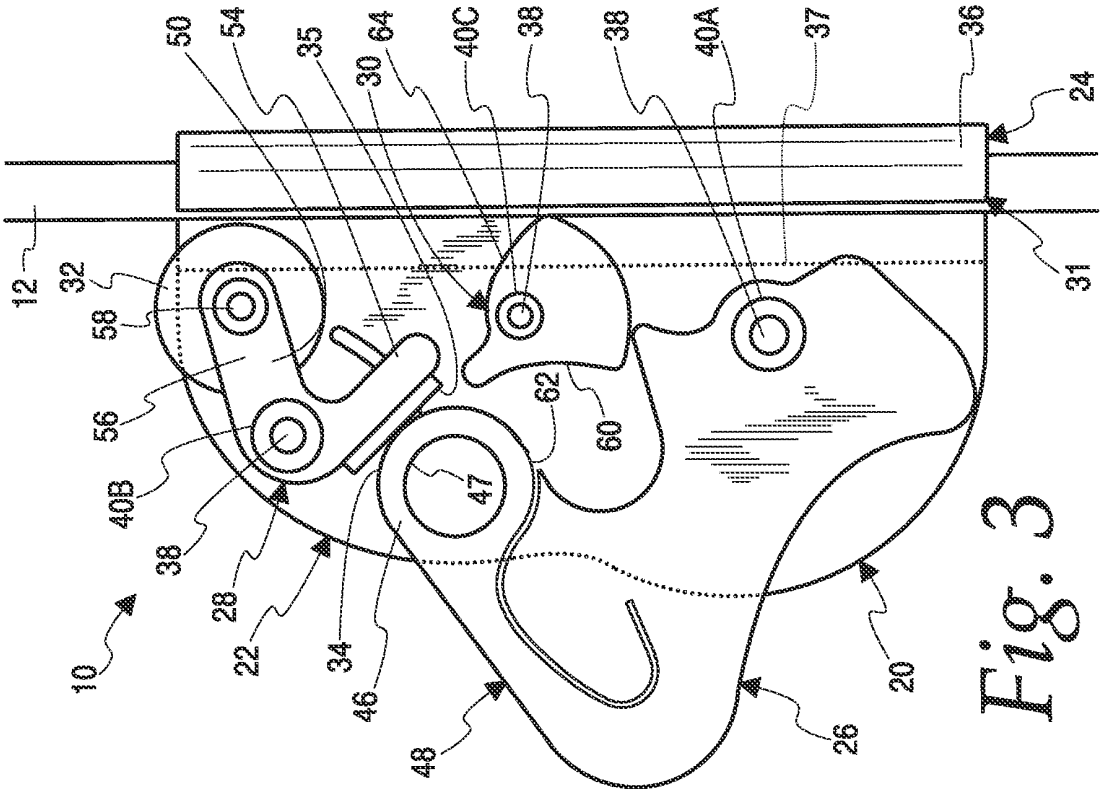


Fig. 1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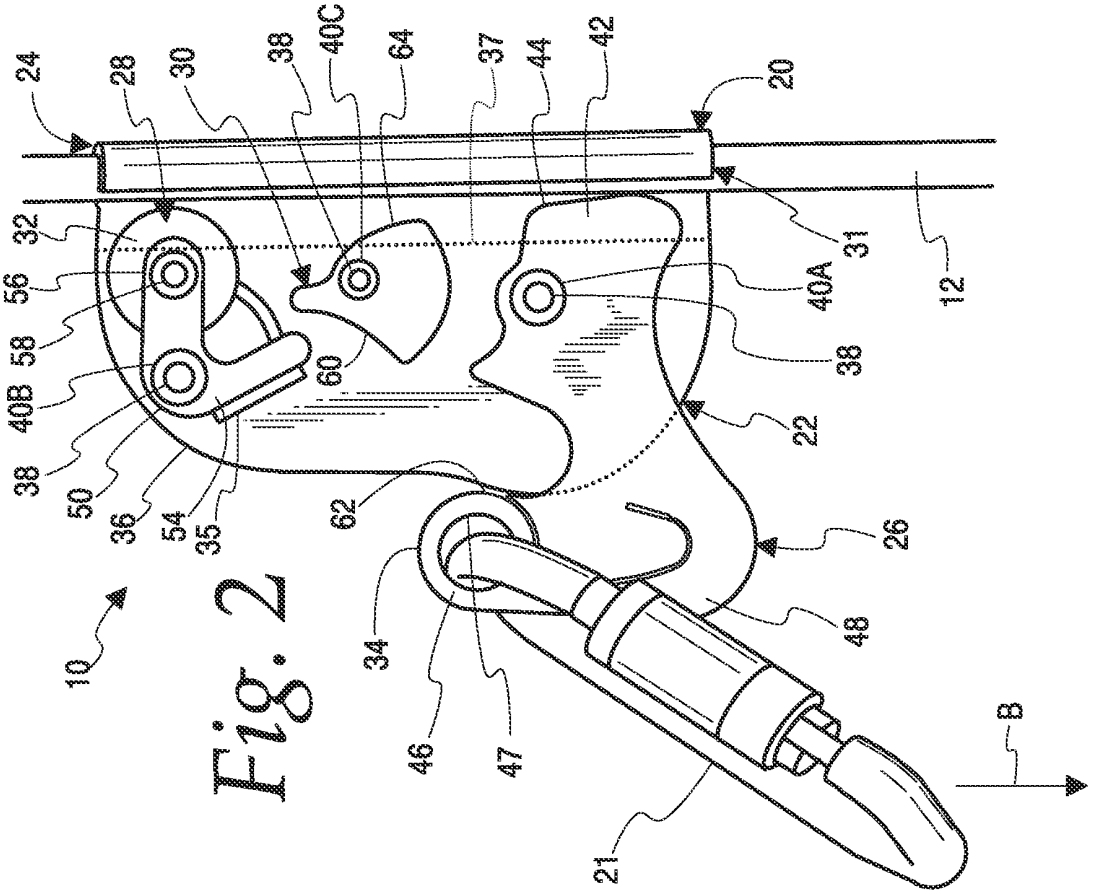
26
31

Fig. 3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40A
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12
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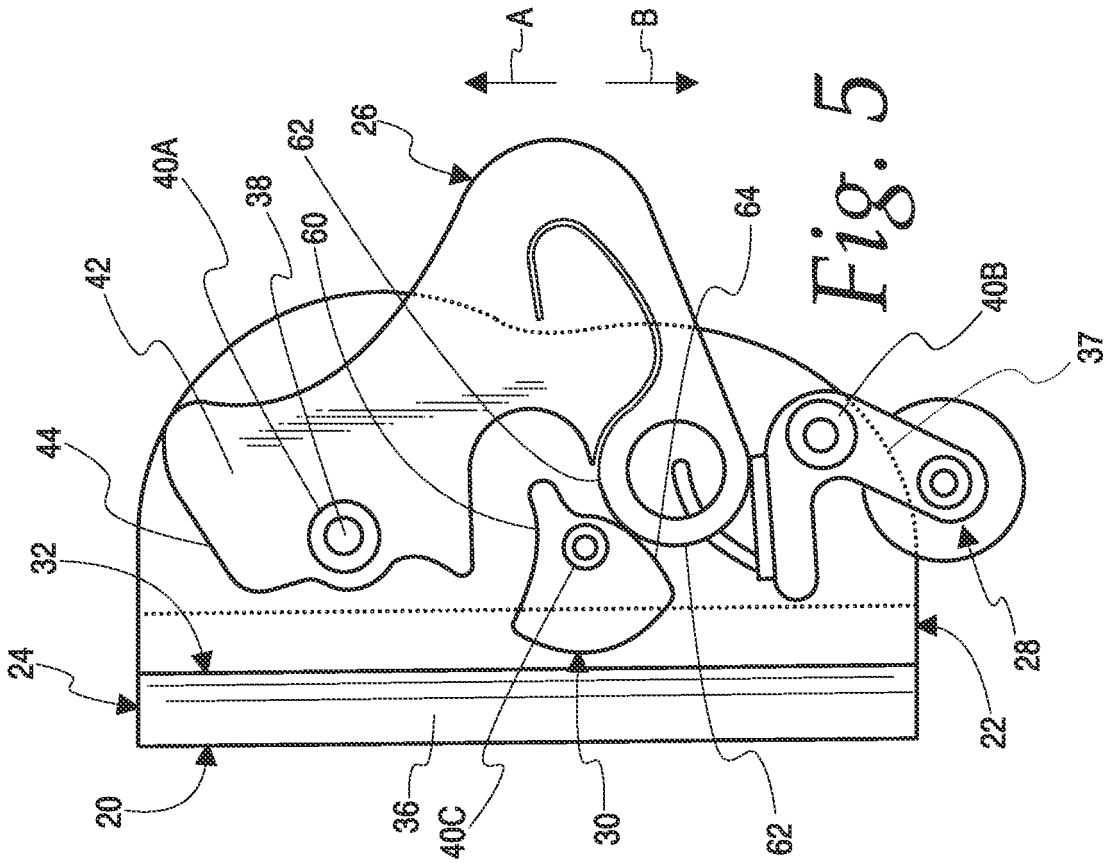
B
21

Fig. 2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B
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36
40C
30
62

Fig. 5

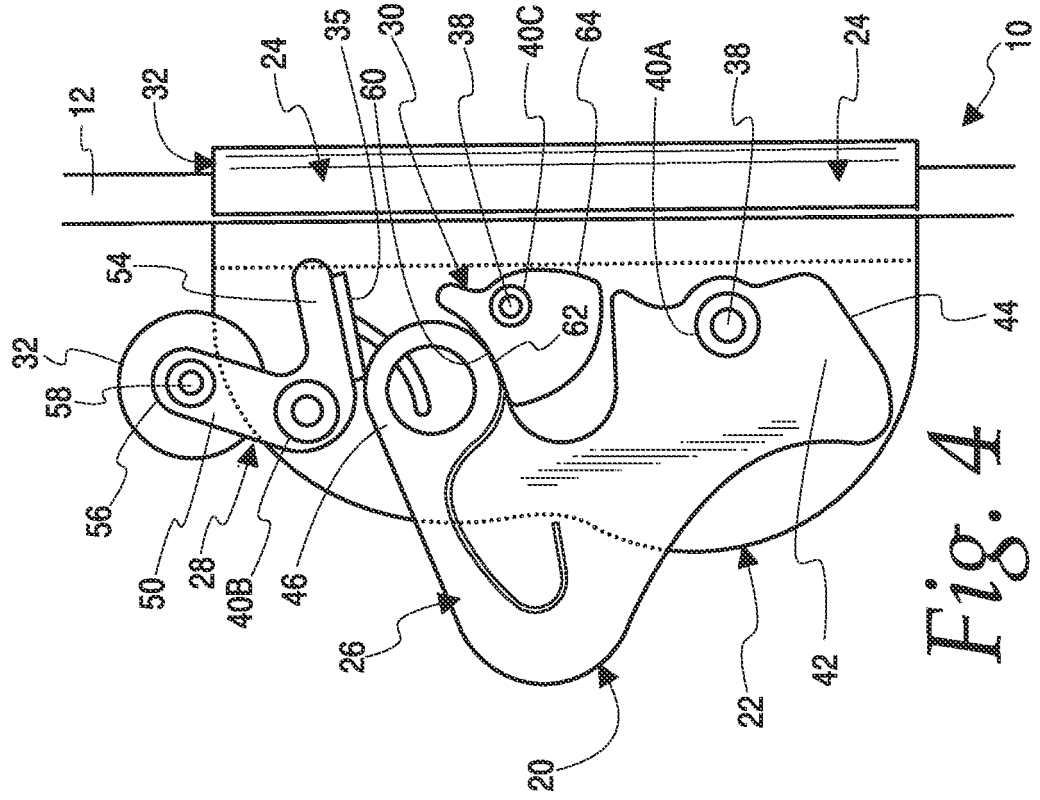
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Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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