

Actuating element for a safety gear**Description**

The invention relates to a device for activating and deactivating a safety gear of a lift cage during assembly of a lift installation.

During assembly of a lift installation there is these days increasing use of the roof of the lift cage by engineers as a work platform. This is particularly so in the case of assembly of lifts without scaffolding. In that regard, the cage during assembly of the installation is suspended at a chain hoist or comparable lifting device which is in turn attached to the shaft head. With the help of the chain hoist the cage is moved by the lift engineer in the shaft to the position desired by the engineer and the lift engineer can subsequently carry out his or her work from the cage roof during the installation.

If one or more lift engineers are now present on the cage it has to be ensured that the cage does not move in undesired manner in the shaft. In particular, it has to be ensured that in the case of failure of the chain hoist the cage does not crash down in the shaft. At the same time, however, it has to be possible for the engineer to move the cage without problem to the place, which is desired by the engineer, for carrying out the necessary work.

In order to realise this it is, for example, proposed in EP 1 254 070 to mount movable hooks on the lift cage, which hooks can be brought by way of a cable by an engineer into a position in which they hook into brackets, which are used for fixing the guide rails, or detent there. The hooks are brought by the engineer into the detent position when the engineer works on the cage roof. They can be released with the help of the cable so that they do not engage in the corresponding fastenings for the guide rails. The engineer can subsequently move the cage. The disadvantage in that regard is that the fastening elements for the guide rails are, in certain circumstances, mounted relatively far apart in the shaft. Thus, the engineer can assume only certain positions in the shaft with the cage, namely those in which the hooks are in the vicinity of the fastening elements. In other positions the cage would, in the case of failure of the chain hoist, drop a relatively large distance before the hooks engage in the fastening elements, which could lead to risk to the engineer.

The object of the present invention is therefore to indicate a device which makes possible any cage position during assembly and which prevents downward movement in the event of failure of the chain hoist.

The object is fulfilled by a device for activating and deactivating a safety gear of a lift cage during assembly of a lift installation, wherein the device comprises an actuating element provided for the purpose of being attached to a cage, wherein the actuating element in a first position so acts on the safety gear that the safety gear is activated and wherein the actuating element in the case of need can be brought by an engineer into a second position in which it does not exert any action on the safety gear.

The invention is based on recognition that the safety gear, which is mounted on the lift cage anyway, can be used for securing the cage during the assembly. However, in order that the cage in the event of failure of the support means does not first have to be accelerated, the safety gear must be activated. This means that the friction linings or wedges of the safety gear must be in a position to immediately wedge in the case of the smallest downward movement of the cage and securely hold the cage at the guide rails without any acceleration of the cage occurring. If, however, the friction linings or wedges are in such a position, then the cage cannot move, since the safety gear would then immediately engage at least in the case of downward movement of the cage. The engineer can therefore deactivate the safety gear by means of the invention when, during assembly, the engineer would like to move the cage in the shaft. The engineer can activate the safety gear again when the cage is stationary for a longer period of time at a specific position and the engineer would like to carry out work on the roof.

For operating (activating and deactivating) the safety gear a simple actuating element is proposed which is actuated by the engineer exactly when he or she wants to move the cage. Through actuation of the actuating element the safety gear is brought into the deactivated state. By this there is understood a state in which the friction linings or wedges of the safety gear do not directly wedge, in the case of downward movement of the cage, and bring the cage to standstill, but in which the safety gear is triggered quite normally by the speed limiter in the event of excess speed of the cage. When the engineer ends actuation of the actuating element again then it returns to its original position and the safety gear is activated once more so that it would immediately engage in

the event of failure of the chain hoist. The device with the actuating element has the advantage that the engineer can bring, directly by his or her own action, the safety gear from the deactivated to the activated position so that the highest level of safety for the engineer is ensured. However, the engineer can also bring the safety gear into the deactivated position by actuation of the actuating element so that the engineer can move the cage. All this can ideally happen from the roof of the lift cage so that the engineer does not have to leave his or her work platform.

A further advantage is that safety elements present in any case, such as the safety gear, are used for safety during assembly. It is not necessary to mount any additional, costly safety elements on the cage. The engineer merely has to mount the device with the actuating element on the cage roof so that it can exert its action on the safety gear and the engineer is himself or herself in a position of operating the actuating element for movement of the cage. Moreover, it is advantageous that the actuating element can be operated by the engineer exactly when he or she would like to move the cage. While the cage is thus stationary and the cage roof is used as an assembly platform the actuating element of the device does not need to be actuated by the engineer and therefore also does not demand any additional attention.

A further advantageous construction consists in that the actuating element in the first position acts in such a way on a speed limiter cable that the safety gear connected with the speed limiter cable is activated. In that regard, the speed limiter cable, which acts in any case on the safety gear, is used as a transmission element between the actuating element and the safety gear. Use is thus made of components of the lift, which have to be installed in any case, for the device for activating and deactivating the safety gear.

As an alternative to use of the speed limiter cable it is also conceivable to employ a hook or a long rod which is fixed to the actuating element and which for its part, in the case of actuation of the actuating element by the engineer, frees the safety gear so that the safety gear is deactivated. In both cases the actuating element is operatively connected with the respective element (speed limiter cable or hook) for transmission of the movement.

A further advantageous construction consists in the actuating element having a cut-out within which the speed limiter cable can be guided. The actuating element thus comprises the speed limiter cable and this enables good transmission of the movement of the

actuating element to the speed limiter cable.

A further advantageous construction consists in that the actuating element has clamping jaws which fix the speed limiter cable when the actuating element moves towards the first position and which release the speed limiter cable when the actuating element moves towards the second position. If the actuating element is brought by the engineer into the second position, then the clamping jaws loosen and the speed limiter cable is released. The actuating element or the device thus no longer exerts force on the speed limiter cable, whereby the action of the actuating element on the safety gear is cancelled. Thus, the safety gear can be transferred to the deactivated state and the cage moved.

As an alternative to the clamping jaws arranged at the actuating element the device can also comprise an abutment element which is so fixable to the speed limiter cable that the actuating element in the first position exerts a vertically upwardly directed force on the abutment element. If the actuating element is in the first position, then it presses from below against the abutment element. The abutment element itself is again fixed to the speed limiter cable so that by way of the abutment element, which is urged upwardly, the speed limiter cable is also drawn upwardly. As a consequence, the actuating element in the first position acts in such a way on the safety gear that it is activated. If the actuating element is now actuated by the engineer, then the force exerted from below on the abutment element diminishes or force is no longer exerted at all and in this case as well the speed limiter cable is released so that the safety gear can again go over to the deactivated state. The advantage in this regard is that the abutment element can be mounted by the engineer at a finely adjustable position of the speed limiter cable so that the activation of the safety gear can be set in optimum manner.

A further advantageous construction of the invention consists in that the actuating element comprises counter-bearings for positioning of the abutment element. If the abutment element is fixed to the speed limiter cable then it could happen that the actuating element, which acts from below against the abutment element, is in an unfavourable position, so that the abutment element slips past the actuating element and the actuating element thus could not realise its action. In order to ensure that the abutment element is always mounted in the correct position in relation to the actuating element, counter-bearings are therefore directly mounted on the actuating element.

An advantageous development consists in that the actuating element is constructed as a pedal which can be brought by an engineer into the second position against a restoring force. The engineer therefore merely has to operate the corresponding pedal by foot or hand and the safety gear is already freed by this simple operation. As an alternative to construction as a pedal it is also conceivable for the actuating element to be constructed as a form of lever which has to be operated by the engineer.

Advantageously, the restoring force against which the engineer has to move the pedal or lever is generated by means of a spring or a spring element. The force exerted by the actuating element on the speed limiter cable or the rod or the hook is thus produced by this spring element. The engineer moves the actuating element against this force so that it is also ensured in every case that the actuating element cannot transfer by itself from the first position in which the safety gear is activated to the second position in which the safety gear is deactivated. The spring element can in that regard be constructed as, for example, a helical spring acting against the actuating element. However, the spring element can also be realised in the construction of the actuating element itself, in that a spring steel or an appropriate material having the desired resilient or force-applying property is used.

In a development, a spring is arranged between the abutment element and the actuating element. This spring serves for adjusting the vertically upwardly directed force. This has the advantage that even in the case of mounting of the abutment element in a somewhat unfavourable position the force exerted by the actuating element on the speed limiter cable is defined so that activation of the safety gear also takes place to a defined extent.

An advantageous development consists of the device comprising a housing which receives the actuating device in such a manner that the actuatable area of the actuating device is limited. This has the advantage that the engineer cannot operate the actuating device in error and thus could deactivate the safety gear. The engineer has to actively operate the actuating device at the place where it is intended. The limitation of the operable area of the actuating device also ensures that the device providing safety cannot be manipulated in such a way that, for example, the actuating element is brought into the second position through application of a heavy load and thus the safety gear permanently deactivated.

A further advantageous construction consists in that the device comprises a safety switch,

wherein the safety switch prevents movement of the cage or the lifting device when the safety gear is activated. Movement of the cage when the safety gear is activated would have the consequence, at least in the event of downward travel, that the safety gear would engage without delay, since it is indeed in the activated state. This is to be prevented, so that the safety gear in such a case would not have to be first released again. The safety switch at the device ensures, in the case of the safety gear activated by way of the lift control, that movement of the cage is impossible. Only when the actuating element of the device is actuated by the engineer is the safety circuit closed by the safety switch and the cage can move in the lift shaft.

The device is used for preventing unintended movement of a lift cage during assembly of a lift installation. In that regard, the device is mounted by an engineer on a lift cage in such a way that the actuating element is in the first position and can be brought by the engineer into the second position before the cage is moved. This has the advantage that the device has to be used merely for installation of the lift assembly. The device can subsequently be removed again by the engineer and the engineer can use the same device for assembly of a further lift installation.

The invention is described and explained in more detail in the following by way of the figures, in which:

Figure 1 shows a schematic illustration of a device for activating a safety gear,

Figure 2 shows a further form of embodiment of a device for activating a safety gear,

Figure 3 shows a perspective illustration of a form of embodiment of the device for activating a safety gear,

Figure 4 shows a perspective illustration of a form of embodiment of the device for activating a safety gear,

Figure 5 shows a perspective illustration of a further form of embodiment of the device for activating a safety gear,

Figure 6 shows a perspective illustration of a further form of embodiment of the device

for activating a safety gear and

Figure 7 shows a schematic illustration of the function of a form of embodiment of the device for activating a safety gear.

Figure 1 shows a schematic illustration of the device for activating and deactivating a safety gear 40 of a lift cage 30. The safety gear 40 is illustrated in the activated state in Figure 1a, whereas the safety gear 40 is illustrated in the deactivated state in Figure 1b. The cage 30 is moved in the lift shaft (not illustrated) along the guide rails 60. In that case, the safety gear 40 acts, in the case of a sudden downward movement of the cage 30, in such a manner on the guide rail 60 that the cage 30 is brought to standstill with as little delay as possible. For this purpose, arranged in the safety gear 40 are brake elements 45, 46 (friction elements or wedges) which in the activated state in Figure 1a interact in such a way that the safety gear 40 wedges with the guide rail 60 when the cage 30 executes a downward movement. In Figure 1b the brake elements 45 and 46 of the safety gear are so arranged that the cage 30 is not fixed to the guide rail 60 by the safety gear 40.

In Figure 1a the safety brake 40 is shifted into an activated state in that the lever 41 is raised about the fulcrum 43 and thus the brake element 46 wedges between the brake element 45 and the guide rail 60. This produces securing of the cage 30 to the guide rail 60 by the safety gear 40 when the cage executes a downward movement. The raising of the lever 41 takes place in Figure 1a with the help of the actuating element 1, which is disposed in the position P1. In the position P1 the lever 41 is raised by means of the hook 13 of the lever 41 against the force which acts via a spring element 42 on the lever 41. The brake element 46 is thereby displaced towards the brake element 45 and the safety gear 40 is in the activated position. The actuating element 1 is mounted by the engineer on the roof of the cage 30 in such a way that it is arranged in position P1 and the safety gear 40 is activated by way of the hook 13 and the lever 41.

In Figure 1b, the safety gear 40 is shifted into the deactivated state by an action of the engineer, for example by treading down the actuating element 1. The engineer can also actuate the actuating element 1 by, for example, hand if the element is a form of lever. Through the actuation, the actuating element 1 is brought from the position P1 in Figure 1a to the position P2 in Figure 1b. The hook 13 is thereby moved in such a way that it frees the lever 41 of the safety gear 40. The lever 41 is now drawn downwardly by the spring

element 42 so that it bears against the abutment element 44. The brake elements 45 and 46 of the safety gear 40 are thereby brought into a position which corresponds with the deactivated state of the safety gear 40.

When the engineer concludes actuation of the actuating element then it returns to the position P1 and, by way of the hook 13, the lever 41 of the safety gear is raised again so that the safety gear 40 is activated once more.

Figure 2 similarly shows a device for activating and deactivating the safety gear 40 of a lift cage 30. In this embodiment of the device the actuating element 1 does not act on the lever 41 of the safety gear 40 by way of a hook 13, but instead the action is achieved by way of the cable 50 of the speed limiter. For this purpose the actuating element 1 in Figure 2 position P1 is operatively connected with the speed limiter cable 50. The actuating element 1 acts against the force of the spring element 42, which draws the lever 41 of the safety gear downwardly in such a way that the lever is drawn upwardly against this spring force by way of the speed limiter cable 50. For that purpose, the actuating element 1 exerts a force on the operatively connected speed limiter cable 50 upwardly in vertical direction, which corresponds with at least the force of the spring element 42. The functionality of the safety gear 40 is as described in Figure 1 and the safety gear 40 is activated in Figure 2a by the actuating element 1.

In Figure 2b the safety gear 40 is deactivated through actuation of the actuating element 1 by the engineer. The actuating element 1 is brought by the engineer into the position P2 and the action of the actuating element 1 on the speed limiter cable 50 connected with the lever 41 of the safety gear 40 is cancelled. The lever 41 of the safety gear 40 can thereby be moved against the abutment 44 by means of the force of the spring element 42, the brake elements 45, 46 of the safety gear 40 are thus displaced relative to one another and the safety gear 40 is deactivated. In this embodiment it is equally possible for the actuating element to be brought into the position P2 either by treading on a pedal or by pulling or moving a lever. When the engineer releases her or her hand or foot from the actuating element 1 it automatically returns to the position P1 and thus acts again on the speed limiter cable 50, which once more activates the safety gear 40 by way of the lever 41.

Figure 3 shows a perspective illustration of a form of embodiment of the device for

activating and deactivating the safety gear 40 of a lift cage 30. In this case the actuating element 1 is constructed as a pedal. The pedal has a cut-out 11, in which the speed limiter cable 50 can be received or which surrounds the speed limiter cable 50. The actuating element 1 is mounted in a housing 4 of the device by means of, for example, a bolt 6. The actuating element 1 acts by a force F_1 , which is directed vertically upwardly in the direction of the speed limiter cable 50, against an abutment element 2. The abutment element 2 is attached by the engineer to the speed limiter cable 50. The abutment element 2 consists, in the illustrated embodiment, of two plate-like bodies which are so fixed by means of screws to the speed limiter cable 50 that the cable extends therebetween. The abutment element 2 can in that case be constructed in any desired mode and manner; it merely has to be ensured that it can be securely fastened to the speed limiter cable 50 and that the actuating element 1 can act from below against the abutment element 2 by the force F_1 .

For better positioning of the abutment element 2, counter-bearings 12 are arranged at the actuating element in the embodiment. These counter-bearings 12 act against the abutment element 2, so that it cannot slip off the actuating element 1. The counter-bearings 12 can be simple metal ridges as illustrated in the embodiment. However, the counter-bearings can also be realised in a different way. The actuating element 1 is so arranged in the housing 4 that projections or edges of the housing 4 protrude beyond the actuating element 1 so that the activation area of the actuating element 1 is bounded. It is thereby ensured that an engineer cannot, through application of a block or a larger, heavy plate, permanently bring the actuating element 1 into the position P2 in which the safety gear 40 would be deactivated. The speed limiter cable 50 is raised against the force, which is not illustrated in Figure 3, of the spring element 42 of the safety gear 40, and thus activates the safety gear 40, by the force F_1 by which the actuating element 1 acts from below on the abutment element 2.

In Figure 4 the same form of embodiment is illustrated in perspective view from a different angle. The actuating element 1 is urged by the spring or the spring element 3 by the force F_1 against the abutment element 2, which is attached to the speed limiter cable 50. The actuating element 1 is thus disposed in the position P1 in which the speed limiter cable 50 is raised against the force of the spring element 42 and the safety gear 40 is in activated position. If the actuating element 1 is now pressed downwardly by an engineer against the spring or the spring element 3 then a force no longer acts on the abutment element 2 and

the speed limiter cable 50 is drawn downwardly by the force of the spring element 42 acting on the lever of the safety gear 40. The safety gear 40 is thereby deactivated.

When the engineer ends actuation of the actuating element 1 then the spring element 3 again ensures that the actuating element 1 acts once more against the abutment 2 by the force F_1 and the speed limiter cable 50 is drawn upwardly again. The device comprises, for the actuating element 1, an abutment 7 which is realised in the embodiment by a bolt. This means that the engineer cannot actuate the actuating element further than up to the defined position P2. The abutment element 2 is held by the counter-bearings 12 in the position so that it cannot slip off the actuating element 1 while this is in the position P1 and thereby the safety gear 40 could be erroneously deactivated.

The device additionally comprises a safety switch 5 which ensures that the cage cannot be moved when the actuating element 1 is in the position P1, thus in the position in which the safety gear is activated.

Figure 5 shows a perspective illustration of a further form of embodiment of the device. The actuating element 1, 1' comprises, in this embodiment, a first pedal element 1, which is pressed downwardly by the engineer. This first pedal element 1 acts on a second pedal element 1', which is pressed downwardly against the spring force F_1 of the spring 3 for deactivation of the safety gear 40. For actuation of the first pedal element 1 the engineer must thus apply the force which compensates for the action of the spring 3. The first pedal element 1 has in that case a pivot axis at the bolt 8 and the second pedal element 1' has a pivot axis at the bolt 6 and an abutment at the bolt 7. Through actuation of the pedal elements 1, 1' the vertically upwardly directed force F_1 on the abutment element 2 is cancelled and thus the action on the speed limiter cable 50 is equally cancelled. The safety gear 40 can transfer from the activated to the deactivated state. The pedal element 1' comprises a counter-bearing 12 for positioning of the abutment element 2 and the pedal elements 1, 1' are again accommodated in a housing 4, which minimises risk of faulty operation by the engineer.

In Figure 6 the same form of embodiment is perspectively illustrated from a different angle. The pedal element 1' is urged by the spring or the spring element 3 by the force F_1 against the abutment element 2, which is attached to the speed limiter cable 50. The pedal element 1' is thus disposed in the position P1 in which the speed limiter cable 50 is raised

against the force of the spring element 42 and the safety gear 40 is in activated position. If the pedal element 1 is now pressed downwardly by an engineer then the pedal element 1' is similarly pressed downwardly against the spring or the spring element 3. A force no longer acts on the abutment element 2 and the speed limiter cable 50 is drawn downwardly by the force of the spring element 42 acting on the lever of the safety gear 40. The safety gear 40 is thereby deactivated. The spring or the spring element 3 is, in this embodiment, realised by two springs which are arranged on both sides at the edges of the pedal element 1'. By virtue of the two-part construction of the actuating element 1, 1' and the arrangement of the spring elements 3 on both sides a guided downward movement of the pedal element 1' is ensured so that not only the force, but also the direction of the movement of the pedal element 1' can be satisfactorily controlled.

Figure 7 shows once again a schematic illustration of the manner of operation of the pedal elements 1, 1' of the actuating element. In Figure 7a the actuating element 1, 1' is in the position P1. The pedal element 1' is urged by the spring element 3 against the abutment element 2. The abutment element 2 is attached to the speed limiter cable 50, which is urged upwardly and the safety gear 40 is thus activated. In Figure 7b the pedal element 1 of the actuating element has been actuated by the engineer. The pedal element 1 pivots about the pivot axis formed by the bolt 8. The plunger 9 is thereby moved towards the second pedal element 1' and presses this downwardly against the spring force of the spring element 3. In the alternative, the plunger can also be arranged at the second pedal element 1' so that the first pedal element 1, when actuated, acts on the plunger. The actuating element 1, 1' is thus in position P2. The pivot axis of the second pedal element 1' is in that case formed by the bolt 6. The device has an abutment 7 so that the second pedal element 1' can be pressed downwardly only as far as a defined point. By virtue of the downward movement of the second pedal element 1' the abutment element 2 is free and the upwardly directed force F1 on the speed limiter cable 50 is cancelled. The safety gear is thereby deactivated. The second pedal element 1' contacts the safety switch 5 and the cage 30 can move.

The examples in the figures show possible forms of embodiment of the invention. It will be obvious that realisation of the device according to the invention can also be effected in different mode and manner.

Patent claims

1. Device for activating and deactivating a safety gear of a lift cage during assembly of a lift installation,
wherein the device comprises an actuating element (1, 1') provided for the purpose of being attached to a cage (30),
wherein the actuating element (1, 1') in a first position (P1) so acts on the safety gear (40) that the safety gear is activated,
wherein the actuating element (1, 1') when actuated by an engineer can be brought into a second position (P2) in which it does not exert any action on the safety gear (40) and
wherein the device comprises a housing (40) which receives the actuating device (1, 1') such that the actuable area of the actuating device is limited by projections or edges of the housing (4) which protrude beyond the actuating element.
2. Device according to claim 1, wherein the actuating element (1, 1') in the first position (P1) so acts on a speed limiter cable (50) that the safety gear (40), which is connected with the speed limiter cable, is activated.
3. Device according to claim 1 or 2, wherein the actuating element (1, 1') has a cut-out (11) within which the speed limiter cable (50) can be guided.
4. Device according to any one of the preceding claims, wherein the actuating element (1, 1') comprises clamping jaws which fix the speed limiter cable (50) when the actuating element (1, 1') moves towards the first position (P1) and which release the speed limiter cable (50) when the actuating element (1, 1') moves towards the second position (P2).
5. Device according to one of claims 2 and 3, wherein the device comprises an abutment element (2) for the actuating element (1, 1'), wherein the abutment element (2) is so fixable to the speed limiter cable (50) that the actuating element (1, 1') in the first position (P1) exerts a vertically upwardly directed force (F1) on the abutment element (2).
6. Device according to claim 5, wherein the actuating element (1, 1') has counter-bearings (12) for positioning the abutment element (2).

7. Device according to any one of the preceding claims, wherein the actuating element (1, 1') is constructed as a pedal which can be brought by an engineer into the second position (P2) against a restoring force.
8. Device according to claim 7, wherein the restoring force is generated by a spring element (3).
9. Device according to claim 5, wherein a spring element is arranged between the abutment element (2) and the actuating element (1, 1').
10. Device according to any one of the preceding claims, wherein the device comprises a safety switch (5) and wherein the safety switch prevents movement of the cage (30) when the safety gear is activated.
11. Use of a device according to any one of claims 1 to 10 for preventing unintended movement of a lift cage during assembly of a lift installation, wherein the device can be so mounted on a lift cage (30) by an engineer that the actuating element (1, 1') is disposed in the first position (P1) and is brought by the engineer into the second position (P2) before the cage (30) is moved.