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(54) A self-belay set with two connectors

(57) The present invention is related to a self-belay set (1) comprising two connectors (4,5) attached respectively to both ends of a cable (6), which is connectable to a climber, each of the connectors comprising a hook-shaped housing (10) and a steel slider (40) movably arranged inside said housing, **characterized in that** the slider (40) and the housing (10) are provided with blocking means (12) for preventing the slider from being moved out of the open or closed position except by hooking the open connector onto an actuator (50), said actuator comprising a permanent magnet (52), configured to exert a magnetic gripping force on the slider, said gripping force being sufficient to move the slider out of the open position and into the closed position.

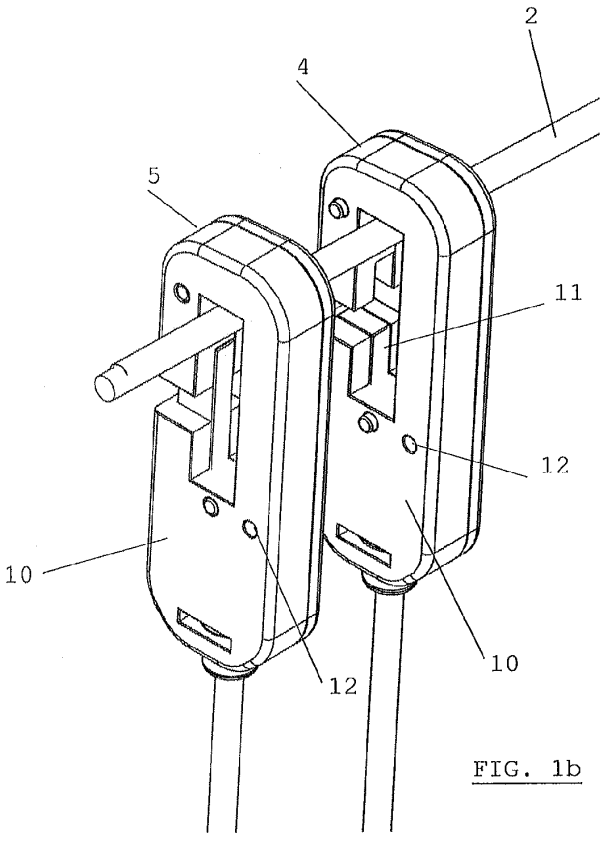

FIG. 1b

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Description

Field of the Invention

[0001] The present invention is related to climbing equipment, in particular to a device often referred to as a self-belay set, used for example in high rope courses, and comprising two connectors, which can be hung at belay points to secure the climber.

State of the art.

[0002] A self-belay set of the above type is known for example from document US4423796, which describes a climbing device, chiefly aimed at climbing ladders, and involving two connectors connected by a Bowden cable. Each connector has a housing and a slider moving inside said housing, the slider's movement being actuated by the climber gripping one of the ladder's rungs with an open connector. When the climber subsequently pulls on the connector, the slider moves up inside the housing and closes the connector securely around the ladder's rung. At the same time, through the use of a push-pull cable also known as a Bowden cable, provided between the connectors, the slider movement causes the other slider in the second connector to move down, thereby releasing the other connector. The slider/housing combinations are devised such that a connector is secured around a ladder rung before the other connector is released, i.e. the climber cannot release both connectors at the same time. However, this system does not comprise a blocking means, able to prohibit the user from opening a connector.

[0003] Another self-belay set is known for example from document WO2008/049143. When using the device described in the latter reference, a climber is secured on a horizontal rope by two carabiners equipped with blocking mechanisms which, when activated, make it impossible for the climber to open the carabiner. In order to activate a blocking mechanism, the unblocked carabiner must be brought into contact with a belay means, referred to as a key, arranged on the horizontal rope. A Bowden cable or an electrical cable connection is provided between the carabiners, so that by blocking one carabiner, the other carabiner is unblocked and ready to be opened by the climber. With the key arranged on one side of a fixed anchor point where the horizontal rope is interrupted, e.g. a post, this provides a safety against improper use of the belay set at such anchor points. W02008/049143 describes a number of keys and corresponding connectors, having mechanical or electromechanical blocking means. A disadvantage of this particular type of device is that it requires a large number of actions to be taken by the climber, given that two actions are required in order to remove a carabiner from the rope : unblocking and opening. In order to pass a fixed anchor point, the climber must therefore :

- open the unlocked carabiner,
- bring it into contact with the key in order to block it,
- open the newly unlocked carabiner, and
- bring that one into contact with the key in order to lock it again and unlock the first carabiner.

Also, the interaction between the key and the unblocked carabiner requires the rather complex and possibly awkward action of inserting the key into a keyhole or socket provided on the carabiner, especially when manipulated by children. It is not visible to the climber at first sight which carabiner is locked and which carabiner is unlocked. The blocking mechanisms described in detail in W02008/049143 are either purely mechanical or electromechanical, the latter being powered by a battery arranged in the carabiners, or by an external power source to which the keys are connected. The availability of such power sources is however not 100% ensured at all times. One solution involving a magnetic force is mentioned, wherein the steel cable itself is used as an iron core to attract a magnetic blocking apparatus in its direction. The latter system is however not described in detail.

[0004] Finally, in all of the known systems, the Bowden cable is used in combination with an additional connection means for carrying the climber's weight in case of a fall. In the case of US4423796, this is a flexible wire rope of slightly shorter length than the Bowden cable, while in W02008/049143, the Bowden cable is loosely built into a belay sling. Such designs are complex and increase the danger of the Bowden cable and load carrying means becoming entangled or otherwise interacting in a non-desired way.

Summary of the invention

[0005] The invention is related to a self-belay set, and actuator and a set of climbing equipment according to the appended claims.

[0006] The invention is related to a self-belay set comprising two connectors and a cable, the connectors being attached respectively to both ends of said cable, said cable being connectable to a climber, each of the connectors comprising a hook-shaped housing and a steel slider movably arranged inside said housing, the slider being movable between an open position wherein the connector can be hooked onto or unhooked from a rope or bar, and a closed position, wherein the connector is closed around said rope or bar, the self-belay set comprising an interaction means between both connectors, configured so that when one connector is in the open position, the other is in the closed position, and so that a movement of one slider with respect to its housing causes an opposite movement of the other slider,
characterized in that the slider and the housing are provided with blocking means for preventing the sliders from being moved out of the open or closed position except by hooking the open connector onto an actuator, said actuator comprising at least one permanent magnet, con-

figured to exert a magnetic gripping force on the slider, said gripping force being sufficient to move the slider out of the open position and into the closed position, when the connector is displaced with respect to the actuator.

[0007] In the belay set of the invention, there is thus a direct interaction between a slider present in the connector and a permanent magnet or magnets present in an actuator. According to the preferred embodiment, the slider and magnet(s) have a shape which suitable to allow said direct interaction to take place by establishing a closed magnetic circuit when the magnet(s) and the slider are brought into mutual contact.

[0008] According to a preferred embodiment, the slider is a U-shaped steel component comprising a base and upstanding legs, the legs pointing upward when the connector is hooked onto a horizontal rope, and wherein the housing comprises a corresponding recessed portion in which the slider is movable between the open and closed positions, and wherein the permanent magnet(s) extend (s) over the entire width of the actuator, so that it may be placed in between the upstanding legs of the slider when the connector is hooked onto the actuator, thereby exerting said magnetic gripping force on the slider, said force being sufficient to move the slider out of the open position and into the closed position, when the connector is pulled downward with respect to the actuator.

[0009] According to the preferred embodiment, said interaction means between the connectors is formed by said cable, and wherein said cable comprises a hollow outer cable and an inner pull cable attached to the sliders, and wherein, apart from said cable, no other load-bearing connection is present between the first and second connector.

[0010] In a belay set according to the invention, said cable may be fixed to a connection element, located in a central position of the cable, said connection element being attachable to the climber.

[0011] Said blocking means may be provided in the form of a ball and plunger type locking device, arranged in the connector housing, and located so as to cooperate with two bore holes provided in the slider surface, one bore hole defining the open position, the other defining the closed position of the slider.

[0012] In a belay set according to the invention, each connector may comprise a connection piece, arranged for attaching the cable to the connector, said connection piece being a hollow cylindrical element comprising a base section of a first diameter, a middle section of a second diameter, and a top section of a third diameter, wherein the middle section has the smallest diameter of the three, said sections defining a profile of the connection piece, and wherein the housing of each connector comprises an opening with a profile corresponding to the profile of said connection piece, so that the connection piece fits closely into said opening, and wherein said cable is inserted through said connection piece from the outer side of the connector to the inner side of the connector, and welded to said connection piece at the inner side.

[0013] The invention is equally related to an actuator for use in combination with a belay set according to the invention, said actuator being configured to be attached to a rope, a bar or an anchor point, the actuator comprising a top portion (51), extending above the rope or bar when the actuator is attached to said rope or bar, and wherein the permanent magnet(s) is (are) arranged in a bore hole extending through the complete width of said top portion, the length of the magnet corresponding to the width of the top portion.

[0014] According to a preferred embodiment of the actuator, the height of the top portion is such that when the open connector is first brought into contact with the actuator, and before the connector is pulled downward, the slider is pulled - by magnetic force - out of the open position over a part of the distance between open and closed positions, said part being sufficient to partially close one connector and partially open the other connector, so that neither of the connectors can be detached by the climber.

[0015] The invention is also related to a climbing equipment set comprising a at least one belay set according to the invention and at least one actuator according to the invention.

[0016] The invention is also related to a method for moving along a horizontal rope comprising a fixed anchor point, from a first side of the anchor point to the second side, an actuator according to the invention being attached to the rope on said second side, with the help of a belay set according to the invention, the method comprising the steps of :

- hooking the open connector onto the actuator,
- moving the open connector into a position so as to grip the slider,
- pulling the connector downwards so as to move the slider upwards inside the connector housing, until it is secured in the closed position, thereby securing the other connector into the open position,
- sliding the now closed connector over the actuator, thereby removing the connector,
- closing the now open connector by the same interaction with the actuator, thereby again opening the first connector.

Brief description of the figures

[0017] Figure 1 illustrates a belay set and actuator according to the invention, when attached to a rope.

[0018] Figure 2 shows a detailed view of the body and cover of a connector housing, used in a belay set according to the invention.

[0019] Figure 3 shows the slider used in a connector of a belay set according to the invention

[0020] Figure 4 shows the two connectors, in open and closed state respectively.

[0021] Figure 5 shows a detailed view of an actuator

to be used with a belay set according to the invention

[0022] Figures 6a to 6d illustrate the method for closing a connector in a belay set according to the invention.

[0023] Figure 7 shows a detail of the connection piece between a connector and the Bowden cable.

Detailed description of the invention

[0024] Figure 1a shows a belay set 1 according a preferred embodiment of the invention, when it is attached to a climbing rope 2. The drawing shows a fixed anchor point formed by a post 3, to which the rope 2 is attached. The belay set comprises a first and second connector 4 and 5, interconnected by a cable 6, running through and fixed to a U-shaped fixed central connection element 7, which is to be attached to the climber's waist. Cable 6 thus comprises cable portions 6a and 6b. The cable is preferably a Bowden cable, i.e. a hollow outer cable, provided with a central pull cable, establishing an interaction means between the two connectors (see further).

[0025] A closer view of the connectors 4 and 5 is presented in figure 1b. Each connector comprises a housing 10, with a slider 11 being movably arranged within the housing. In the picture shown in figure 1b, connectors 4 and 5 are open and closed respectively. Figures 2a and 2b show a detailed view of the components of the housing 10: the housing body 20 and the housing cover 21. The housing body 20 has an elongated shape with a rectangular cut-out portion 22. To one long side of the cut-out portion is a first leg 23 of the housing body, and to the opposite long side of the cut-out portion 22 is a second leg consisting of a lower and upper portion 24a-24b, separated by opening 25, said opening giving access to the central cut-out portion 22. Upper portion 24b of the second leg is connected by top portion 26 with first leg 23, to form a hook-shaped upper part of the housing body. At the opposite side to top portion 26, an opening 27 is provided, configured to receive a connecting piece for the Bowden cable (see further). Along a part of the legs 23,24 and extending until the opening 27, the body 20 has a recessed portion 28, arranged in a U-shape around a central protrusion 29. This recess 28 is configured to receive the slider 11 (as shown in fig 1b). The housing cover (fig. 2b) has a shape which corresponds to the shape of the housing body, and is configured to fit onto the body, and be secured by rivets through openings 30,31 so as to form a hook-shaped connector, with the slider arranged between the body 20 and the cover 21.

[0026] Figure 3 shows the slider 40, which is a U-shaped steel piece with upstanding legs 41 and 42 of rectangular cross-section, connected to a bottom section 43, the slider being shaped to fit into the recessed portion 28 of the housing body 20. Figure 4 shows the two extreme positions of the slider inside the housing: open (fig. 4a) and closed (fig. 4b). In the closed position, the slider's right leg 42 closes off the access to the central cut-out portion 22. Openings 46,47 are provided for connection of the slider to pull cable 49, also which runs throughout the centre of the Bowden cable 6. The pull cable 49 is inserted through opening 47, and blocked by a screw according DIN 914 inserted into side opening 46. In this way, when one slider is moved into the closed position in one of the two connectors, it pulls the other slider into the open position and vice versa. A connection piece 60 is arranged in opening 27, for establishing a connection between each connector 4,5 and a cable portion 6a,6b respectively, while allowing the passage of the pull cable 49. Details of this connection piece 60 in the preferred embodiment are given further in this description.

[0027] Turning back to figure 2, the housing body has a through-bore 32 situated in the vicinity of the central protrusion 29. Through-bore 32 contains a ball and spring plunger 12 or similar type of locking mechanism (preferred embodiment has a ball according to Norm DIN 1.3541) configured to block the position of the slider at two positions, defined by corresponding holes 44 and 45 in one of the slider's legs. The spring force exerted by the ball and spring plunger type device should be sufficient to prevent the climber from moving the slider by hand from the open or closed position. Apart from the ball and plunger mechanism, the pull cable 49 itself forms an obstruction against manually moving the slider away from its closed position. As stated, cable 49 is a 'pull' cable, not a 'push-pull' cable, i.e. the cable's material and thickness are not designed to allow it to act as a pushing rod, capable of pushing the slider of an open connector into its closed position. If the closed slider is pushed down by hand from its closed position of fig. 4b, the pull cable may bend slightly and will then obstruct any further movement of the slider, but it will not be pushed into the hollow cable 6. So even if it is possible for the climber to move the slider over a short distance from its closed position (fig. 4b), thereby releasing the ball and plunger mechanism, the pull cable 49 obstructs any significant movement of the slider.

[0028] In order to close one connector and open the other connector, the climber must use an actuator 50 (fig. 5), provided on the rope. In figure 1, such an actuator is placed on the right-hand side of the anchor point 3. The actuator is fitted onto the rope, and comprises an elongated rectangular-shaped upper portion 51 extending above the rope and comprising a permanent magnet 52 of cylindrical shape, fitted into an opening which extends through the complete width of the upper portion. Possibly, two permanent magnets are used having a thickness corresponding to half the width of the upper portion 51. A detailed view of the actuator is shown in in figure 5. It comprises a lower grip portion 53, and a groove 54, extending along the length of the upper portion 51. At the front of the upper portion, the actuator has a conic shape, hereafter referred to as the nose 55 of the actuator. The groove 54 is configured to fit closely onto the rope, so that the actuator may be mounted in a stable way onto the rope. Holes 57 and 58 may be provided through the whole of the upper portion 51 and to one side of the groove 54, to allow the insertion of pins which secure the

actuator onto the rope. The opening 56 is configured to receive the permanent magnet 52 in a close-fitting way. According to the preferred embodiment, the magnet is a neodymium supermagnet. The housing 10 and actuator 50 may be produced from AlMgSi0.5 while the slider may be produced from steel St37 (S235JR). The actuator may equally be configured to be attached to an anchor point, such as the post 3 shown in figure 1, for example when such a post form the end of a rope course.

[0029] The operation of the opening and closing of the connectors will now be described in more detail, with reference to figures 6a to 6c. As shown in figure 6a, the open connector 4 is placed over the actuator 50, preferably by hooking the connector on the rope 2 and sliding it over the nose 55 of the actuator. Then the connector is moved upward, so that the magnet 52 is brought into the vicinity of the slider 40. As soon as the magnetic force is exerted on the slider, the connector moves into the position shown in figure 6b, in which the magnet 52 is located between the upstanding legs of the slider, thereby forming a closed magnetic circuit, and thus gripping the slider with a force sufficient to move it out of the ball and plunger lock 12. According to the preferred embodiment, the magnet is configured to produce a gripping force of approximately 50N. Further according to a preferred embodiment, the height of the actuator's top portion 51 is such that in the position of figure 6b, the slider is already pulled out of its 'open' position over a distance d. At the same time, the slider of the other connector is moved over the same distance out of the closed position, which is however insufficient to remove the connector from the rope. So at this intermediate point, both connectors are closed.

[0030] In order then to effectively close and secure the first connector 4, the climber pulls it down over the actuator with sufficient force to pull the slider into the closed position, and pull the permanent magnet 52 out of the closed circuit, and into the position shown in figure 6c, wherein the slider is secured and blocked by the ball and plunger mechanism 12. At the same time, the slider of the second connector is fully opened by the action of the Bowden cable, and equally secured by its own ball and plunger mechanism. When the connector 4 is in the closed position of fig. 6c, it is impossible to open the connector by using the actuator. When the actuator is again inserted into the cut-out portion of the closed connector (see fig. 6d), the magnetic circuit is closed regardless of the position of the magnet between the upstanding legs. In other words, it is impossible to grip the slider and move it back towards the open position. This movement can only be actuated by closing the other connector 5.

[0031] In order to remove the now closed connector 4 from the actuator, the climber slides it off in the opposite direction from the actuator nose. The climber then uses the actuator again to close the second connector 5 and open the first 4, so that it is always the first connector (seen in the direction of travel), that is open.

[0032] In the belay set of the invention, at any time during use of the belay set, one connector is closed and blocked, while the other is open. The open connector can be taken off the rope without first using an opening mechanism. As the open connector is visibly open, it is immediately clear to the climber which connector is open en which one is blocked. The closing of an open connector requires the simple and straightforward action of hooking the connector onto the actuator and pulling it down over the actuator. No insertion of a connector into a keyhole or socket is necessary. This increases the ease of use of the belay set. At the same time, the blocking mechanism ensures that the climber cannot open a connector in an inappropriate way. The use of a permanent magnet ensures that a reliable non-electrical means is always available for securing the belay set by a magnetic force.

[0033] A further advantage of the preferred embodiment shown in figure 1 is the fact that no other connection is provided between the connectors 4 and 5, apart from the Bowden cable 6. This means that it is the Bowden cable itself which carries the weight of a climber in case of a fall. For this purpose, the cable and especially its attachment to the connectors 4 and 5 must be able to withstand high loads. An embodiment is described hereafter including the choice of materials and dimensions of the cable 6 and connection pieces 60, which ensures a suitable attachment strength. The specified dimensions (in mm) and materials do not form a limitation to the inventive scope. According to this embodiment, the cable 6 is made from a 10mm diameter 6X36 wound stainless steel cable, comprising in the centre a 7X7 stainless steel cable of 2mm diameter. All steel qualities are AISI316. Figure 7 shows a detail of the connection piece 60 already referred to with reference to figure 4. Connection piece 60 is a cylindrically symmetrical element with a base section 61 of a first diameter, a middle section 62 of a second diameter, and a top section 63 of a third diameter, wherein the middle section has the smallest diameter of the three. Opening 27 in the housing 20 has a corresponding profile, so as to fit the connection piece 60 firmly into the housing (see figure 4). Housing cover 21 has a rectangular slit 33 for receiving the top portion 61 (see fig. 2b). The hollow interior 64 of the connection piece 60 has a constant diameter, except for side portions 65 and 66 having a conically expanding diameter. Each end of the hollow cable is attached to a connection piece 60 by inserting the cable from right to left into the connection piece 6, as seen in figure 7, until the cable protrudes from the left-hand conical side portion 65, and by soldering between the outer surface of the cable and the inner surface of said conical side portion 65. Preferably silver solder is used. The opposite conical portion 66 serves as a way of protecting the cable from damage at this location when the cable bends with respect to the connection piece 60.

[0034] Connection element 7 shown in figure 1 comprises a hollow U-shaped portion 7a, and a plate element 7b attached to the U-shaped portion and provided with a hole 8, to be connected to the climber's waist. The cable

6 runs through the U-shaped portion 7a and is welded to the ends of the U-shaped portion, so that the connection element 7 forms a central fixed support point on the Bowden Cable. In this way, the climber is secured at all times by a cable portion extending between one connector 4 or 5 and the central connection element 7.

Claims

1. A self-belay set (1) comprising two connectors (4,5) and a cable (6), the connectors being attached respectively to both ends of said cable (6), said cable being connectable to a climber, each of the connectors comprising a hook-shaped housing (10) and a steel slider (40) movably arranged inside said housing, the slider being movable between an open position wherein the connector can be hooked onto or unhooked from a rope (2) or bar, and a closed position, wherein the connector is closed around said rope or bar, the self-belay set comprising an interaction means between both connectors, configured so that when one connector is in the open position, the other is in the closed position, and so that a movement of one slider with respect to its housing causes an opposite movement of the other slider,
characterized in that the slider (40) and the housing (10) are provided with blocking means (12,49) for preventing the sliders from being moved out of the open or closed position except by hooking the open connector onto an actuator (50), said actuator comprising at least one permanent magnet (52), configured to exert a magnetic gripping force on the slider, said gripping force being sufficient to move the slider out of the open position and into the closed position, when the connector is displaced with respect to the actuator.

2. Belay set according to claim 1, wherein the slider (40) is a U-shaped steel component comprising a base (43) and upstanding legs (41,42), the legs pointing upward when the connector is hooked onto a horizontal rope (2), and wherein the housing (10) comprises a corresponding recessed portion (28) in which the slider is movable between the open and closed positions, and wherein the permanent magnet(s) (52) extend(s) over the entire width of the actuator (50), so that it may be placed in between the upstanding legs of the slider when the connector is hooked onto the actuator, thereby exerting said magnetic gripping force on the slider, said force being sufficient to move the slider out of the open position and into the closed position, when the connector is pulled downward with respect to the actuator.

3. Belay set according to claim 1 or 2, wherein said interaction means between the connectors (4,5) is formed by said cable (6), and wherein said cable (6) comprises a hollow outer cable and an inner pull cable (49) attached to the sliders (40), and wherein, apart from said cable (6), no other load-bearing connection is present between the first and second connector (4,5).

4. Belay set according to claim 3, wherein said cable (6) is fixed to a connection element (7), located in a central position of the cable, said connection element (7) being attachable to the climber.

5. Belay set according to any one of claims 1 to 4, wherein said blocking means (12) are provided in the form of a ball and plunger type locking device, arranged in the connector housing (20), and located so as to cooperate with two bore holes (44,45) provided in the slider surface, one bore hole defining the open position, the other defining the closed position of the slider.

6. Belay set according to any one of claims 3 to 5, wherein each connector (4,5) comprises a connection piece (60), arranged for attaching the cable (6) to the connector, said connection piece being a hollow cylindrical element comprising a base section (61) of a first diameter, a middle section (62) of a second diameter, and a top section (63) of a third diameter, wherein the middle section has the smallest diameter of the three, said sections defining a profile of the connection piece, and wherein the housing (10) of each connector (4,5) comprises an opening (27) with a profile corresponding to the profile of said connection piece (60), so that the connection piece fits closely into said opening, and wherein said cable (60) is inserted through said connection piece (6) from the outer side of the connector to the inner side of the connector, and welded to said connection piece at the inner side.

7. Actuator (50) for use in combination with a belay set according to any one of claims 1 to 6, said actuator being configured to be attached to a rope, a bar, or an anchor point (3), the actuator comprising a top portion (51), extending above the rope or bar when the actuator is attached to said rope or bar, and wherein the permanent magnet(s) (52) is (are) arranged in a bore hole (56) extending through the complete width of said top portion (51), the length of the magnet(s) (52) corresponding to the width of the top portion (51).

8. Actuator according to claim 7, wherein the height of the top portion (51) is such that when the open connector is first brought into contact with the actuator, and before the connector is pulled downward, the slider (40) is pulled - by magnetic force - out of the open position over a part (d) of the distance between open and closed positions, said part (d) being suffi-

cient to partially close one connector and partially open the other connector, so that neither of the connectors can be detached by the climber.

9. A climbing equipment set comprising a at least one belay set (1) according to any one of claims 1 to 6 and at least one actuator (50) according to claim 7 or 8.

10. A method for moving along a horizontal rope (2) comprising a fixed anchor point (3), from a first side of the anchor point to the second side, an actuator (50) according to claim 7 or 8 being attached to the rope on said second side, with the help of a belay set (1) according to any one of claims 1 to 6, the method comprising the steps of:

- hooking the open connector (4) onto the actuator (50),
- moving the open connector (4) into a position so as to grip the slider (40)
- pulling the connector (4) downwards so as to move the slider (40) upwards inside the connector housing (10), until it is secured in the closed position, thereby securing the other connector (5) into the open position,
- sliding the now closed connector (4) over the actuator (50), thereby removing the connector (4),
- closing the now open connector (5) by the same interaction with the actuator (50), thereby again opening the first connector (4).

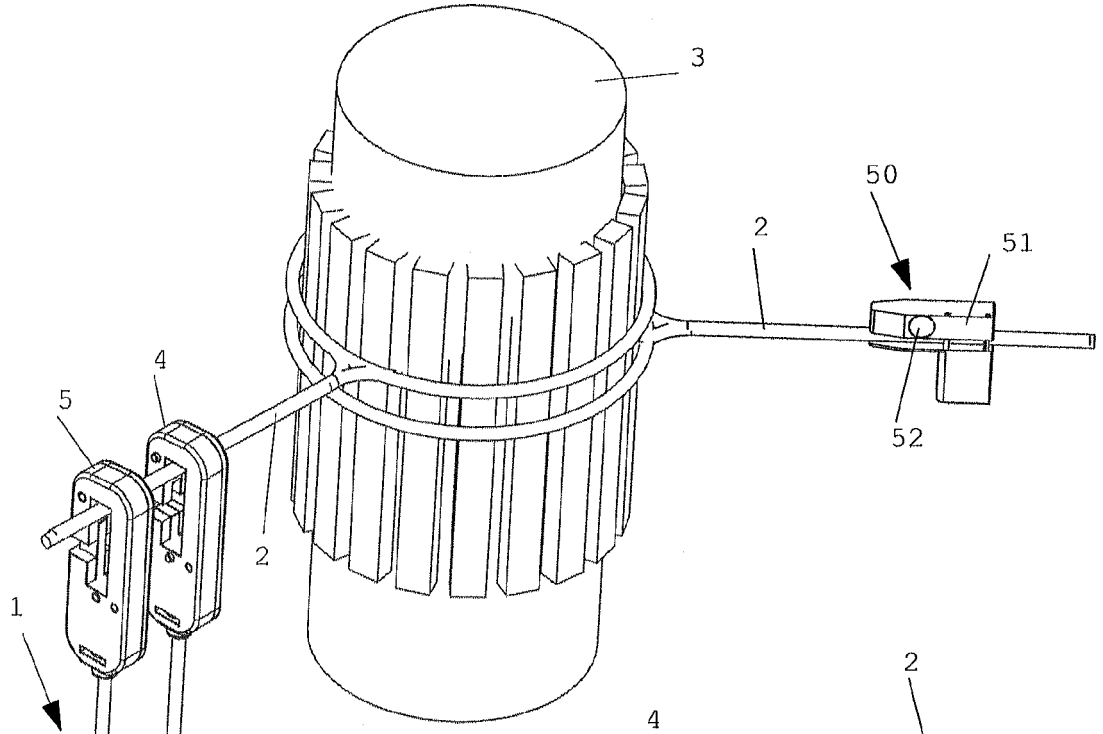


FIG. 1a

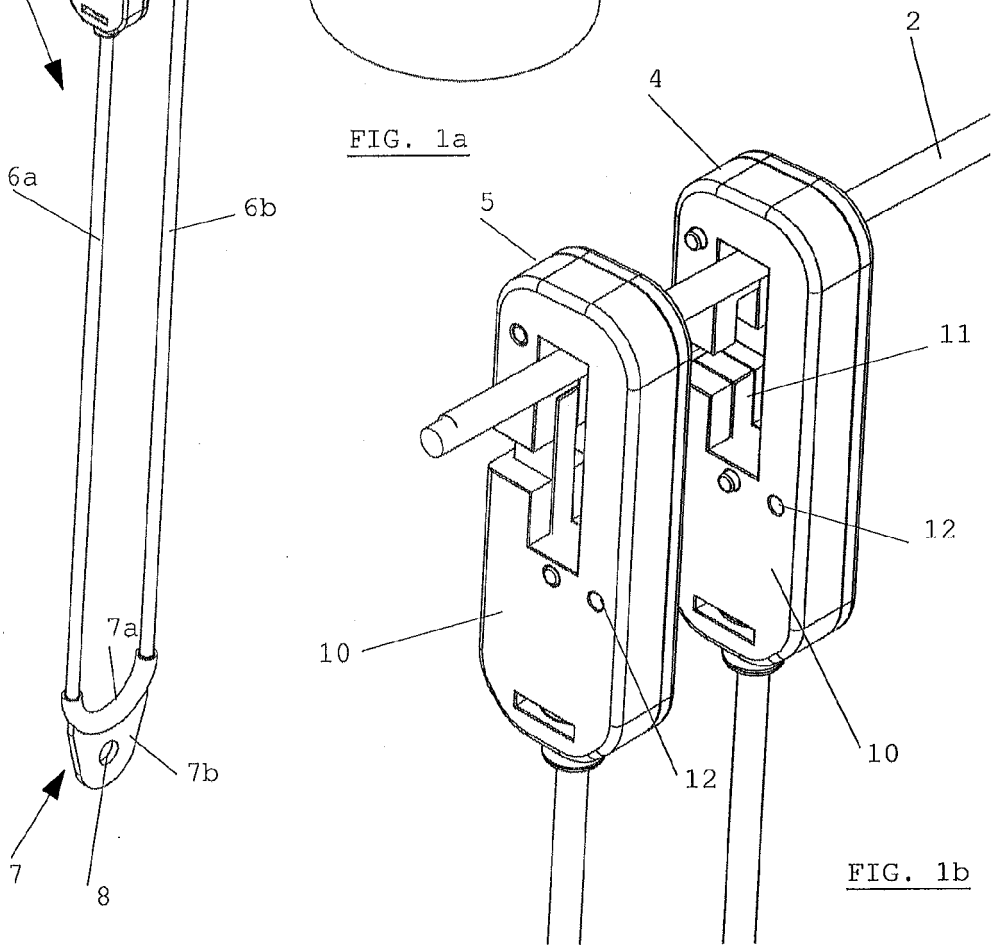


FIG. 1b

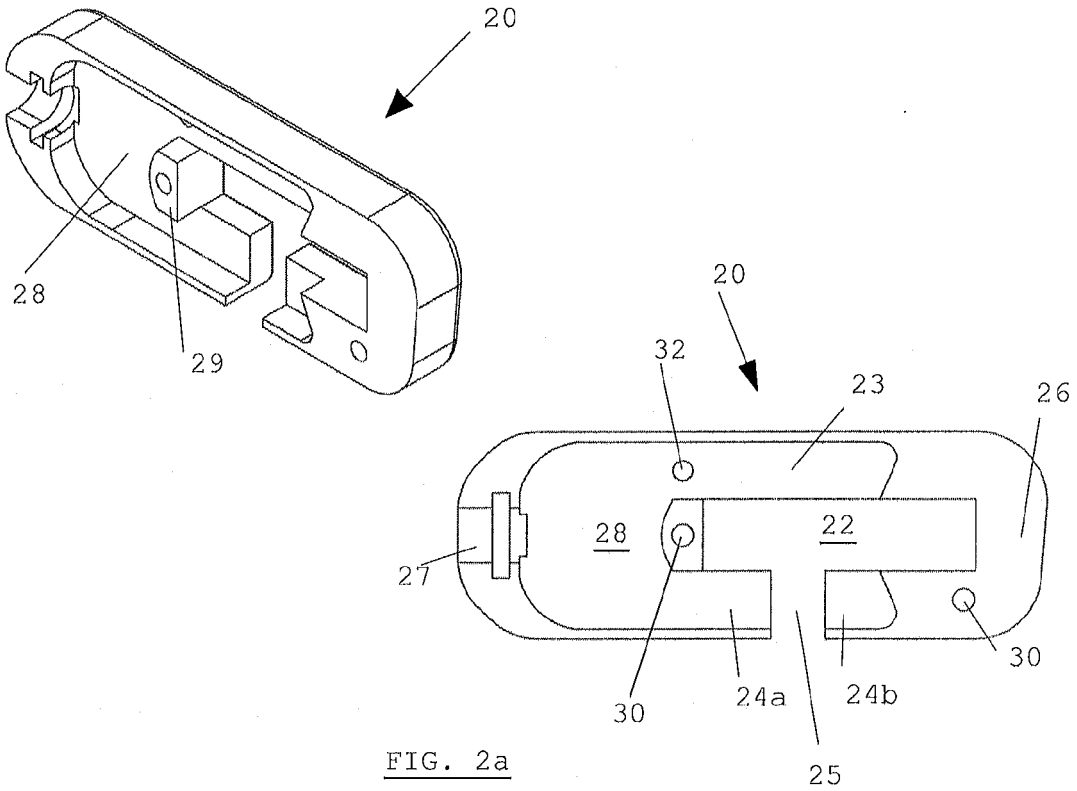


FIG. 2a

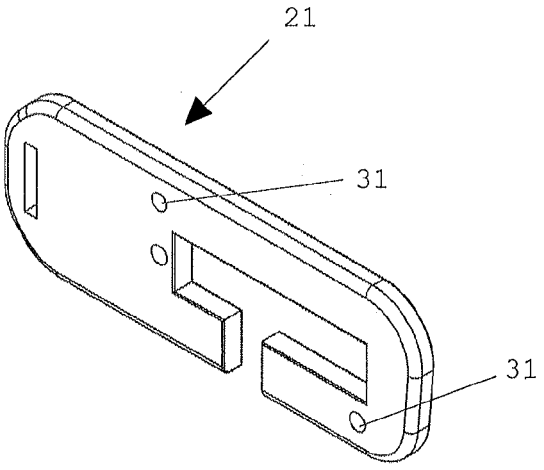


FIG. 2b

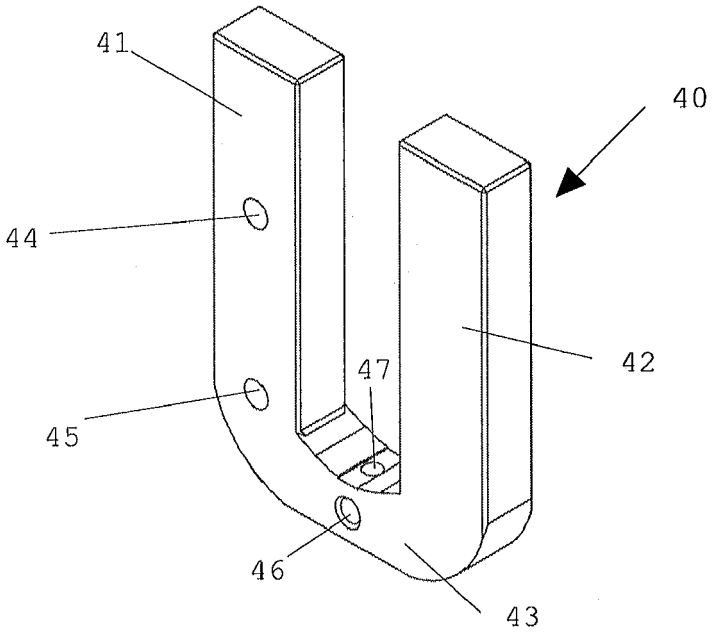


FIG. 3

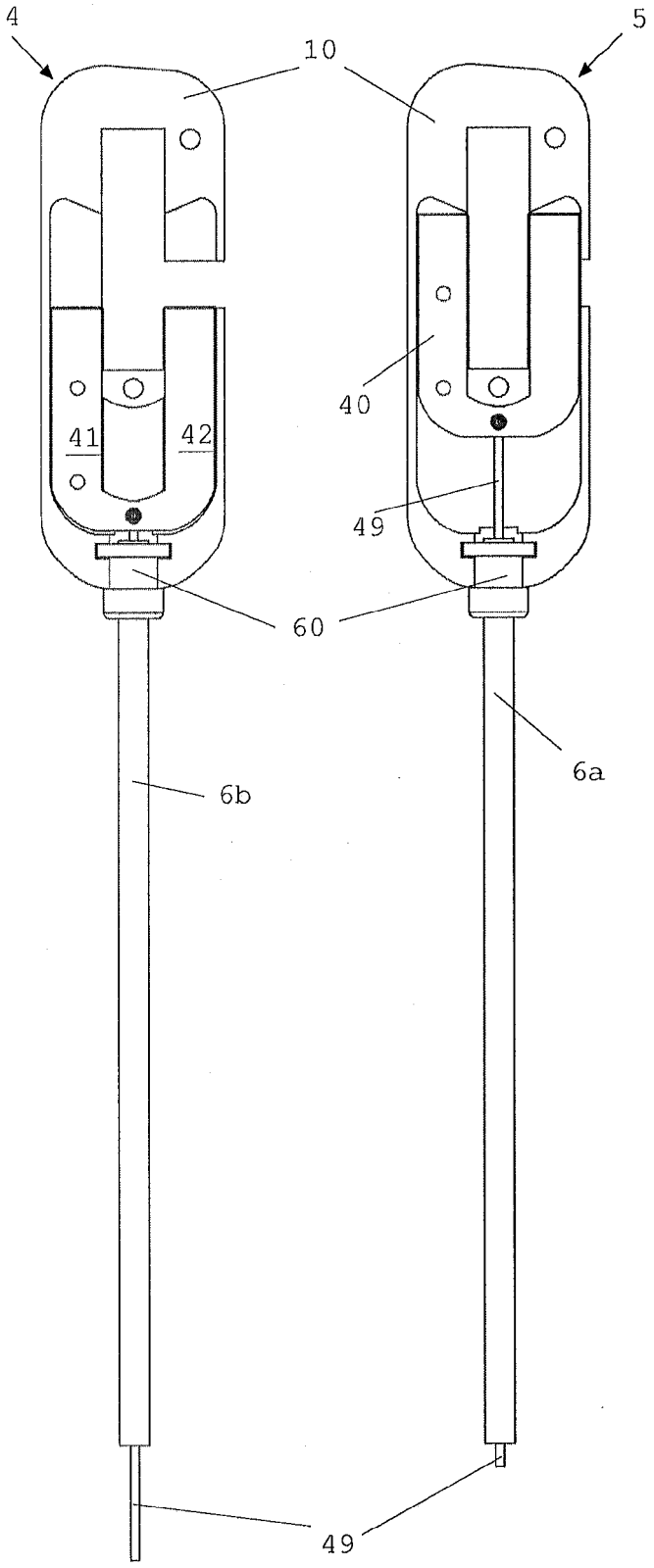


FIG. 4a FIG. 4b

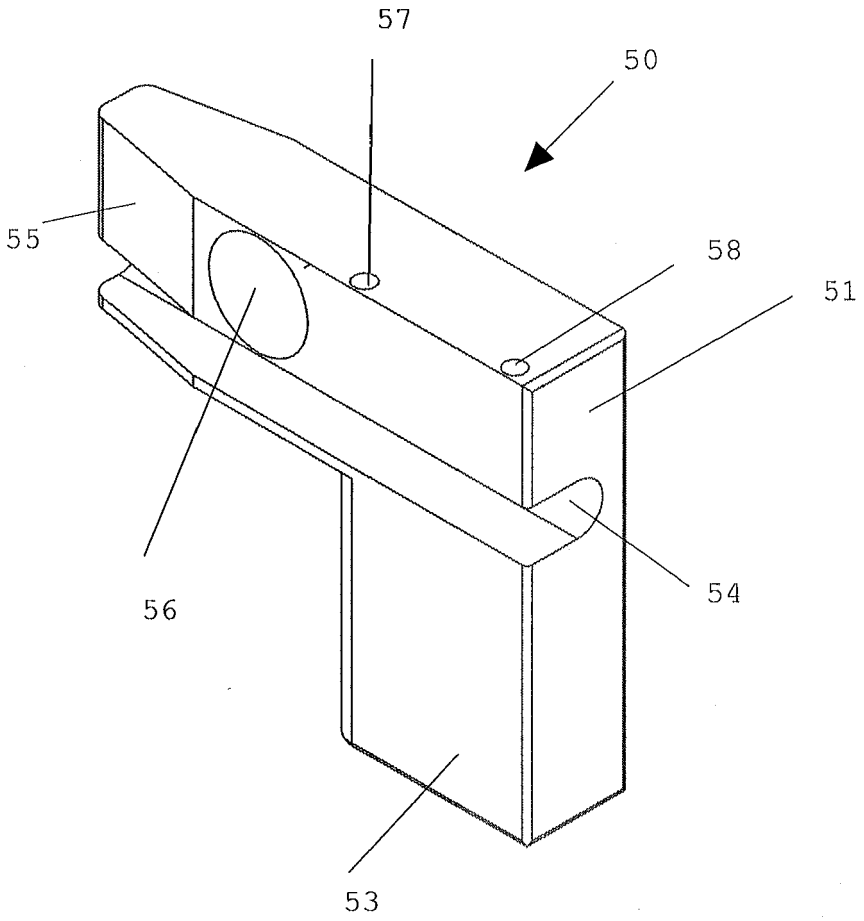


FIG. 5

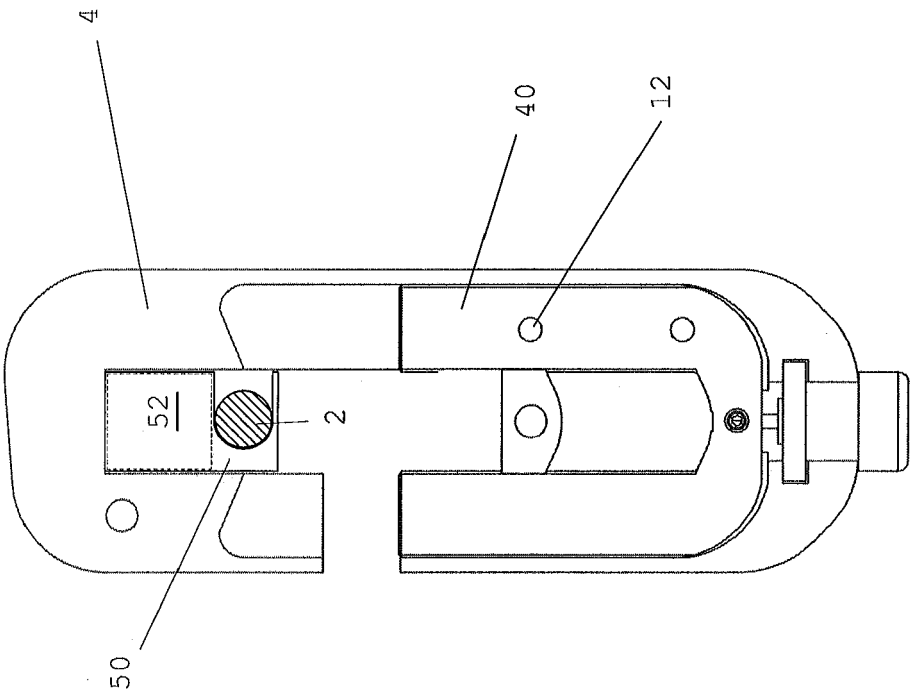
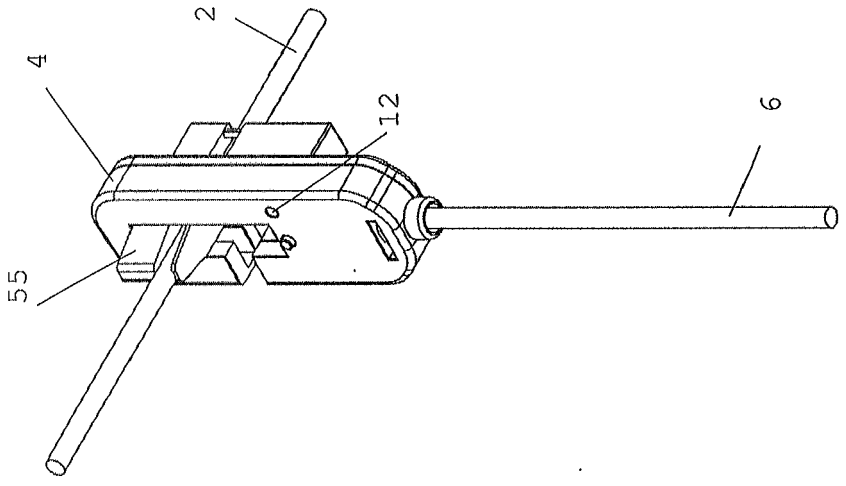


FIG 6a



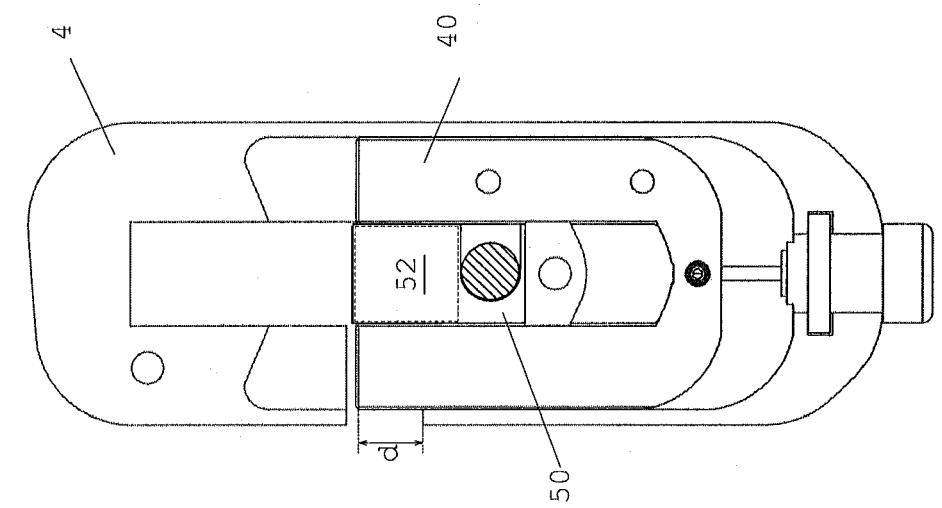
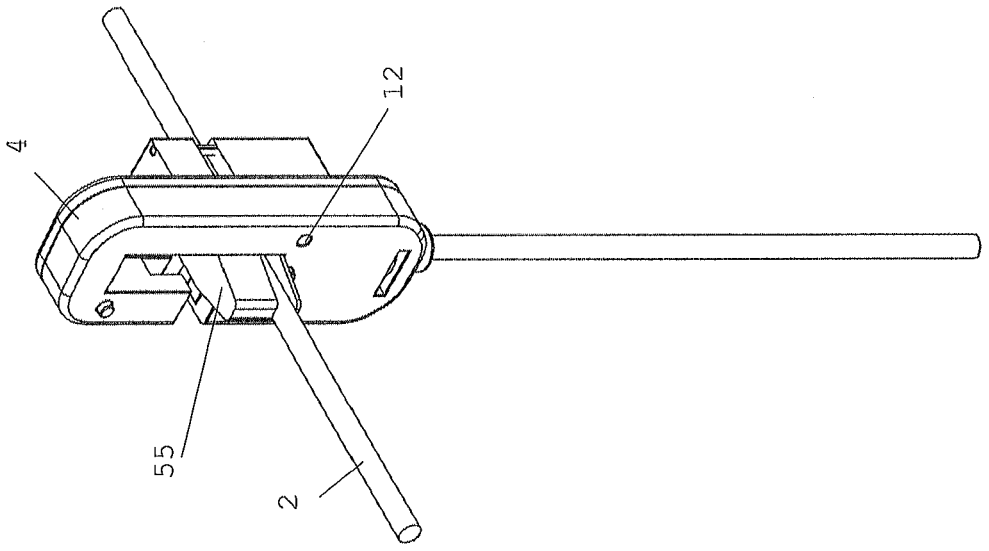


FIG. 6b



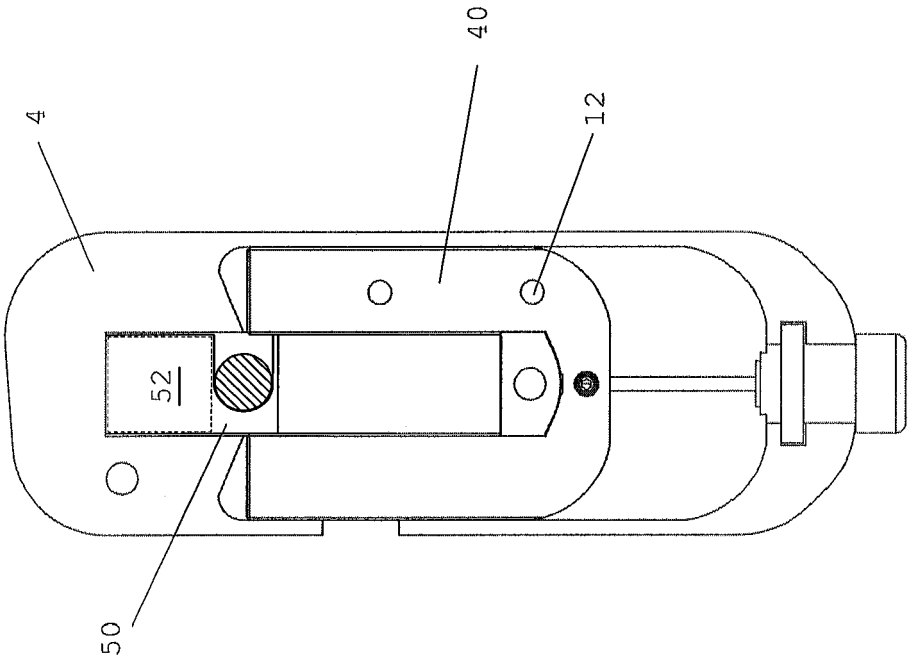
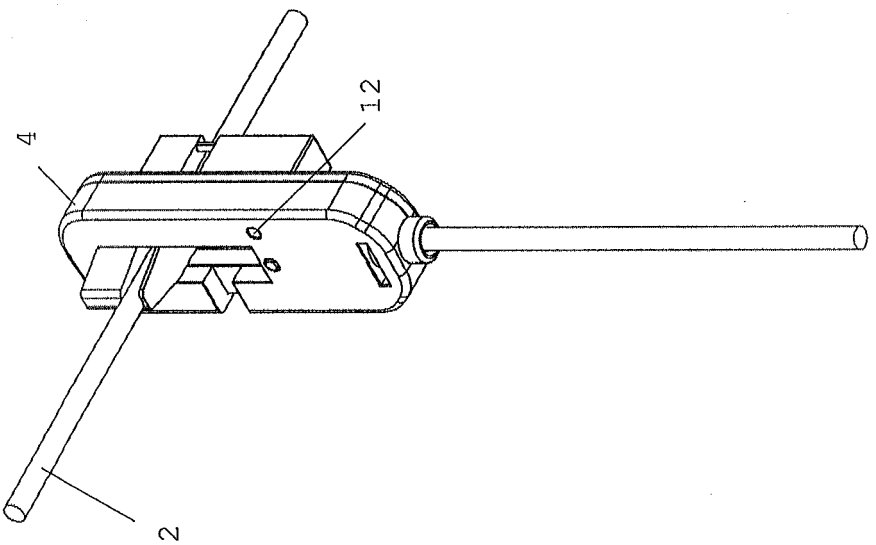


FIG. 6c



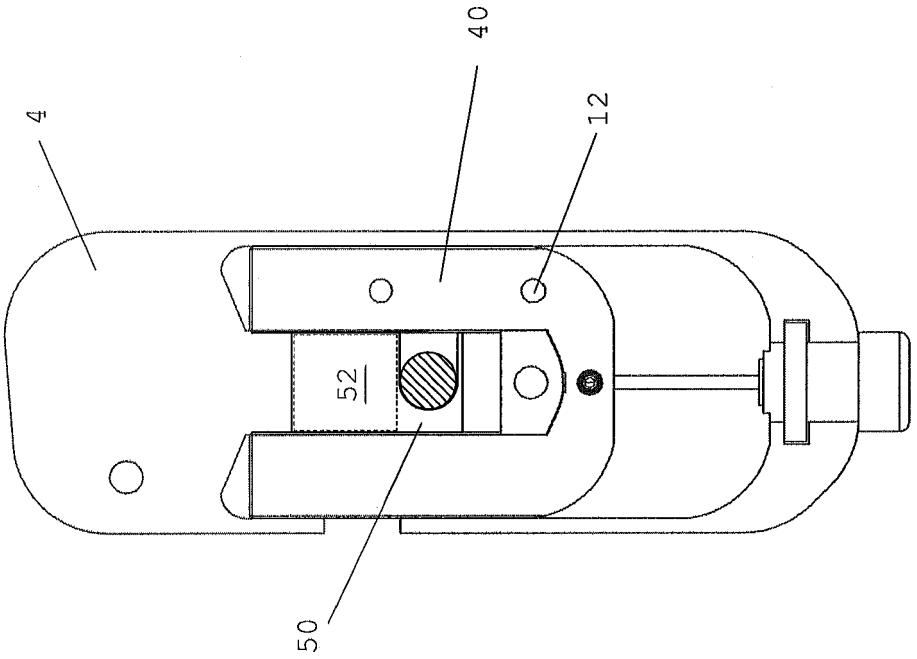
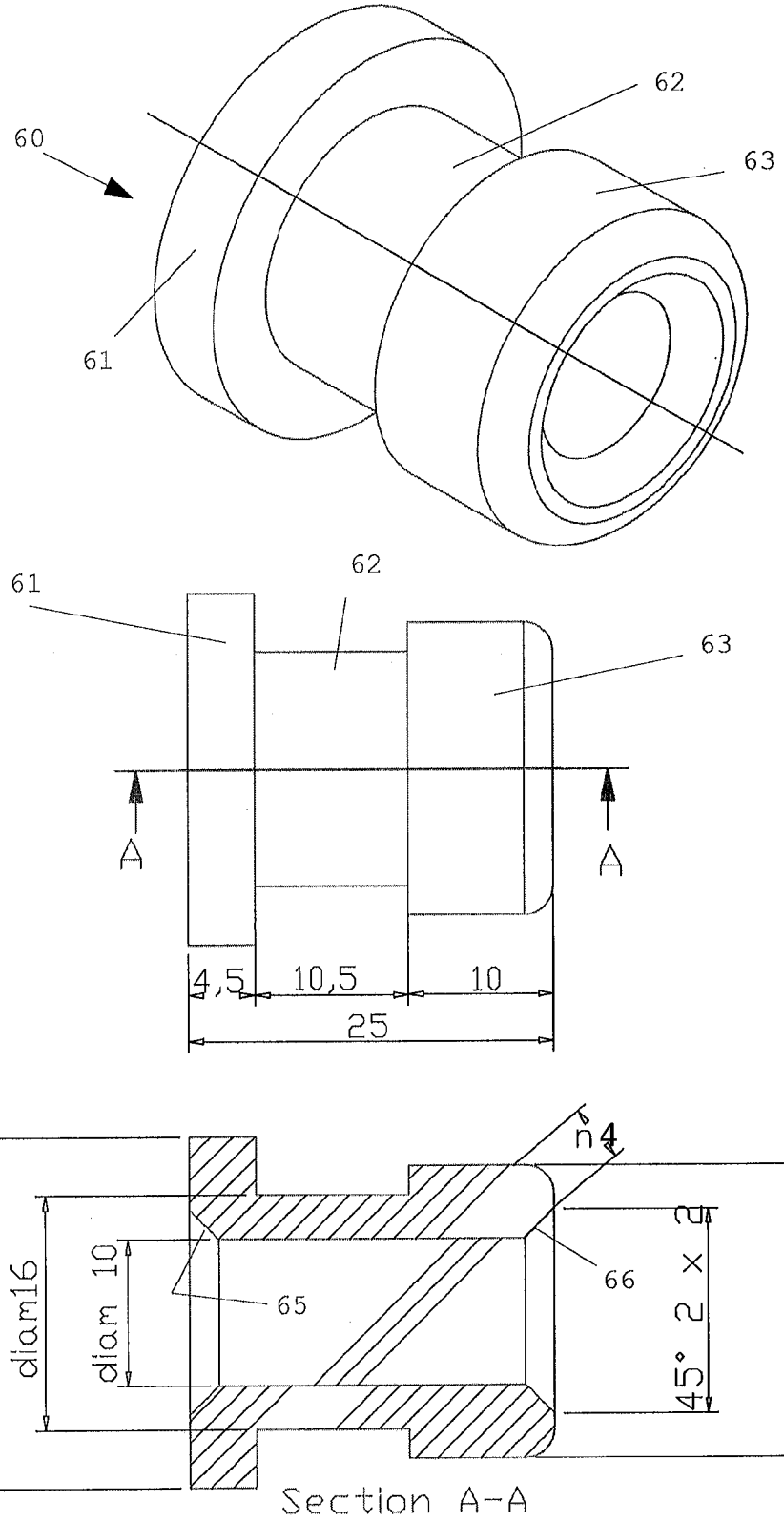


FIG. 6d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4,5
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10
25
n4
diam 24
diam16
diam 10
65
66
45° 2 x 2
diam 20
Section A-A

FIG. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 09 17 3795

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A62B
E04G
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E06C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 January 2010	Vervenne, Koen

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3

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