

Method of constructing a lift installation, and lift installation for that purpose

The invention relates to a method of constructing a lift installation according to the introductory part of claim 1 and to a lift installation for that purpose according to the introductory part of claim 10.

In the erection of multi-storey buildings the number of storeys to be served in the course of the basic building work, and the travel height of the lift installation, increase. For each increase in the travel height the engine room of the lift installation together with the drive unit and cable rollers has to be correspondingly raised.

A method of increasing the travel height of a lift installation is described in laid-open specification DE 1 900 971, in which the engine room is raised by the lifting mechanism of a scaffolding company. For that purpose a hook of the lifting mechanism is hooked into a wire cable loop provided at the engine room. The entire engine room with lift cage mounted thereon is raised to such an extent that the engine bearers, by which the engine room was fastened in the previous installation position, can be removed. After removal of the engine bearers, the engine room and lift cage are raised somewhat above the new installation position. The engine room is fastened in the new installation position by a new set of engine bearers.

A lifting mechanism, for example a building crane, is additionally needed for use of the known method. This lifting mechanism is usually provided by the construction company responsible for erection of the building. Provision of the lifting mechanism is connected with additional costs not only for the manufacturer of the lift installation, but also for the party ordering the lift installation. Moreover, the lift installation manufacturer is made dependent on the construction company.

The object of the present invention is to indicate a method for construction of a lift installation in which an additional lifting mechanism is not needed. Moreover, it is an object of the invention to provide a lift installation which is particularly suitable for use of the method according to the invention.

The invention fulfils the object through provision of a method with the features of claim 1. In the method according to the invention initially a cross member, which has an

appropriate chain hoist, is arranged above a second installation position. The chain hoist is connected by way of chains with the support plate and the support plate is released from a first installation. The support plate is then raised by the chain hoist from a first installation position to the second installation position. The support plate is mounted in the second installation position.

The method according to the invention for construction of a lift installation does not require an additional lifting mechanism, i.e. an additional crane, in order to increase the travel height of the lift. Costs can thereby be saved. Thus, the lift installation can, with respect to the lifting mechanism no longer needed, be constructed independently of a construction company.

In a first embodiment of the invention the lift cage and the counterweight are secured prior to release of the support plate from the first installation position and the securing is removed again after mounting of the support plate in the second installation position. In that case the cable connection for the drive are detached. In this manner the lift cage and the counterweight are separated from the drive. Correspondingly, a power supply cable is preferably separated from the drive unit prior to release of the support plate from the first installation position and is reconnected with the drive unit after mounting of the support plate in the second installation position.

In a further embodiment of the invention the support cable connection between the drive unit, the lift cage and the counterweight is released after the securing of the lift cage and the counterweight and is produced again after mounting of the support plate in the second installation position.

In a further embodiment of the invention the support plate is released from the first installation position in that the support plate is moved vertically by the traction motor and locking devices, which are provided at the ends of the support plate and which in the mounted state protrude laterally beyond the support plate, are folded against the direction of movement of the support plate. Preferably, for the mounting in the second installation position the locking devices are moved in such a manner that they protrude laterally beyond the support plate, wherein cables and/or chains can be used for the movement of the locking devices. This has the advantage that for change of the installation position from the support plate no support components, such as, for example, mounting bearers,

have to be removed and remounted in the second, higher installation position. The installation position is not changed, the support plate being drawn through the lift shaft.

In a further embodiment of the invention the support plate is released from the first installation position in that the support plate is raised from a rest protruding from a shaft wall into the shaft. In preferred manner the support plate is, for raising to the second installation position, turned through an acute angle to such an extent that it can move through a lift shaft without contacting the shaft walls. In this embodiment of the invention as well the advantage is offered that no bearer components have to be removed from the support plate for the raising.

The object is further fulfilled by a lift installation with the features of claim 10.

The lift installation according to the invention is distinguished by the fact that at least one recess, which serves for mounting the support plate, in a shaft wall is associated with an installation position of a support plate. The support plate can be securely mounted - directly or indirectly - by way of the recess. Moreover, the support plate can be easily released.

In an embodiment of the lift installation a rest protruding into the shaft is associated with the recess at an opposite shaft wall. This measure makes possible simple mounting of the support plate in an installation position and simple release of the support plate from an installation position.

In an alternative embodiment of the lift installation a further recess is associated with the recess at an opposite shaft wall. The support plate is provided at opposite ends with locking devices, wherein the locking devices can be mounted in the recesses. This measure also serves for simple mounting and release of the support plate.

Further advantageous embodiments of the invention are evident from the subclaims and the examples of embodiment illustrated in the following by way of the drawing, in which:

Fig. 1 shows a schematic illustration of a lift installation and a cross member, which has a chain hoist,

Fig. 2 shows a schematic illustration of a part of a lift installation with a support plate in a first embodiment, and

Fig. 3 shows a schematic illustration of a part of a lift installation with a support plate in a second embodiment.

In the figures the same reference numerals denote functionally equivalent components.

A lift installation 1, which comprises a lift shaft 2, a support plate 3 with a drive unit 4 arranged thereon, a lift cage 5 and a counterweight 6, is schematically illustrated in Fig. 1. The support plate 3 with the drive unit 4, the lift cage 5 and the counterweight 6 are provided in the lift shaft 2, wherein the lift cage 5 and the counterweight 6 are arranged below the support plate 3. The drive unit 4, which typically comprises an electric motor, drives a drive pulley 7 around which run one or more support cables 8 connected with the lift cage 5 and the counterweight 6. The constructional space, which is provided for reception of the drive unit 4 and further components required for operation of the lift installation, such as for example a control apparatus (not illustrated), present above the support plate 3 is termed engine room 9 in the following.

The support plate 3 is mounted in a first installation position 10. The mounting of the support plate 3 is illustrated in Fig. 1 in simplified form. A detailed illustration is provided with respect to Figs. 2 and 3. For increase in the travel height of the lift installation 1 up to a second installation position the support plate 3 is essentially to be raised to the height of the second installation position 11 and mounted there. This is signified in Fig. 1 by an arrow. The distance between first and second installation positions 10 and 11 can be, for example, 21 metres.

For this purpose a cross member 12 is mounted above the second installation position 11. Mounting of the cross member 12 can be carried out from pre-erected mounting platforms (not illustrated) which can be made of wood and mounted in the lift shaft 2. The cross member 12 is preferably placed on two brackets 13 which are mounted at the walls (not illustrated in more detail) of the lift shaft 2. The brackets 13 can be anchored in the shaft walls by means of, for example, six fastening elements, for example screws and dowels.

The cross member 12 has a chain hoist 14 which is preferably provided below the cross

member 12. The cross member 12 is mounted above the second installation position 11 in such a manner that sufficient free space for reception of the engine room 9 is present between cross member 12 or - if the chain hoist 14 is arranged below the cross member - between chain hoist 14 and the second installation position 11. The cross member 12 is mounted, for example, 3.5 metres above the second installation position 11. The chain hoist 14 is fastened to corner and/or edge points of the support plate 3 by way of an appropriately dimensioned support chain 15 as well as by way of individual chains 15.2. The chain hoist can be a commercially available chain hoist, such as is known to the expert as, for example, TIRAC hoist. Instead of a chain hoist use can also be made of equivalent traction means such as, for example, a traction hoist co-operating with a belt, etc.

Prior to raising the support plate 3 the lift cage 5 and the counterweight 6 are preferably secured. For securing the lift cage this is set in the safety retainer and connected with guide rails 16 by way of additional safety straps (not illustrated). The counterweight 6 is moved down to the floor of the lift installation and comes to rest there on a buffer 17. Through securing of the lift cage 5 and counterweight 6 a corresponding release of the support cables 6 is possible.

The cable connection formed between the drive pulley 7, the lift cage 5 and the counterweight 6 by the support cable 8 is preferably detached prior to raising the support plate 3 to the second installation position 11. In that case the support cable 8 is removed completely from the drive region. After mounting the support plate 3 in the second installation position 11 it is then drawn in again. The support cable 8 preferably has a length enabling operation to a maximum height of the lift installation 1.

A current supply cable (not illustrated) provided for current supply of the drive unit 4 is separated from the drive unit 4 prior to raising the support plate 3 and secured or demounted in order to prevent fouling of the current supply cable and a risk to persons.

In a given case, scaffolding, mounting platforms or bridge connections to storey roofs, which are installed in the lift shaft between the first installation position 10 and the second installation position 11 and which are not illustrated, have to be removed for the lifting process. Safety rails (not illustrated) provided on the support plate 3 are preferably demounted prior to raising the support platform 3 so as to not obstruct the lifting process.

The drive unit 4, thereagainst, can advantageously remain on the support platform 3 during the lifting process.

The support plate 3 is raised by the chain hoist 14 from the first installation position 10 to the second installation position 11. The support plate 3 is then mounted in the second installation position 11, wherein preferably checking for secure mounting is carried out. After mounting of the support platform 3 the support chain 15 can be detached from the support plate 3. Moreover, after mounting of the support plate 3 safety rails (not illustrated), which may have been removed, are remounted on the support plate 3. Bridge connections to the storey associated with the second installation position 11 can be mounted. The current supply cable can be reconnected with the drive unit 4. The cable connection between the drive pulley 7, the lift cage 5 and the counterweight 6 can be produced again by means of the support cable. If the support cable 8 was completely removed for the lifting process then the support cable 8 can now be drawn up again. The securing of the lift cage 5 and the counterweight 6 can be removed. Subsequently, the lift installation 1 is preferably readjusted and can be placed back in operation. The increase in the travel height of the lift installation 1 can advantageously take place within one working day.

Fig. 2 schematically shows a part of a lift installation in which the support plate 3 is mounted in a first installation position 10. For the mounting of the support plate 3 the lift shaft 2 has, in a shaft wall 18, at least two recesses 19 formed in such a manner that they can receive an end of the support plate 3.

At the opposite shaft wall 20 there is preferably provided a rest 21 which protrudes into the lift shaft 2 and which is arranged in such a manner that it can receive an end of the support of the plate 3 so that the support plate 3 comes to lie substantially horizontally in the recess 19 and on the rest 21. Several rests can also be provided instead of one rest 21. The rest 21 is preferably mounted at that shaft wall 20 in which the access to the storey is provided and, in particular, preferably at the storey roof. The rest 21 can be fastened to the shaft wall 20 by means of screws and dowels 22. In addition, the support plate 3 can be fastened to the rest 21 by means of, for example, screws and dowels 23.

For raising the support plate 3 from the first installation position 10 to a second installation position 11 the support plate 3 is initially raised from the rest 21 by the chain hoist 14,

which is illustrated in Fig. 1, by means of the support chain 15 and thereby released from the first installation position 10. The support plate 3 is then turned through an acute angle to such an extent that it can move through the lift shaft 2 without contacting the shaft walls 18, 20. The support plate is thus raised obliquely or diagonally. This is clarified in Fig. 2 by the support plate 3.1 shown in dashed lines.

A rest 21 is similarly mounted in the second installation position 11, wherein the mounting is carried out as in the first installation position. For mounting of the rest 21 in the second installation position 11 the end of the support plate 3, which is to come to lie on the rest 21, is preferably raised to such an extent that the rest 21 can be mounted in the shaft wall 20.

The support plate 3 is mounted in the second installation position 11 in that one end of the support plate 3 comes to rest in the recess 19 and the opposite end comes to rest on the rest 21. The support plate 3 can be fastened to the rest 21 by means of, for example, screws and dowels 23.

Fig. 3 schematically shows a part of a lift installation in which the support plate 3 is to be mounted in a second installation position 11. At least two recesses 24 and 25, which serve for mounting the support plate 3, are provided in a shaft wall 18 in the second installation position 11 per shaft wall. The support plate 3 has, at opposite ends, rotatable locking devices 26 which are preferably arranged below the support plate 3 and which come to rest in the recesses 24 and 25. In the state of mounting in an installation position 10, 11 the locking devices 26 laterally protrude beyond the support plate 3 and lie in the recesses 24 and 25. Cables 27 by way of which the locking devices 26 can be rotated are preferably arranged at the locking devices 26. Chains can also be used instead of the cables 27.

The support plate 3 is released from a first position 10 in that it is raised by the chain hoist 14, which is illustrated in Fig. 1, by means of the support chain 15. During the raising, the locking devices 26 are moved against the movement direction of the support plate 3. The locking devices 26 preferably fold away downwardly.

The support plate 3 is raised above the height of the second installation position 11, preferably by 0.5 metres. The cables 27 are then tightened in order to rotate the locking

devices 26 so that they protrude into the recesses 24, 25. The rotational movement of the locking device 26 is illustrated in Fig. 3 by dashed-line locking devices. The cables 27 can be actuated from scaffolding (not illustrated) mounted in the lift shaft 2. Actuation of the cables 27 can be carried out, for example, manually or by means of chain hoist. After the locking devices 26 have been rotated so that they laterally protrude beyond the support plate 3 into the recesses 24, 25 the support plate 3 for mounting in the second installation position 11 is lowered by way of the chain hoist 14 and the support chain 15 so that the locking devices 26 come to rest in the recesses 24, 25.

Obviously the support plate 3 according to the example of the embodiment illustrated in Fig. 2 can also be provided with the above-described locking device 26 at least at the end of the support plate 3 associated with the recess 19. For lifting of the support plate 3 the locking device 26 is rotated, in particular folded away downwardly. The support plate 3 is moved horizontally upwards by the locking device 26. For mounting in the second installation position 11 the locking device 26 is moved by means of a cable 27 back into a horizontal position.

Patent claims

1. Method of constructing a lift installation, which comprises a support plate (3) with a drive unit (4) in a first installation position (10), a lift cage (5) and a counterweight (6), wherein the drive unit (4) is connectible with the lift cage (5) and the counterweight (6) by way of a support cable (8), characterised by the following steps:

- mounting of a cross-member (12), which has a chain hoist (14), above a second installation position (11),
- connecting the chain hoist (14) with the support plate (3) by way of a support chain (15),
- releasing the support plate (3) from the first installation position (10),
- raising the support plate (3) by the chain hoist (14) from the first installation position (10) to the second installation position (11) and
- mounting the support plate (3) in the second installation position (11),

wherein the support plate (3) is released from the first installation position (10) in that the support plate (3) is moved vertically by the chain hoist (14) and locking devices (26), which are provided at the ends of the support plate (3) are movable in such a manner that they protrude, in the mounted state, laterally beyond the support plate (3),

characterized in that the locking devices (26) are one or both of rotated against the direction of movement of the support plate (3) and moved by cables or chains.

2. Method according to claim 1, characterised in that the lift cage (5) and the counterweight (6) are secured prior to release of the support plate (3) from the first installation position (10) and after mounting of the support plate (3) in the second installation position (11) the securing is removed.

3. Method according to claim 2, characterised in that the lifting cable connection (8) between the drive unit (4) and the lift cage (5) and the counterweight (6) is released after the securing of the lift cage (5) and the counterweight (6) and is produced again after mounting the support plate (3) in the second installation position (11).

4. Method according to any one of the preceding claims, characterised in that a power supply cable is separated from the drive unit (4) prior to release of the support plate (3) from the first installation position (10) and is reconnected with the drive unit (4) after mounting of the support plate (3) in the second installation position (11).

5. Method according to any one of the preceding claims, characterised in that for mounting of the support plate (3) in the second installation position (11), the locking devices (26) provided at the ends of the support plate (3) are moved in such a manner that they protrude laterally beyond the support plate (3).

6. Method of constructing a lift installation, which comprises a support plate (3) with a drive unit (4) in a first installation position (10), a lift cage (5) and a counterweight (6), wherein the drive unit (4) is connectible with the lift cage (5) and the counterweight (6) by way of a support cable (8), characterised by the following steps:

- mounting of a cross-member (12), which has a chain hoist (14), above a second installation position (11),
- connecting the chain hoist (14) with the support plate (3) by way of a support chain (15),
- releasing the support plate (3) from the first installation position (10),
- raising the support plate (3) by the chain hoist (14) from the first installation position (10) to the second installation position (11) and
- mounting the support plate (3) in the second installation position (11),

wherein the support plate (3) is released from the first installation position (10) in that the support plate (3) is raised from a rest (21) protruding from a shaft wall (20) into a lift shaft (2) and that the support plate (3) for raising into the second installation position (11) is turned to such an extent through an acute angle, that it can move through a lift shaft (2) without contacting the shaft walls (18, 20).

7. Lift installation, which comprises a lift shaft (2), a support plate (3) with a drive unit (4) in a first installation position (10), a lift cage (5) and a counterweight (6), wherein the support plate (3) with the drive unit (4), the lift cage (5) and the counterweight (6) are arranged in the lift shaft (2) and wherein the drive unit (4) is connectible with lift cage (5) and the counterweight (6) by way of a support cable (8), and wherein locking devices (26), which are provided at the ends of the support plate (3) are movable in such a manner that they protrude, in the mounted state, laterally beyond the support plate (3), characterized in that the locking devices (26) are one or both of rotatable arranged at the ends of the support plate (3) and movable or rotatable by cables or chains.

8. Lift installation according to claim 7, characterised in that at least one recess (19, 24, 25), which serves for mounting the support plate (3), in a shaft wall (18, 20) is associated with an installation position (10, 11) and that a further recess (25) is associated with the recess (24) at an opposite shaft wall (20), wherein the locking devices (26), provided at opposite ends of the support plate (3), can each be mounted in a respective recess (24, 25).

9. Lift installation, which comprises a lift shaft (2), a support plate (3) with a drive unit (4) in a first installation position (10), a lift cage (5) and a counterweight (6), wherein the support plate (3) with the drive unit (4), the lift cage (5) and the counterweight (6) are arranged in the lift shaft (2) and wherein the drive unit (4) is connectible with lift cage (5) and the counterweight (6) by way of a support cable (8), wherein at least one recess (19, 24, 25), which serves for mounting the support plate (3), in a shaft wall (18, 20) is associated with an installation position (10, 11) and a rest (21) protruding into the lift shaft (2), which rest (21) serves also for mounting the support plate (3), is associated with the recess (19) at an opposite shaft wall (20).

10. Lift installation according to claim 9, characterised in that the support plate (3), for raising into the second installation position (11), is turnable to such an extent, through an acute angle, that it can be moved through the lift shaft (2) without contacting the shaft walls (18, 20).