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DEVICE FOR ANCHORING AN OPERATOR TO A HEIGHT WORK STRUCTURE, AS WELL AS AN AERIAL BUCKET COMPRISING SUCH AN ANCHORING DEVICE

Abstract

The anchoring device (**100**) comprises a housing (**110**), provided with a means (**113**) of fastening to the height work structure, and a linkage member (**120**), provided with a fastener (**122**) which can be hooked by a lanyard (**40**) to be attached to the operator. The linkage member is movably mounted on the housing along a direction of movement (X**120**) to move between a retracted configuration. in which the fastener is arranged within an internal volume of the housing to prevent hooking by the lanyard, and an extended configuration in which the fastener is arranged outside the internal volume so that it can be hooked by the lanyard and. once the fastener is hooked by the lanyard. the housing interferes with the lanyard to prevent the linkage member from returning to the retracted configuration. The position of the linkage member in the direction of movement is detected by at least one position sensor (**151, 152**) arranged in the internal volume.

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Background/Summary

[0001] The present invention relates to a device for anchoring an operator to a height work structure. It also relates to an aerial bucket with such an anchoring device.
[0002] The field of the invention is, in general, the safety of operators working at height, in particular operators on board an aerial bucket.
[0003] When an operator is working at height, the operator is usually attached by a safety lanyard to the height work structure, such as the platform of an aerial bucket. This way, in case of a fall, the operator remains suspended from the structure. At the operator, one end of the lanyard is typically attached to a harness or vest or safety belt that the operator wears around their body. The opposite end of the lanyard is to be anchored to the height work structure, by means of an anchoring device to which the invention relates.
[0004] A rudimentary approach is for the end of the lanyard, typically with a carabiner, to be directly attached to the height work structure. This solution is effective if it is actually hooked on. However, it has been observed that some operators do not hook it on, for the sake of convenience or because they are not aware of the safety rules.
[0005] In response to this problem, “intelligent” anchoring devices have been developed in recent years which detect whether a lanyard is attached to them and, if not, issue warning signals or even inhibit certain associated aerial bucket commands. However, these existing anchoring devices are complex and/or impractical, and are thus ill-suited to the generally dirty and demanding working conditions on construction sites. These anchoring devices are also sometimes dependent on one or more specific parts, which makes them very restrictive in use. Furthermore, they are unable to avoid being “fooled” by an unscrupulous operator, for example by allowing a false end to be easily attached, such as the end of a lanyard whose other end is not attached to the operator.
[0006] U.S. Pat. No. 9,149,670 B1 discloses an anchoring device for an aerial bucket, comprising an anchoring part which forms a fastener for the carabiner of a lanyard and which, in the embodiment of FIGS. **12** and **13** of U.S. Pat. No. 9,149,670 B1, is provided so as to be vertically movable relative to a fixed housing between two extreme positions, respectively retracted and extended relative to this fixed housing. This anchor acts mechanically, either directly or via a linkage device, on a hydraulic valve that controls the supply of fluid to the hydraulic system of the aerial bucket.
[0007] The purpose of the present invention is to provide a new anchoring device which, while being simple and robust, is practical and effective in detecting whether an operator is properly anchored.
[0008] To this end, the invention relates to a device for anchoring an operator to a height work structure, such as a platform of an aerial bucket, the anchoring device being as defined in claim **1**.
[0009] One of the ideas behind the invention is not to seek to directly detect a lanyard that can be hooked to the anchoring device, but to detect, in relation to a housing that can be fixed to the height work structure, the position of a linkage member that can be hooked by the lanyard and that can move between the inside and the outside of the housing in a predetermined direction of movement.

The invention provides for the linkage member to move between a retracted and an extended configuration by moving it in the aforementioned direction. In the retracted configuration, the linkage member is so arranged inside the housing that the housing prevents access to a fastener of the linkage member, which is provided for hooking the lanyard. In the extended configuration, the aforementioned fastener is positioned sufficiently outside the housing to make it accessible to be hooked by the lanyard. Once the lanyard is hooked to the fastener in this way, the housing and lanyard mechanically interfere with each other to prevent the linkage from returning to the retracted configuration. In practice, the embodiment of the fastener is not restrictive, nor is that of the end part of the lanyard to be attached to this fastener, so that this end part may in particular take the form of any conventional carabiner. Likewise, the means of the anchoring device according to the invention, by which the housing is attached to the height work structure, is adaptable to any type of structure. In any case, the retracted fastener is not at risk of being damaged or accumulating dirt since it is largely or entirely protected inside the housing. In addition, once the operator has moved the linkage member into the extended configuration and hooked the lanyard to that linkage member, the operator does not have to worry about additional handling of the anchoring device according to the invention, while being assured that the anchoring device is effectively retaining the linkage in the extended configuration as long as the lanyard remains hooked thereto. The invention also provides for the position of the linkage member to be monitored by one or more position sensors: as explained in more detail below, the signal emitted by this or these position sensor(s) is advantageously processed to determine the correct anchoring of the operator, in particular to check that the operator present on the height work structure has actually moves the linkage member into the extended configuration to hook their lanyard thereto and to determine whether the operator has not fallen or whether they are neither inanimate nor attempting to “fool” the anchorage device by attaching a substitute for the lanyard to which the operator is to be attached. Also as will be explained below, the anchoring device in accordance with the invention advantageously makes it possible to emit warning signals in the event of non-anchoring or poor anchoring, and to do so directly to the operator or to personnel in the vicinity of the height work structure, for example in the form of sound or light signals, and/or to a remote data processing system, which uses the corresponding information for various purposes.
[0010] It should be noted that the anchoring device in accordance with the invention is applicable to any height work structure, for example to a scaffold.
[0011] However, the invention has a preferential application in the field of person lifting machines. The invention further relates to an aerial bucket as defined in claim **16**. In practice, this aerial bucket is understood in a broad sense, both in terms of the nature of its lifting structure and its possible capacity for translation on the ground, as explained in detail below.
[0012] Additional advantageous features of the anchoring device according to the invention are specified in the other claims.

Description

[0013] The invention will be better understood upon reading the following description, given only as an example, and with reference to the drawings, in which:
[0014] FIG. **1** is a perspective view of a lifting device according to the invention;
[0015] FIG. **2** is an elevation view of a platform of the aerial bucket of FIG. **1**, equipped with an anchoring device in accordance with the invention, according to a first embodiment;
[0016] FIG. **3** is a schematic and partially perspective view of the anchoring device of FIG. **2**, shown alone;
[0017] FIG. **4** is an elevation view of only one part of the anchoring device of FIG. **3**;
[0018] FIG. **5** is a partial view in plane V of FIG. **3**,

[0019] FIGS. **6** to **8** are views similar to FIG. **5**, illustrating respectively different states of use of the anchoring device according to the first embodiment;
[0020] FIG. **9** is a view similar to FIG. **3**, illustrating a second embodiment of the anchoring device according to the invention, shown in partial cross-section;
[0021] FIG. **10** is a partial cross-section in plane X of FIG. **9**,
[0022] FIG. **11** is a partial cross-section in plane XI-XI of FIG. **10**,
[0023] FIGS. **12** to **14** are views similar to FIG. **10**, respectively illustrating different states of use of the anchoring device according to the second embodiment, these states of use being respectively similar to those of FIGS. **6** to **8**.
[0024] FIG. **1** shows an aerial bucket **1** that allows one or more operators to reach a high area to carry out work there.
[0025] The aerial bucket **1** has a chassis **10** that rests on the ground.
[0026] In this example, the chassis **10** rests movably on the ground and is therefore provided with wheels **11** for its translation on the ground. Alternatively, not shown, all or some of the wheels **11** are replaced by tracks. More generally, the wheels **11** are only examples of the ground translation members, which are fitted to the chassis **10**. Regardless of the specific features of these ground translation members, the chassis **10** is advantageously designed to be self-propelled so that it can move on the ground by itself. Alternatively, rather than being self-propelled, the aerial bucket **1** is designed to be towed or pushed to move it on the ground.
[0027] Alternatively, the chassis **10** rests on the ground in a fixed manner by means of suitable fixed support members.
[0028] In any case, the aerial bucket **1** comprises a platform **20**, otherwise known as a basket, which is designed for the operator using the platform to stand on. The platform **20** is thus designed to accommodate this operator, as well as, if necessary, one or more other persons and/or equipment, in order to carry out work at height. As shown in more detail in FIG. **2**, the platform **20** comprises a floor **21**, on which the operator stands and which extends horizontally when the aerial bucket **1** is placed on level ground. The platform **20** also includes a guardrail **22**, which rises from the floor **21** surrounding the platform and is intended to prevent people from falling off the platform. Furthermore, the platform **20** is advantageously provided with a control panel **23** allowing the operator on board the platform **20** to control the movement of the chassis **10** on the ground and/or to control the operation of a lifting structure **30** of the aerial bucket **1**, supporting the platform **20**.
[0029] The lifting structure **30** is arranged on the chassis **10** in such a way that the platform **20** can be moved at least in height relative to the frame. To this end, in the example of the design considered in FIG. **1**, the lifting structure **30** comprises a turret **31**, which rests on the chassis **10** and which is rotatable relative thereto about an axis of rotation extending perpendicularly to the ground, and an arm **32**, which connects the turret **31** to the platform **20** and which is deployable so as to move the platform **20** closer to or further from the turret **31**, in particular upwards and laterally to the turret. The design of the turret **31** is not limiting. Similarly, the embodiment of the arm **32** is not limiting, it being noted that the term “arm” used here is understood in a broad sense and thus corresponds to an elongated mechanical structure, including several arm elements that are movable relative to each other, in particular in an articulated and/or telescopic manner, for the purpose of deploying this mechanical structure.
[0030] More generally, the embodiment of the lifting structure **30** is not limiting as long as, by moving parts of this lifting structure in relation to each other and/or in relation to the chassis **10**, the positioning of the platform **20** in relation to the chassis **10** is modified in a corresponding manner, the platform **20** thus being controlled in movement, via the lifting structure **30**, by the operator using the aerial bucket **1**, in particular from the platform **20** by means of the control panel **23**. Thus, in variants not shown, the lifting structure **30** may be without the turret **31** and/or comprise, or even consist of, a scissor lifting mechanism.
[0031] Whatever the specific features of the aerial bucket **1**, it comprises a safety system, by which

the operator on board the platform **20** is attached thereto, and which thus enables the operator to work safely with regard to the risk of falling. As shown schematically in FIG. **2**, this safety system comprises a lanyard **40** by which the platform **20** and the operator on board that platform are connected to each other. The lanyard **40** has two ends **41** and **42** which are opposite each other in the longitudinal direction of the lanyard **40**. The lanyard **40** also has a rope **43** directly connecting the ends **41** and **42** to each other.

[0032] The end **41** of the lanyard **40** is intended to be attached to the operator, typically via a clothing accessory **50** worn by the operator and surrounding the operator's body. The clothing accessory **50** is for example a vest, a harness, a belt or a shoulder strap. In practice, the specifics relating to the end **41** of the lanyard **40** and the clothing accessory **50** are not limiting.

[0033] The end **42** of the lanyard **40** is intended to be attached to the platform **20** via an anchoring device **100** which will be described in more detail in relation to FIGS. **3** to **8**. According to a practical embodiment, the end **42** of the lanyard **40** comprises a hooking element, such as a conventional carabiner **44**, which allows the lanyard **40** to be hooked to the anchoring device **100** and whose embodiment is not restrictive as long as it can mate with the anchoring device **100**, as will be explained below.

[0034] As can be seen in FIGS. **3** to **5**, the anchoring device **100** comprises a housing **110** which, in the example embodiment considered in the Figures, includes a main shell **111** and a cover **112** fixedly attached to the main shell **111**. In practice, the housing **110** is advantageously made of a material resistant to shocks and, more generally, to the conditions of use on construction sites, this material being preferably metallic, for example aluminium-based.

[0035] The housing **110** is adapted to be attached to the platform **20**, in particular to dedicated anchor points of the latter, located for example on the guardrail **22**. To this end, the housing **110**, in particular its main shell **111**, is provided with a fastening means **113**, typically mechanical. In the illustrated embodiment, the fastening means **113** has a through-hole **114** for receiving a locking ring **60** that permanently holds the housing **110** onto the platform **20** unless the locking ring **60** is removed and released. The fastening means **113** thus allows the housing **110** to be attached to the platform **20** by an intermediate locking element, such as the locking ring **60** or such as a lifeline along which a ring is freely movable. It is understood that such an intermediate locking element makes the anchoring device **100** adaptable to any embodiment of the platform **20**. Alternatively, and not shown, the housing **110** is attached directly to the platform **20**, with an adapted form of the fastening means **113** and/or dedicated fittings of the platform **20**. In all cases, the fastening means **113** advantageously makes it possible, if necessary in cooperation with the aforementioned intermediate locking element, to retain the housing **110** with respect to the platform **20** in a secure manner, while allowing the positional adjustment of the housing **110** with respect to the platform **20** so that the anchoring device **100** is oriented substantially in the direction in which the stresses exerted by the lanyard **40** on the anchoring device **100** are exerted.

[0036] The housing **110** forms an internal volume V**110**. Here, this internal volume V**110** is delimited jointly by the main shell **111** and the cover **112**. As can be seen from FIGS. **4** and **5**, the internal volume V**110** advantageously includes two compartments V**110**.**1** and V**110**.**2**, each of which is bounded jointly by the main shell **111** and the cover **112**. For reasons that will become apparent later, the housing **110** closes off the compartment V**110**.**1** completely, except for a passage **115** that connects the compartments V**110**.**1** and V**110**.**2** to each other. Furthermore, the housing **110** partially closes the compartment V**110**.**2** and, in the embodiment considered in the figures, includes for this purpose two walls **116** and **117**, which belong respectively to the main shell **111** and to the cover **112** and which are arranged opposite each other, delimiting between them the compartment V**110**.**2**.

[0037] Regardless of the specifics of the housing **110**, the anchoring device **100** also comprises a linkage member **120** which participates in mechanical connection between the housing **110** and the lanyard **40**. The linkage member **120** is mounted on the housing **110** so as to be movable along a direction of movement X**120**. In a practical and economical embodiment, which is implemented in the example shown in the figures, the linkage member **120** is movable relative to the housing **110** in translation along a geometric axis which corresponds to the direction of movement X**120**.

[0038] In the embodiment considered in the figures, the linkage member **120** comprises an elongated body **121** which, as clearly visible in FIGS. **4** and **5**, extends lengthwise along the direction of movement X**120**. This elongated body **121** is arranged inside the internal volume V**110** of the housing **110**, extending both into the compartment V**110.1**, into the compartment V**110.2** and in the passage **115** in which the elongated body **121** is advantageously received in a complementary manner so as to guide the linkage member **120** in movement along the direction of movement X**120**. To this end, the passage **115** is advantageously delimited by a bearing **118** fixedly integrated onto the housing **110**, in particular onto its main shell **111**.

[0039] Regardless of the design of the elongated body **121**, the linkage member **120** also comprises a fastener **122** that can be hooked onto the lanyard **40**, more precisely onto the end **42** of this lanyard. Here, the fastener **122** is carried on one of the two opposite longitudinal ends of the elongate body **121**.

[0040] In a preferred embodiment, the fastener **122** comprises, or even, as shown here, consists of a ring, the inner opening of which forms a hooking zone for the end **42** of the lanyard **40**, in particular for the carabiner **44**, as illustrated in FIGS. **6** to **8**. This ring is advantageously carried by the body **121** in a pivoting manner about a geometric axis Y**122** which extends both tangentially to the ring and perpendicularly to the direction of movement X**120**. This being the case, more generally, the embodiment of the fastener **122** is not limiting since, by means of the movement of the linkage member **120** along the direction of movement X**120**, the linkage member **120** switches reversibly between: [0041] a retracted configuration, which is shown in FIGS. **3** to **5** and in which the fastener **122** is at least partially, if not totally, arranged inside the internal volume V**110** of the housing **110** so that the housing **110** renders the fastener **122** inaccessible to prevent that fastener from being hooked by the lanyard **40**, and [0042] an extended configuration, which is shown in FIGS. **2** and **6** to **8** and in which the fastener **122** is at least partially arranged outside the internal volume V**110** so that the housing **110** leaves the fastener **122** accessible for hooking by the lanyard **40**, in particular by the end **42** of thereof, and, once the fastener **122** is hooked by the lanyard **40**, the housing **110** interferes with the lanyard **40** to prevent the linkage member **120** from returning to the retracted configuration.

[0043] It is understood that, in both the retracted and extended configurations, the position of the linkage member **120** relative to the housing **110** along the direction of movement X**120** is not unique. On the contrary, when the linkage member **120** is in the retracted configuration, this linkage member **120** occupies a position with respect to the housing **110** along the direction of movement X**120** from among a continuous set of positions in which the fastener **122** is insufficiently extracted from the internal volume V**110** of the housing **110** to allow the lanyard **40**, in particular the carabiner **44** of the end **42** of that lanyard, to be hooked to that fastener **122**. Likewise, when the linkage member **120** is in the extended configuration, this linkage member occupies a position with respect to the housing **110** along the direction of movement X**120** from among a continuous set of positions in which the fastener **122** is sufficiently extracted from the internal volume V**110** of the housing **110** to hook the lanyard **40**, in particular the carabiner **44** of the end **42** thereof, onto that fastener **122**. FIGS. **6**, **7** and **8** illustrate three different respective positions of the linkage member **120** in the extended configuration

[0044] In the embodiment considered in the figures, the fastener **122** is housed in the compartment V**110.2** and is completely covered by the walls **116** and **117** of the housing **110** when the linkage member **120** is in the retracted configuration, as is clearly visible in FIGS. **3** and **5**. Thus, when the linkage member **120** is in the retracted configuration, the housing **110** protects the fastener **120**, while leaving the fastener **120** free to be extracted from the compartment V**110.2** when the linkage member **120** has moved from the retracted configuration to the extended configuration.

[0045] Advantageously, the anchoring device **120** comprises a resilient member **130**, typically a spring, which acts on the linkage member **120** so as to return that linkage member from the extended configuration to the retracted configuration. In practice, the resilient member **130** is for example interposed, along the direction of movement X**120**, between the housing **110** and the elongated body **121** so as to be compressed when the linkage member **120** is moved from the retracted configuration to the extended configuration, as is clearly visible by comparing FIG. **5** with FIGS. **6** to **8**. In any case, the resilient member **130** tends to move the linkage member **120** into the retracted configuration and to keep it there. In order to move the linkage member **120** from the retracted configuration to the extended configuration, it is necessary to overcome the resistance of the resilient member **130**.

[0046] To facilitate the manipulation of the linkage member **120** in order to move same from the retracted configuration to the extended configuration, the linkage member **120** is advantageously provided with a gripping element **123** which emerges outside the internal volume V**110** when the linkage member is in the retracted configuration. This gripping element **123** is only shown schematically, in dotted lines, in FIG. **5**, so as not to encumber the other figures. In practice, this gripping element **123** comprises or consists of a flexible tongue which is permanently attached to the linkage member **120**, in particular to its fastener **122**. In any case, when the linkage member **120** is in the retracted configuration, the user of the anchoring device **100** can easily take hold of the gripping element **123** and pull thereon to displace the linkage member **120** along the direction of movement X**120**, until the linkage member is in the extended configuration where the user has access to the fastener **122** in order to hook the lanyard **40** thereto.

[0047] In a particularly advantageous optional arrangement, the linkage member **120** is carried by the housing **110** not directly, but via a mechanism **140** which releasably connects the linkage member **120** and the housing **110**. As can be seen from FIGS. **4** and **5**, this mechanism **140** here comprises a mechanical fuse **141**, the breaking of which causes the mechanism **140** to switch from an unbroken state, shown in FIGS. **2** to **7**, to a broken state, shown in FIG. **8**. The mechanism **140** also comprises a support **142** which is mounted on the housing **110** so as to be movable along the direction of movement X**120**, being housed in the internal volume V**110**, in particular in the compartment V**110.1**. The support **142** carries the linkage member **120** and is connected to it by the mechanical fuse **141**. In the unbroken state of the mechanism **140**, the mechanical fuse **141** kinematically connects the linkage member **120** and the support **142** to each other along the direction of movement X**120**, between two opposite extreme positions between which the linkage member **120** is movable relative to the housing **110** along the direction of movement X**120**, namely a first functional position, which is illustrated in FIGS. **3** to **5** and which is occupied by the linkage member in the retracted configuration, and a second functional position, illustrated in FIG. **7**, which is occupied by the linkage member **120** in an extended configuration and in which the support **142** is brought into abutment along the direction of movement X**120** against the housing **110**, in particular against an internal shoulder **119** thereof. It is understood that in FIG. **6**, the linkage member occupies an intermediate position between the first and second functional positions. In the broken state of the mechanism **140**, the linkage member **120** is freely movable along the direction of movement X**120** relative to the support **142** so that the linkage member **120** in the extended configuration is movable relative to the housing **110** along the direction of movement X**120** between the aforementioned second functional position and a dysfunctional position, which is illustrated in FIG. **8** and which is further from the aforementioned first functional position than the second functional position. In the dysfunctional position, the linkage member **120** is brought into abutment in the direction of movement X**120** against the housing **110**, in particular against the internal shoulder **119**, so as to effectively retain the linkage member **120** relative to the housing **110**. The mechanical fuse **141** is designed to break, thereby moving the mechanism **140** from the unbroken state to the broken state, when the linkage member **120** in the second functional position is urged towards the dysfunctional position with a force above a predetermined threshold.

This predetermined threshold is, for example, 1000 Newton or, more generally, is chosen between 500 and 2000 Newton. More generally, the predetermined threshold is dimensioned not to be crossed when the anchoring device **100** is manually manipulated by a user for the purpose of reversibly hooking the fastener **122** by the lanyard **40**; at the same time, the predetermined threshold is crossed when an operator, attached to the platform **20** via the lanyard **40** and the anchoring device **100**, falls from the platform **20** or is subjected to a strong ejection force outward from the platform **20**.

[0048] The mechanism **140** thus makes it possible, outside of a situation where the operator falls off, to limit the travel of the linkage member **120** with respect to the housing **110** in the direction of travel X**120** to the distance between the aforementioned first and second functional positions, while making it possible, when the operator falls off, to cause the linkage member **120** to overtravel with respect to the housing **110**, beyond the second functional position, before coming up against the housing **110** and thus being retained thereby.

[0049] Of course, other embodiments than the one related to the mechanical fuse **141** and the support **142** are possible for the mechanism **140**. In any case, the anchoring device **100** advantageously incorporates a visual indicator to indicate, on the outside of the housing **110**, that the mechanism **140** has switched into the broken state and thus that the anchoring device **100** should no longer be used in this state.

[0050] In any case, the anchoring device **100** comprises one or more position sensors, which detect(s) the position of the linkage member **120** relative to the housing **110** along the direction of movement X**120** and which output(s) a position signal which is representative of this position of the linkage member **120**. According to a preferred embodiment, which is both practical and efficient, being adapted to the field of work at construction sites, and which is implemented in the embodiment considered in the figures, two such position sensors are provided, being referred to **151** and **152** in the figures, and each corresponding to a Hall effect sensor. These Hall effect position sensors **151** and **152** are here carried by the same printed circuit board **150** and measure the variation of the magnetic field generated by a permanent magnet **160** which is fixedly carried by the linkage member **120**: as is clearly visible by comparing FIGS. **5** to **8**, during the movement of the linkage member **120** in the direction of movement X**120** with respect to the housing **110**, in particular between the first functional position and the aforementioned dysfunctional position, the magnet **160** scans, at a distance, the position sensors **151** and **152**, the position of the magnet **160** being more specifically detected by the position sensor **151** when the linkage member **120** is between the aforementioned first and second functional positions, whereas the position of the magnet **160** is more specifically detected by the position sensor **152** when the linkage member **120** is between the aforementioned second functional position and dysfunctional position. However, according to an alternative variant not shown, the Hall effect position sensors **151** and **152** are replaced by a set of mini-switches, which are distributed along the direction of movement X**120** and which are scanned in contact by an actuator fixedly carried by the linkage member **120**. More generally, the position sensor(s) of the anchoring device **100**, such as the Hall effect position sensors **151** and **152**, can be embodied in a variety of ways, being active sensors as well as passive sensors, emitting a position signal which can be either analogue or digital, and/or be either contactless or contacting.

[0051] Whatever the design of the position sensor(s) **151** and **152**, they are arranged inside the internal volume V**110** of the housing **110**, advantageously being housed in the compartment V**110.1**. The position sensor(s) **151** and **152** are thus effectively protected by the housing **110**. The sealing of the arrangement of the position sensor(s) **151** and **152** inside the housing **110** is advantageously reinforced by any appropriate means. In this regard, in one practical embodiment, which is implemented in the example shown in the figures, the printed circuit board **150** is sealed in a waterproof case **170** which is fixedly carried by the cover **112** of the housing **110**.

[0052] In order to evaluate the position signal emitted by the position sensor(s) **151** and **152**, the

anchoring device **100** comprises a processing unit **180** which is connected to the position sensor(s) in such a way that it can process the position signal. In practice, the processing unit **180** is electronic in nature, in the sense that it comprises electronic components, analogue and/or digital, enabling the implementation of the processing steps which will be detailed below.
[0053] As illustrated schematically in FIG. **3**, the processing unit **180** is preferably dissociated from the housing **110**, which, among other things, limits the size of the housing **110** and also has practical and economic advantages. The processing unit **180** is thus connected to the housing **110** by an electrical cable **190**, which ensures the transmission of the position signal emitted by the position sensor(s) **151** and **152** and which is here connected to the printed circuit board **150**, as schematically indicated by the solid line **171** in FIG. **3**. Not shown in detail in FIG. **3**, this processing unit **180** is arranged in a dedicated cabinet, which is separate from the housing **110** and which is for example fixedly attached to the platform **20**.
[0054] Alternatively, and not shown, the processing unit **180** is fully integrated within the housing **110**, thus avoiding the need for the aforementioned cabinet and may be convenient in certain operating environments. The electronic components of the processing unit **180** are then arranged within the internal volume V**110** of the housing **110**, thus being effectively protected there by the housing **110**. The electronic components of the processing unit **180** are advantageously housed in compartment V**110.1**, where they benefit from the sealing of this compartment and where they are in the immediate vicinity of the printed circuit board **150** to which they are directly connected electrically, in particular for the purposes of transmitting the position signal emitted by the position sensor(s) **151** and **152**, without the corresponding electrical connection having to extend outside the housing **110**.
[0055] Regardless of the design of the processing unit **180**, that unit is connected to an electrical power source **70** which, as shown schematically by the dashed lines in FIG. **3**, ensures the electrical supply of the processing unit **180**, as well as that of the position sensor(s) **151** and **152**, in particular via the processing unit **180** and the printed circuit board **150**, and via the electrical connection between the latter, such as the electrical cable **190**. In practice, the electrical power source **70** may be specific to the anchoring device **100**, or it may be integrated into the lifting platform **1** for the purpose of supplying power to various components of the latter, such as the control panel **23** to which the processing unit **180** is electrically connected in such a case, for example.
[0056] Before describing the various processing steps implemented by the processing unit **180**, it should be noted that, optionally, that unit is, as illustrated schematically in FIG. **3**, advantageously connected to: [0057] warning means **81**, such as an audible and/or light-up alarm, which are activated by the processing unit **180** as a function of the result of the processing carried out by this processing unit, and/or [0058] a wireless communication module **82** that sends data resulting from the processing performed by the processing unit **180** to a remote processing system.
[0059] The warning means **81** are designed to emit warning signals, in particular sound, voice and/or light signals, to the operator on board the platform **20** and/or to personnel in the vicinity of the aerial bucket **1**. In practice, the warning means **81** may be dissociated from both the housing **110** and the cabinet of the processing unit **180**, as illustrated schematically in FIG. **3**, or may be carried by the aforementioned cabinet, or may be integrated into the housing **110**, particularly when the processing unit **180** is totally integrated into the housing **110**.
[0060] In turn, the wireless communication module **82** is designed to transmit said data via a wireless communication protocol capable of reaching said remote processing system, the latter being for example a monitoring centre, server(s), cloud hardware, etc. Again, the wireless communication module **82** may, in practice, be dissociated from both the housing **110** and the cabinet of the processing unit **180**, as schematically illustrated in FIG. **3**, or may be carried by the aforementioned cabinet, or may be integrated into the housing **110**, particularly when the processing unit **180** is totally integrated into the housing **110**.
[0061] The processing unit **180** is adapted to perform a first processing step of determining, from

the position signal, whether the linkage member **120** is in the retracted or extended configuration. In other words, from the position signal emitted by the position sensor(s) **151** and **152**, the processing unit **180** is able to determine whether the linkage member **120** is in the retracted configuration or whether the linkage member **120** is in the extended configuration. In this way, the processing unit **180**, when activated, makes it possible to verify that the operator on board the platform **20** is attached to the platform via the anchoring device **100**. In particular, if this first processing step implemented by the processing unit **180** results in the linkage member **120** being in the retracted configuration, the processing unit **180** concludes that there is a failure to anchor and can then advantageously activate the warning means **81** and/or have the wireless communication module **82** send a corresponding item of data to the aforementioned remote processing system.

[0062] The processing unit **180** is advantageously adapted to also implement a second processing step consisting of determining, from the position signal emitted by the position sensor(s) **151** and **152**, whether the position occupied by the linkage member **120** in the extended configuration is between the aforementioned first and second functional positions, or between the aforementioned second functional position and dysfunctional position. Thus, the processing unit **180**, when activated, makes it possible to verify that the operator on board the platform **20** has not fallen off that platform or been violently ejected from the platform **20**. In particular, if this second processing step by the processing unit **180** results in the linkage member **120** being between the second functional position and the dysfunctional position, the processing unit **180** concludes that the operator has fallen from the platform **20** or has experienced a violent ejection force and may cause the warning means **81** and/or the wireless communication module **82** to emit a distress signal.

[0063] The processing unit **180** is advantageously adapted to also implement a third processing step consisting of processing, together with the position signal emitted by the position sensor(s) **151** and **152**, a presence signal which is representative of the detection of the presence of an operator on the platform **20**. This presence signal is symbolically depicted by the arrow **90** in FIG. **3**. In practice, this presence signal **90** is emitted by a presence detector, which is separate from the anchoring device **100** and whose embodiment is not limiting. It is understood that this presence signal **90** informs the processing unit **180** of the actual presence of an operator on board the platform **20**: the third processing step thus advantageously provides that, in the absence of an operator on the platform **20**, as indicated by the presence signal **90**, the processing unit **180** does not conclude that there is an anchoring fault when the linkage member **120** is in the retracted configuration.

[0064] According to a particularly practical and efficient embodiment, the presence signal **90** is a dead man's signal, i.e. a signal provided by a dead man's equipment with which the platform **20** is equipped, such as a dead man's trigger or a dead man's pedal: in a manner known per se, this dead man's equipment comprises a normally open switch which must be closed to allow the operation of all or part of the aerial bucket from the platform **20**, in particular the activation of the control panel **23**. In the example shown in FIG. **2**, this dead man's equipment is a dead man's pedal **24**. Thus, it is understood that once the operator is on board the platform **20** and needs to use the control panel **23**, the operator must press the dead man's equipment, such as the dead man's pedal **24**, which informs the processing unit **180** of the actual presence of the operator on board the platform **20**, via the presence signal **90**. Furthermore, in addition to ensuring the transmission of the presence signal **90**, a wired link between the dead man's pedal **24** and the processing unit **180** advantageously allows that unit to be supplied with electricity from the dead man's pedal **24**.

[0065] Advantageously, the processing unit **180** is also adapted to perform a fourth processing step of determining that the linkage member **120** is not in an extended configuration without its fastener **122** being hooked to the lanyard **40** attached to a non-inanimate operator. This fourth processing step is implemented by the processing unit **180** from a motion signal **91** which is schematically indicated by a dotted line in FIG. **3**. This motion signal **91** is emitted by an inertial sensor **153** of the anchoring device **100**. This inertial sensor detects movements in the space of the housing **110**, in particular vibrations of the housing **110**, and is for example carried by the printed circuit board

150. In practice, the embodiment of the inertial sensor **153** is not limiting; for example, the inertial sensor **153** is an accelerometer, in particular a six-axis accelerometer. In any embodiment of the inertial sensor **153**, the motion signal **91** emitted by the inertial sensor is representative of the motions detected by the inertial sensor. Furthermore, the processing unit **180** is connected to this inertial sensor **153** so as to be able to process the motion signal **91**, the corresponding transmission of the motion signal being ensured either by the electrical cable **190** as schematically illustrated in FIG. **3**, or by a direct electrical connection when the processing unit **180** is totally integrated inside the housing **110**. The fourth processing step mentioned above is based on the ability of the processing unit **180** to exploit, by means of ad hoc calculations, the motion signal **91** in order to conclude that the housing **110** is connected, via the linkage member **120**, to an active, i.e. non-inanimate person. In particular, the processing unit **180** is able to conclude from the motion signal **91** that the housing **110** is "too" stationary to be connected to a non-inanimate person, which may be the case both when the operator on board the platform **20** is inanimate, and when the operator on the platform **20** is trying to "fool" the anchoring device **100** by hooking the fastener **122** to a false end or contrivance substituting for the lanyard **40**, for example a piece of wood wedged across the fastener **122** to securely hold the linkage member **120** in the extended configuration. It is understood that, once the processing unit **180** concludes that the housing **110** is substantially immobile in space while the linkage member **120** is in the extended configuration, the processing unit **180** deduces that the operator on board the platform **20** is inanimate or is attempting to "fool" the anchoring device **100**; similarly to the first processing step described above, the processing unit **180** may then activate the warning means **81** and/or notify the remote processing system via the wireless communication module **82**. In practice, the processing unit **180** implements this fourth processing either exclusively on the basis of the motion signal **91**, or on the basis of two differentiated motion signals, namely the motion signal **91** and another motion signal, issued by an inertial sensor which is distinct from the inertial sensor **153** and which is fixedly attached to the platform **20**, for example by being integrated into the cabinet of the processing unit **180** when that unit is separated from the housing **110**.

[0066] It should be noted that, for at least one or each of the four processing steps described above, the warning signals emitted by the warning means **81** may be modulated in timing, rhythm and/or intensity, specifically between the different processing steps where appropriate. For example, with regard to the warning signals emitted during the first processing step, these warning signals are first triggered according to a first level, in which an audible beep and/or a flashing light is emitted every second for ten seconds, then continue according to a second level, in which an audible beep and/or a flashing light is emitted every 0.5 seconds for ten seconds, and then continue according to a third level, in which an audible beep, stronger than the audible beeps of the first and second levels, and/or flashes of light, stronger than the flashing lights of the first and second levels, are emitted continuously, as long as the linkage member **120** is in the retracted configuration while the processing unit **180** is activated. Of course, the values of number, duration and intensity, which have been given above, are not limiting, but purely illustrative.

[0067] FIGS. **9** to **14** show an alternative embodiment of the anchoring device **100**, which is referenced as **200**.

[0068] The anchoring device **200** comprises a housing **210** which is functionally similar to the housing **110** of the anchoring device **100**. In the embodiment considered in FIGS. **9** to **14**, the housing **210** includes two half-shells **211** and **212**, which are functionally similar to the main shell **111** and the cover **112** of the housing **110** and which are notably fixedly attached to each other.

[0069] Following similar considerations to those detailed above for the fastening means **113**, the housing **210** is provided with a fastening means **213** which comprises a through-hole **214**, which is functionally similar to the through-hole **114** and which is in particular able to receive the aforementioned locking ring **60**, as illustrated in FIGS. **9** to **14**.

[0070] The housing **210** forms an internal volume V**210**, here jointly delimited by the half-shells

211 and **212**. The internal volume V**210** is functionally similar to the internal volume V**110** of the housing **110** and advantageously includes compartments V**210.1** and V**210.2**, which are functionally similar to the compartments V**110.1** and V**110.2** and which are connected to each other by a passage **215** functionally similar to the passage **115**.

[0071] The anchoring device **200** also comprises a linkage member **220**, which is functionally similar to the linkage member **120** and which is here mounted on the housing **210** so as to be movable along a direction of movement X**220**, in particular translational along a geometric axis which corresponds to the direction of movement X**220**.

[0072] The linkage member **220** comprises an elongated body **221**, which is functionally similar to the elongated body **121** and which is here arranged within the internal volume V**210**, extending both into the compartment V**210.1**, in the compartment V**210.2** and in the passage **215** in which the elongated body **221** is advantageously received in a complementary manner so as to guide the linkage member **220** in a movable manner along the movement direction X**220**. To this end, the passage **215** is advantageously delimited, here in part, by a guide washer **218** fixedly attached to the housing **210**.

[0073] In any embodiment, the linkage member **220** comprises a fastener **222** which is functionally similar to the fastener **122** of the anchoring device **100**. In the embodiment illustrated in FIGS. **9** to **14**, the fastener **222** is carried by one of the two opposite longitudinal ends of the elongated body **221** and comprises a ring whose internal opening forms a hooking zone for the end **42** of the lanyard **40**, in particular for the carabiner **44**, as illustrated in FIGS. **12** to **14**. In practice, the aforementioned ring of the fastener **222** is mounted on the elongated body **221** either in a fixed manner or in a freely rotatable manner about a geometric axis corresponding to the direction of movement X**220**.

[0074] In any case, the linkage member **220** is designed to switch reversibly between retracted and extended configurations, which are functionally similar to the retracted and extended configurations respectively defined above for the linkage member **120** of the anchoring device **100**. The linkage member **220** is thus in a retracted configuration in FIGS. **9** to **11**, where the fastener **222** is advantageously housed in the compartment V**210.2**, being completely covered by walls **216** and **217** of the housing **210**, which belong to the half-shells **211** and **212** respectively. The linkage member **220** is in the extended configuration in FIGS. **12** to **14**, which illustrate three different respective positions of the linkage member **220** in the extended configuration and in which the fastener **222** is hooked to the lanyard **40**, in particular to the carabiner **44** of the end **42** of that lanyard **40**.

[0075] The anchoring device **200** also comprises a resilient member **230** which is functionally or even structurally similar to the resilient member **130** of the anchoring device **100**. In the example illustrated in the Figures, the resilient member **230** is arranged around the elongated body **221**, being centred on a geometric axis corresponding to the direction of movement X**220**, and is interposed, along the direction of movement X**220**, between the housing **210**, in this case the guide washer **218**, and the linkage member **220**, in this case with the interposition of a sleeve **224** attached to the elongated body **221**, so that the resilient member **230** is compressed when the linkage member **220** is moved from the retracted configuration to the extended configuration, as can be seen by comparing FIG. **10** with FIGS. **12** to **14**. Here, the elastic member **230** comprises or consists of a spring which abuts against the guide washer **218** and against the sleeve **224**.

[0076] The linkage member **220** is advantageously provided with a gripping element **223** which is functionally or even structurally similar to the gripping element **123**, this gripping element **223** being visible in FIGS. **9** and **10**, but not being shown in FIGS. **12** to **14**.

[0077] Unlike the linkage member **120**, the linkage member **220** is carried directly by the housing **210**, but with the advantageous integration of an overtravel spring **240** which makes it possible, outside a situation where the operator falls, to limit the travel of the linkage member **220** relative to the housing **210** in the direction of travel X**220** to the distance between first and second functional

positions which are respectively similar to those defined above for the linkage member **120**, while allowing, when the operator falls off, the linkage member **220** to travel over a distance relative to the housing **210**, beyond the second functional position, until the linkage member **220** reaches a dysfunctional position, which is similar to that defined above for the linkage member **120** and in which the linkage member **220** abuts against the housing **210** and is thus retained thereby. More precisely, the overtravel spring **240** is interposed, along the direction of movement X**220**, between the linkage member **220**, here with the interposition of a sleeve **225** fixedly attached to the elongate body **221**, and a stop mounted on the linkage member **220** so as to be movable in the direction of movement X**220**, this stop being formed here by the aforementioned sleeve **224** on which the resilient member **230** acts. As long as the overtravel spring **240** is not compressed, it kinematically binds the linkage member **220** and the aforementioned stop, formed here by the sleeve **224**. Thus, without compression of the overtravel spring **240**, the linkage member **220** can be moved relative to the housing **210** in the direction of movement X**220** between two extreme positions which are opposite each other, namely the aforementioned first functional position, which is illustrated in FIGS. **9** to **11** and which is occupied by the linkage member **220** in the retracted configuration, and the aforementioned second functional position, which is illustrated in FIG. **13** and which is occupied by the linkage member **220** in extended configuration. In the second functional position, the aforementioned stop, formed here by the sleeve **224**, is pressed against the housing **210**, here against the guide washer **218**. In FIG. **12**, the linkage member **220** in the extended configuration occupies an intermediate position between the first and second functional positions. By compressing the overtravel spring **240** and thereby resiliently deforming it in the direction of movement X**220**, the linkage member **220** in the extended configuration can be moved relative to the housing **210** in the direction of movement X**220** between the second functional position and the aforementioned dysfunctional position, illustrated in FIG. **14**, which is further away from the first functional position than the second functional position and in which the sleeve **225** is here brought into abutment along the direction of movement X**220** against the housing **210**, here against the guide washer **218**. The overtravel spring **240** is adapted to be compressed when the linkage member **220** in the second functional position is urged towards the dysfunctional position with a force greater than a predetermined threshold, the value of which is selected according to considerations similar to those detailed above for the force threshold relating to the mechanism **140** of the anchoring device **100**.
[0078] In practice, it is understood that, in the embodiment considered in FIGS. **9** to **14** where the resilient member **230** acts on the sleeve **224** forming the aforementioned stop, the overtravel spring **240** is much stiffer than the spring belonging to or constituting the resilient member **230**. Of course, other arrangements than the one detailed above are possible for the overtravel spring **240** and its associated stop, within the anchoring device **200**.
[0079] Compared to the mechanism **140** of the anchoring device **100**, the overtravel spring **240** and its associated stop thus enable the same overtravel function to be performed for the linkage member **220** when an operator, attached to the platform **20** via the lanyard **40** and the attachment device **200**, falls off the platform **20** or is subjected to a powerful ejection force out from the platform **20**. Unlike the mechanism **140**, the actuation of the overtravel spring **240** is reversible and therefore does not damage the overtravel spring or its associated stop.
[0080] In the embodiment shown in FIGS. **9** to **14**, the fact that the linkage member **220** is carried directly by the housing **210** is used to enhance the guidance of the linkage member **220** relative to the housing **210** along the direction of movement X**220**. Here, as is clearly visible in FIG. **11**, it is thus provided that the sleeve **225** integral with the elongated body **221** cooperates by guided contact with dedicated arrangements of the housing **210**, such as tracks **219** of the housing **210**, which each extend in the direction of movement X**220**, being distributed around this movement axis, and on which the sleeve **225** slides while being centred on the movement axis X**220**.
[0081] In any case, the anchoring device **200** further comprises one or more position sensors that

are functionally or even structurally similar to the position sensors **151** and **152** of the anchoring device **100**. Thus, following similar considerations to those detailed above for the anchoring device **100**, two such position sensors may be provided, similar to sensors **151** and **152** respectively. In the embodiment considered in FIGS. **9** to **14**, the anchoring device **200** comprises three position sensors, respectively referenced as **251**, **252** and **253**. Here, the position sensors **251**, **252** and **253** are carried on the same printed circuit board **250**, functionally similar to the printed circuit board **150**, and are, for example, Hall effect sensors that measure the variation of the magnetic field generated by a permanent magnet **260** that is fixedly carried by the linkage member **220**. As can be seen from a comparison between FIGS. **10** and **12** to **14**, when the linkage member **220** moves in the direction of movement X**220** relative to the housing **210**, in particular between the aforementioned first functional position and dysfunctional position, the magnet **260** scans the position sensors **251**, **252** and **253** from a distance. The position of the magnet **260** is advantageously detected more specifically by the position sensor **251** when the linkage member **220** is in the first functional position as is clearly visible in FIG. **10**, by the position sensor **252** when the linkage member **220** is between the first and second functional positions as is clearly visible in FIGS. **12** and **13**, and by the position sensor **253** when the linkage member **220** is in the dysfunctional position as is clearly visible in FIG. **14**.
[0082] Regardless of the design of the position sensor(s) of the anchoring device **200**, such as the position sensors **251**, **252** and **253**, such position sensor(s) is/are advantageously arranged inside the internal volume V**210** of the housing **210**, in particular by being housed in the compartment V**210.1**
[0083] The anchoring device **200** further comprises a processing unit **280** which is functionally or even structurally similar to the processing unit **180**, as schematically shown only in FIG. **9**. In particular, following considerations similar to those detailed above in relation to the processing unit **180**, the processing unit **280** can either be dissociated from the housing **210** by means of their connection via an electrical cable **290** similar to the cable **190**, as illustrated schematically in FIG. **9**, or integrated into the housing **210**. In addition, similarly to the processing unit **180**, the processing unit **280** is connected to the electrical power source **70**, the warning means **81** and the wireless communication module **82**. In particular, the processing unit **280** is adapted to carry out the various processing steps detailed above for the processing unit **180**, this aspect of the use of the anchoring device **200** being identical to that of the anchoring device **100**.
[0084] Finally, there are a number of possible developments and variants to what has been described so far. By way of example, the following is a list of various corresponding aspects, which may be considered in isolation with the above or in combination with each other: [0085] rather than the linkage member **120** or **220** being translationally movable relative to the housing **110** or **210**, other kinematics of relative movement between the linkage member and the housing are possible. For example, the linkage member may be provided so as to be pivotable relative to the housing about a pivot axis, the aforementioned direction of movement being peripheral to this pivot axis in such a case. Another example is based on kinematics combining translation and rotation. Of course, the position sensor(s) are adapted accordingly. [0086] Optionally, the processing unit **180** or **280** is advantageously equipped with an external electrical connection port, such as a USB port. Such an external port makes it possible, among other things, to collect data stored in the processing unit, to update the processing steps performed by the processing unit, to configure operating parameters of the processing unit, and/or to activate/deactivate processing steps performed by the processing unit. For example, it is possible to configure the sound and/or visual levels of the warning signals.
[0087] Optionally, a back-up battery may be carried, advantageously in a removable manner, within the anchoring device **100** or **200**, in particular inside the internal volume V**110** or V**210** of the housing **110** or **210** and/or in the cabinet of the processing unit **180** or **280** when that unit is dissociated from the housing **110** or **210**, in order to temporarily maintain the operation of the position sensor(s) **151** and **152** or **251**, **252** and **253** and of the processing unit **180** or **280** in the

event that the power supply from the electrical power source **70** is interrupted. [0088] When the platform **20** is likely to host several operators on board simultaneously, a first possibility consists of providing the anchoring device **100** or **200** only once, by assigning it to a reference operator and providing conventional anchoring elements on board the platform for the other operator(s); in this case, the reference operator is responsible for ensuring that the other operator(s) is/are properly anchored to the platform **20**. A second possibility is to provide as many copies of the anchoring device **100** or **200** on board the platform **20** as there are operators likely to be present on the platform **20**. In this case, one of the operators, known as the reference operator, must first declare the number of people actually present on board the platform **20** to a supervision system common to the respective processing units **180** or **280** of the various anchoring devices **100** or **200**. This supervision system manages the data resulting from the processing respectively implemented by the different processing units **180** or **280**, taking into account the declared number of operators respectively associated with the different anchoring devices. [0089] Optionally, the data resulting from the processing carried out by the processing unit **180** or **280** is displayed on a screen so as to give corresponding visual information to the operator on board the platform **20**, this screen potentially being integrated into the control panel **23** or being independent thereof. [0090] As detailed above, the anchoring device **100** or **200** makes it possible, on the basis of the result of the processing steps implemented by its processing unit **180**, to generate warning or distress signals, as well as corresponding data sent to a remote processing system, if necessary in the form of a device whose detection, processing, alerting and data-sending functions are integrated into a single unit. In any case, it is understood that the anchoring device **100** or **200** is thus completely independent of the control system of the aerial bucket **1** and is therefore adaptable to any type of aerial bucket, i.e. a machine for lifting people. This being said, optionally, the processing unit **180** or **280** of the anchoring device **100** or **200** may be connected, for example via a CAN bus, to the control system of the aerial bucket **1** so that the signals resulting from the processing steps carried out by the processing unit **180** or **280** are directly taken into account by the aforementioned control system and thus induce, if necessary, a limitation of the movements of the aerial bucket **1**, or even the total stoppage of this aerial bucket. [0091] Rather than the anchoring device **100** or **200** being used to anchor an operator to the platform of an aerial bucket, the anchoring device **100** or **200** is usable to anchor an operator to any type of height work structure, such as a scaffold, etc.

Claims

1. A device for anchoring an operator to a height work structure, such as a platform of an aerial bucket, the anchoring device comprising: a housing, which forms an internal volume and which is provided with fastening means for fastening the housing to the height work structure, a linkage member, provided with a fastener adapted to be hooked by a lanyard attachable to the operator, the linkage member being mounted on the housing so as to be movable along a direction of movement so as to be able to switch between: a retracted configuration in which the fastener is at least partially arranged within the internal volume so that the housing renders the fastener inaccessible to prevent it being hooked by the lanyard, and an extended configuration in which the fastener is at least partially arranged outside the internal volume so that the housing leaves the fastener accessible to be hooked by the lanyard and, once the fastener is hooked by the lanyard, the housing interferes with the lanyard to prevent the linking member from returning to the retracted configuration, and at least one position sensor, which is arranged within the internal volume and which detects the position of the linkage member relative to the housing in the direction of movement.
2. The anchoring device according to claim 1, wherein the housing includes at least one wall which completely covers the fastener when the linkage member is in a retracted configuration.
3. The anchoring device according to claim 1, wherein the internal volume includes a first

compartment, in which said at least one position sensor is housed, and a second compartment, in which the fastener is housed when the linkage member is in a retracted configuration, wherein the housing closes the first compartment completely, except for a passage which connects the first and second compartments to one another and by means of which the linkage member is guided to move in the direction of movement, and wherein the housing partially closes the second compartment, protecting the fastener when the linkage member is in the retracted configuration, while leaving the fastener free to be extracted from the second compartment when the linkage member has moved from the retracted to the extended configuration.
4. The anchoring device according to claim 1, wherein the linkage member is translationally movable with respect to the housing along an axis corresponding to the direction of movement.
5. The anchoring device according to claim 1, wherein the anchoring device further comprises a resilient member which acts on the linkage member so as to bias the linkage member from the extended configuration to the retracted configuration.
6. The anchoring device according to claim 1, wherein the linkage member is provided with a gripping clement which emerges outside the internal volume when the linkage member is in a retracted configuration.
7. The anchoring device according to claim 1, wherein the anchoring device further comprises a mechanism which releasably connects the linkage member and the housing such that: in an unbroken state of the mechanism, the linkage member is movable relative to the housing in the direction of movement between two extreme positions which are opposite each other, namely a first functional position, which is occupied by the linkage member in a retracted configuration, and a second functional position, which is occupied by the linkage member in an extended configuration, and in a broken state of the mechanism, the linkage member in the extended configuration is movable relative to the housing in the direction of movement between the second functional position and a dysfunctional position that is further from the first functional position than the second functional position, which mechanism is adapted to move from the unbroken state to the broken state when the linkage member in the second functional position is urged towards the dysfunctional position with a force greater than a predetermined threshold.
8. The anchoring device according to claim 7, wherein the mechanism comprises a mechanical fuse, the breaking of which causes the mechanism to change from the unbroken state to the broken state, and a support, which is mounted the housing so as to be movable in the direction of movement and which carries the linkage member and is connected to the linkage member by the mechanical fuse such that: in the unbroken state of the mechanism, the mechanical fuse kinematically connects the linkage member and the support to each other in the direction of movement between the first and second functional positions, the support being abutted against the housing in the direction of movement when the linkage member is in the second functional position, and in the broken state of the mechanism, the linkage member is freely movable in the direction of movement relative to the support.
9. The anchoring device according to claim 1, wherein the anchoring device comprises an overtravel spring which is interposed along the direction of movement between the linkage member and a stop mounted on the linkage member movably along the direction of movement, such that: when the overtravel spring is not compressed, the linkage member is movable relative to the housing in the direction of movement between two extreme positions which are opposite each other, namely a first functional position, which is occupied by the linkage member in the retracted configuration, and a second functional position, which is occupied by the linkage member in the extended configuration and in which the stop is pressed against the housing in the direction of movement, and when the overtravel spring is compressed, the linkage member in the extended configuration is moveable relative to the housing in the direction of movement between the second functional position and a dysfunctional position which is further from the first functional position than the second functional position, which overtravel spring is designed to be compressed when the

linkage member in the second functional position is urged towards the dysfunctional position with a force above a predetermined threshold.

10. The anchoring device according to claim 1, wherein the anchoring device further comprises a processing unit which: is connected to said at least one position sensor so as to be able to process a position signal, which is emitted by said at least one position sensor and which is representative of the position of the linkage member, detected by the position sensor, and is adapted to determine from the position signal whether the linkage member is in the retracted or extended configuration.

11. The anchoring device according to claim 7, wherein the anchoring device further comprises a processing unit which: is connected to said at least one position sensor so as to be able to process a position signal, which is emitted by said at least one position sensor and which is representative of the position of the linkage member, detected by the position sensor, and is adapted to determine from the position signal whether the linkage member is in the retracted or extended configuration, and wherein the processing unit (**180**; **280**) is also adapted to, from the position signal, determine whether the position the linkage member (**120**; **220**) occupies in the extended configuration is between the first and second functional positions, or between the second functional position and the dysfunctional position.

12. The anchoring device according to claim 10, wherein the processing unit is adapted to also process a presence signal, which is representative of the detection of the presence of an operator on the height work structure.

13. The anchoring device according to claim 10, wherein the anchoring device further comprises an inertial sensor, which detects motions in the space of the housing and which emits a motion signal, representative of the motions detected by the inertial sensor, and wherein the processing unit is: connected to the inertial sensor so that the motion signal can be processed, and adapted to determine from the motion signal that the linking member is not in the extended configuration without the fastener hooked to the lanyard attached to a non-inanimate operator.

14. The anchoring device according to claim 10, wherein the anchoring device comprises warning means, such as an audible and/or light-up alarm, which are connected to the processing unit and which are activated by the processing unit depending on the result of the processing steps carried out by the processing unit.

15. The anchoring device according to claim 10, wherein the anchoring device comprises a wireless communication module, which is connected to the processing unit and which sends to a remote processing system data resulting from the processing steps implemented by the processing unit.

16. An aerial bucket, comprising: a ground support chassis, a platform adapted for at least one operator to stand on, a lifting structure, which supports the platform and which is arranged on the frame so as to be able to move the platform at least in height relative to the frame, and at least one anchoring device, which is in accordance with claim 1 and whose housing is attached to the platform by said fastening means.

17. The anchoring device according to claim 9, wherein the anchoring device further comprises a processing unit which: is connected to said at least one position sensor so as to be able to process a position signal, which is emitted by said at least one position sensor and which is representative of the position of the linkage member, detected by the position sensor, and is adapted to determine from the position signal whether the linkage member is in the retracted or extended configuration, and wherein the processing unit is also adapted to, from the position signal, determine whether the position the linkage member occupies in the extended configuration is between the first and second functional positions, or between the second functional position and the dysfunctional position.