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(54) Safety device for a ladder set

(57) The invention concerns a safety device for a ladder set (10) with a plurality of telescopically extendable ladder parts, comprising a control unit for controlling the movement of the ladder parts and control means for delivering control commands to the control unit. The safety device according to the invention is **characterised in that** the control unit can be switched between two operating modes, namely a locked mode, in which movement of the ladder parts relative to each other is locked, and an unlocked mode in which the lock is cancelled. The safety device comprises control elements for changing between the operating modes of the control unit and display means (28) for displaying the current operating mode of control unit (22), said display means being disposed separately from the control elements.

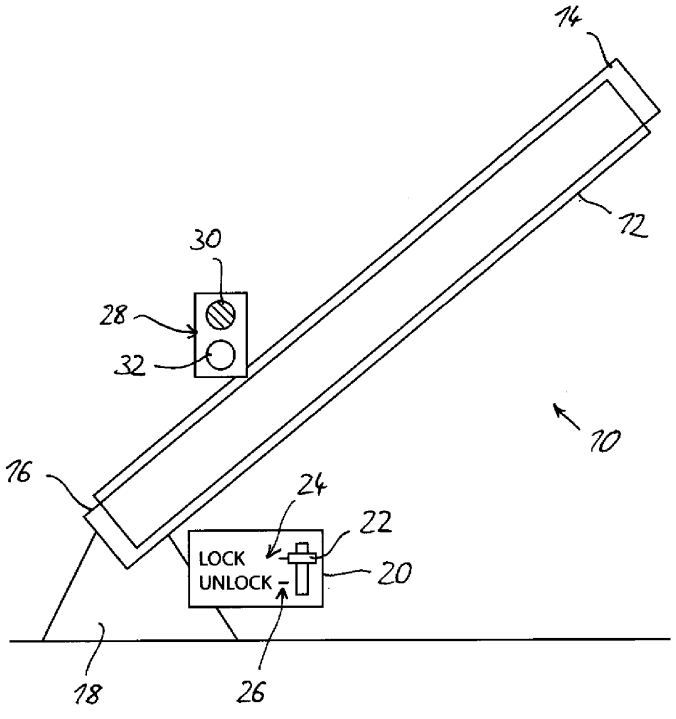

Fig. 1

EP 2 199 530 A1

Description

[0001] The present invention concerns a safety device for a ladder set comprising a plurality of telescopically extendable ladder parts as per the preamble of claim 1.

[0002] Extendable ladder sets are used, in particular, as rescue ladders on fire engines. The ladder parts are usually extended and retracted with the help of control means such as switches, levers or similar, via which motion commands can be delivered to a control unit. These control means can be provided on an operating platform at the foot of the ladder, and, where required, on an additional operating platform in the rescue cage. This allows the movement of the ladder to be controlled either by an operator at vehicle level, or by someone in the rescue cage.

[0003] On rescue missions, accidents frequently occur because the ladder is mounted while being extended or retracted, to reach the rescue cage as quickly as possible, for example, or when leaving the rescue cage in haste. This, however, can easily lead to persons ending up between the rungs, or in the framework, of the moving ladder segments, resulting in serious injuries. To avoid such accidents, accident prevention regulations and the ladder operating instructions specifically state that the ladder must not, under any circumstances, be mounted while the ladder segments are in motion. But in the confusion of rescue situations, actions are often hurried and overhasty, and this order is frequently ignored.

[0004] Hence it is the task of this invention to provide a safety device for a ladder set of this kind, which will allow precautions to be taken to ensure the ladder set is not mounted while the ladder parts are being extended or retracted.

[0005] This task is solved according to the invention by a safety device with the features of claim 1.

[0006] The control unit of the safety device according to the invention can be switched between two operating modes, namely a locked mode and an unlocked mode. In the locked mode, the ladder parts cannot be moved relative to each other, but in the unlocked mode, the lock is lifted and motion commands can be delivered to the control unit for execution. Control elements requiring operation by a user serve to switch between the locked and unlocked modes. The safety device further comprises display means for displaying the current operating mode of the control unit, a signal system, for example, which is disposed separately from the control elements.

[0007] Anyone intending to mount the ladder is automatically notified by the display whether the ladder set is in a "safe" mode. This is the case if the locked mode is activated, making movement of the ladder parts relative to each other impossible. The display means can then display an all-clear signal indicating that there is no risk involved in mounting the ladder. But if the unlocked mode of the control unit is activated, i.e. movement of the ladder parts relative to each other is possible, the display means may display a warning signal to prevent persons from using the ladder. Hence persons not in communication with the ladder operator can be reliably informed of its operating mode. The display can be disposed in some conspicuous position at the bottom of the ladder, or in some other easily seen place, so that it does not go unnoticed even in the confusion of a rescue situation. Several displays may also be disposed at different points on the ladder set, at the top and bottom ends, for example.

[0008] In one preferred embodiment, the display means may comprise at least one visually perceivable signal system. In another preferred embodiment, the display means may comprise at least one audibly perceivable signal system.

[0009] The control elements for changing between the two operating modes of the control unit are preferably provided on at least two spatially separate operating platforms on the ladder set.

[0010] This type of arrangement also allows activation of the locked mode from an operating platform in the rescue cage, for example.

[0011] A preferred example of an embodiment of the invention will be described in more detail below, with reference to the enclosed drawings, in which.

Fig. 1 is a diagrammatic representation of a ladder set fitted with one embodiment of the safety device according to the invention; and

Fig. 2 is a flow chart explaining the functioning of the safety device according to the invention.

[0012] The ladder set 10 shown in Fig. 1 is disposed on a rescue vehicle not shown in more detail and comprises two telescopically extendable ladder parts 12,14, namely a base part 12, which is pivotably disposed in a vertical plane at one end 16 on a base 18, and an extendable part 14, which rests on base part 12 and can be extended along the length thereof with the aid of a cable winch in order to extend the length of ladder set 10. The illustration shown here is extremely simplified as the ladder sets actually used usually comprise a larger number of ladder parts. In the figure and the following description, other details of ladder set 10 are only shown diagrammatically in terms of how they function in order to better explain the functioning of the invention.

[0013] The ladder set 10 comprises a control unit not shown in more detail for controlling the movement of ladder parts 12,14. Such a control unit can be used to control the drive of the cable winch for extending extendable part 14 in relation to base part 12, for example. Control means such as control levers or similar are provided for delivering control commands to this control unit, and are mounted on an operating platform 20 at the bottom of ladder set 10, for manual operation by a ladder operator. When ladder set 10 is in operation, the control unit can be switched between two operating modes. The first operating mode is a locked mode, in which movement of ladder parts 12,14 relative to each other is blocked. In the

locked mode, it is impossible to extend extendable part 14 relative to base part 12, or to retract the former. This can be achieved, for example, by ensuring that the control unit can no longer accept any control commands triggering movement of the ladder. Furthermore, it is also conceivable that the ladder set 10 be fitted with blocking or braking devices, which exert a gripping action when the control unit is in locked mode, thereby hindering movement of ladder parts 12,14.

[0014] The other operating mode of ladder set 10, to which the control unit can be switched, is an unlocked mode in which the lock on ladder parts 12,14 relative to each other is lifted. In the unlocked mode, control commands for moving ladder parts 12,14 relative to each other are accepted and executed.

[0015] Operating platform 20 comprises control elements for changing between the two operating modes of the control unit. For example, a control element (e.g. a push-button) can be provided on operating platform 20 for activating the locked mode. Another, separate control element (e.g. a soft key by the display) can be provided to activate the unlocked mode. In Fig. 1, operating platform 20 is provided with a switch 24 as the operating element, marked with the word "LOCK" and serving to activate the locked mode, whilst the unlocked mode is activated by another switch 26, marked "UNLOCK". The separation of these two different switches 24,26, helps prevent accidental switching to the unlocked mode. Further, when switch 26 for activating the unlocked mode is operated, there may be provision for sending a check-query to the ladder operator to request confirmation of transition to unlocked mode. This means the operator is prompted to re-check to ensure that no one is on the ladder when it is switched to unlocked mode, enabling movement of ladder parts 12,14 relative to each other.

[0016] Ladder set 10 is further provided with an optical signal unit 28 mounted at the bottom of ladder set 10 in the field of vision of anyone about to mount ladder set 10. Optical signal unit 28 comprises an upper warning light 30 and a lower all-clear light 32 which can be configured in different colours such as red and green. In the locked mode, lower all-clear mode 32 comes on automatically signalling that movement of ladder parts 12,14 relative to each other is blocked. The ladders can then be used in safety.

[0017] If, however, the control unit is switched to the unlocked mode, in which ladder parts 12,14 can move relative to each other, signal unit 28 is automatically switched over so that, instead of all-cear light 32, warning light 30 comes on, visually signalling that mounting the ladder is associated with a risk of accident due to moving ladder parts 12,14.

[0018] Anyone intending to mount the ladder can therefore be reliably informed of the operating mode of ladder set 10 by means of signal unit 28, even if communication with the operator at operating platform 20 is difficult. As a general rule, ladder set 10 should not be mounted until movement between the ladder parts has ceased, and the control unit has been switched over to the locked mode. So ladder users must wait until signal unit 28 switches from warning signal to all-clear signal. If need be, the switchover can also be accompanied by an audibly perceivable signal generated by an appropriate signal device.

[0019] If ladder set 10 is fitted with a rescue cage at the outer end of extendable part 14, inside which there is a second operating platform, this operating platform may also be fitted with control elements 24,26 for changing between the operating modes of the control unit permitting the changeover between locked and unlocked modes.

[0020] It is possible that the two operating platforms may not deliver control commands to the control unit on an equal basis, so that, for example, operating platform 20 at the bottom of the ladder can cancel the control function of the operating platform in the rescue cage so that control can only be exercised from lower operating platform 20. Furthermore, ladder set 10 can be fitted with automatically triggering control elements which trigger by themselves when ladder set 10 is used, ensuring the switchover to locked mode. For example, the doors of the rescue cage leading onto the ladder may be fitted with a switch which is automatically activated when the doors are opened so that the locked mode is activated without intervention by the ladder operator. Emergency pushbuttons or similar could also be provided along ladder set 10 to allow anyone on ladder set 10 to stop the ladder movement in an emergency. If the push-button is operated, the control unit is then automatically switched to locked mode as well.

[0021] A substantial advantage of the invention lies in the fact that the locked mode of the control unit can be activated independently of the drive of ladder set 10, i.e. of the engine of the rescue vehicle. This means it is no longer necessary to turn off the vehicle engine to render ladder set 10 safe. Instead, the option of locking the control unit offers an additional safety feature.

[0022] The flow diagram in Fig. 2 explains the functioning of ladder set 10 shown in Fig. 1 and fitted with the safety system according to the invention.

[0023] In starting step 50 in Fig. 2, the control unit of ladder set 10 is in the unlocked mode in which the lock on ladder parts 12,14 moving relative to each other is lifted, and these ladder parts 12,14 can be moved relative to each other. This may be the case when extending ladder set 10. The unlocked mode of the control unit is displayed by signal unit 28, whose warning light 30 comes on, preferably in a warning colour such as red.

[0024] To release ladder set 10 for use, the control unit must first be switched from unlocked to locked mode. This happens through manually activating switch 24 in step 52. The result, in step 54, is that movement of ladder parts 12,14 relative to each other, resp. the control unit as such, is locked. The locked mode is rendered visible in step 56 by the signal device 28, whose warning light 30 goes off and all-clear light 32 comes on. This can be

associated with a change of colour, from red to green, for example.

[0025] Once the mission is complete, and there is no one on left on the ladder, the lock on ladder parts 12,14 moving relative to each other has to be lifted in order to retract ladder parts 12,14, as in step 58, i.e. the unlocked mode has to be activated. This is done by actuating switch 26, so that the operating mode of the control unit is switched over. In step 58, after activating switch 26, a further safety query may be made to check whether the lock really should be lifted. The switchover is then rendered visual by the signal unit 28, whose all-clear light 32 goes off and warning light 30 comes back on to indicate that mounting the ladder is now prohibited (step 60). The lock on the control unit is now lifted (step 62), and ladder set 10 is now returned to the unlocked mode (step 64).

Claims

1. Safety device for a ladder set (10) with a plurality of telescopically extendable ladder parts (12,14), comprising a control unit for controlling the movement of ladder parts (12,14) and control means for delivering control commands to the control unit, **characterised in that** the control unit can be switched between two operating modes, namely a locked mode in which movement of ladder parts (12,14) relative to each other is locked, and an unlocked mode in which the lock is cancelled, and **in that** the safety device comprises control elements (24,26) for changing between the operating modes of the control unit, and display means (28) for displaying the current operating mode of the control unit, which are disposed separately from control elements (24,26).

2. Safety device of claim 1, **characterised in that** display means (28) comprise at least one visually perceivable signal device.

3. Safety device of claims 1 or 2, **characterised in that** display means (28) comprise at least one audibly perceivable signal device.

4. Safety device according to one of the previous claims, **characterised in that** the control elements (24,26) for changing between the operating modes of the control unit are provided at at least two spatially separate operating platforms (20) of ladder set (10).

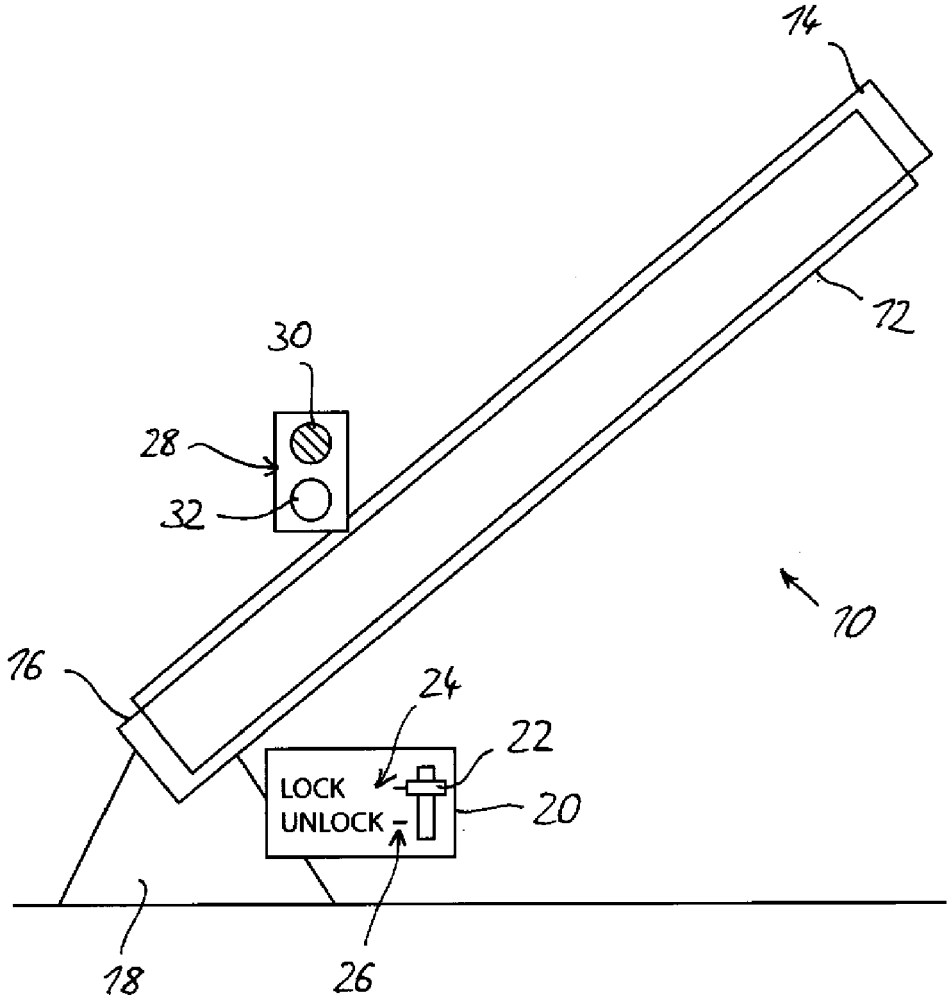

Fig. 1

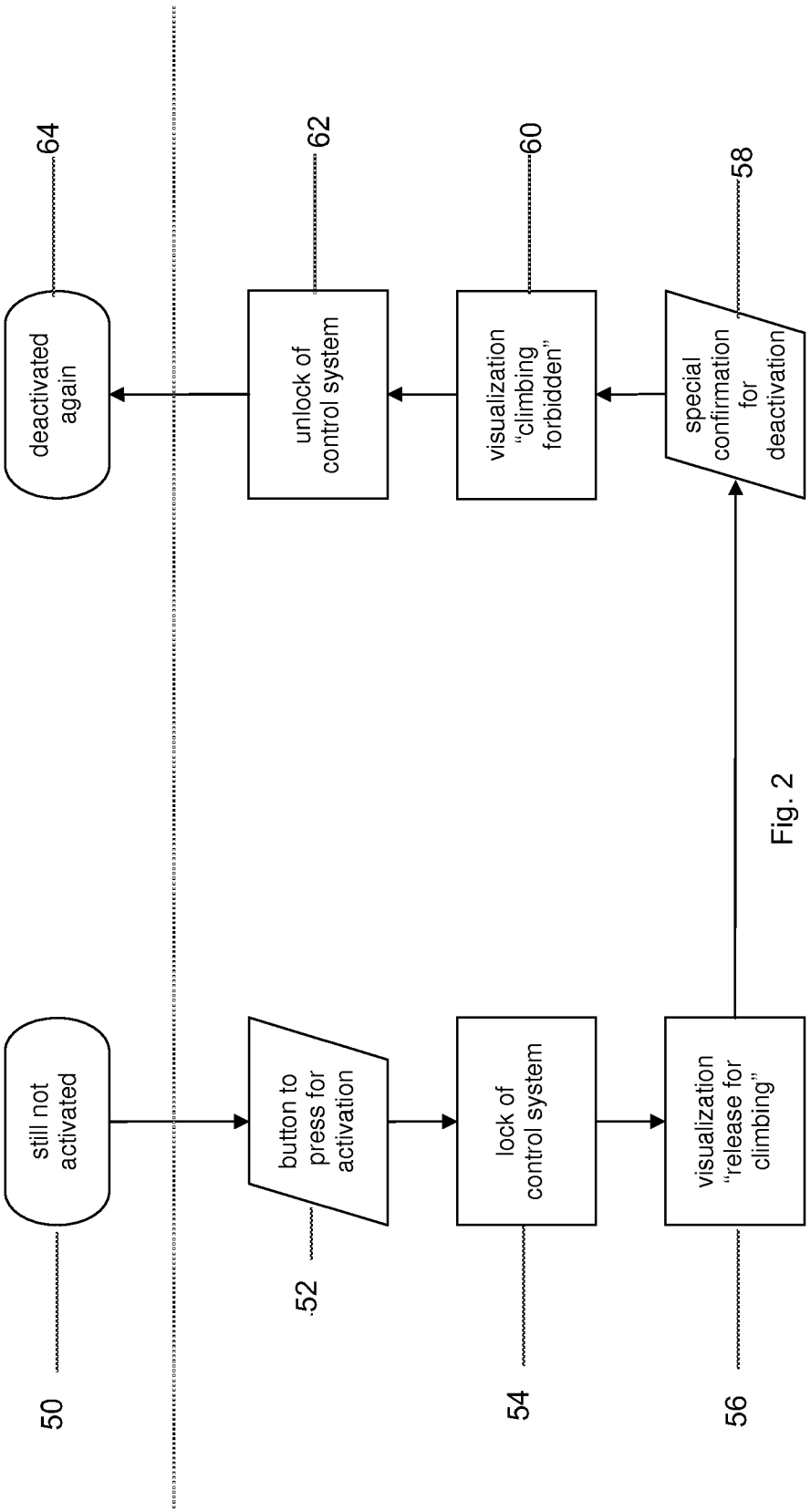
still not activated
50
button to press for activation
52
lock of control system
54
visualization "release for climbing"
56
special confirmation for deactivation
58
visualization "climbing forbidden"
60
unlock of control system
62
deactivated again
64

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 08 17 1774

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 3 949 833 A (KOZAI TETSUO) 13 April 1976 (1976-04-13) * figures 1-6 *	1-3	INV. E06C5/34 E06C5/44
Y	* figure 1 *	4	E06C7/00
Y	DE 10 2005 026023 A1 (IVECO MAGIRUS [DE]) 14 December 2006 (2006-12-14) * paragraph [0004] *	4	
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TECHNICAL FIELDS SEARCHED (IPC)

E06C
E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	21 April 2009	Bauer, Josef

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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21-04-2009

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82