

Method of modernising a lift installation

The present invention relates to a method of modernising a lift installation, which comprises a lift cage movable in a shaft by means of a first drive.

In countries with a high population density, such as, for example, in the Asiatic area, there are suburbs or city areas in which there are almost exclusively high apartment blocks or high-rise buildings with up to 20 or 30 storeys. These buildings are often significantly overpopulated and equipped with a lift installation having merely one lift car. A multiplicity of persons thus has to be conveyed within the shortest possible time particularly during the peak times in morning and evening hours. During these peak times the waiting times for the lift then easily lie within the double-figure minute range. Added to this is the fact that demands for living quality also rise in such areas. However, in most cases the construction of a further lift shaft does not come into question for reasons of space or costs.

Measures for modernisation of lift installations are known from, for example, EP 1 319 624 A1 and EP 1 489 033 A1. In EP 1 319 624 A1 a lift installation with two lift cars movable in separate shafts is retrofitted with a destination call control. The destination call control also comprises several storey terminals for the input of destination call notifications or for recognition of identification codes of the user. Moreover, the destination call control comprises at least one computer unit for evaluation of the destination call notifications or for association of destination storeys with recognised destination codes. In addition, a device is provided which uses a destination signal, which is output by the computer unit, in a control signal for control of the respective existing lift control in order to move the lift appropriate for serving a destination call. In this manner a building with several lift shafts can be modernised in such a manner that an additional destination call control is provided so that the lift movable in a first shaft is modernised with modern storey terminals and at the same time the second lift movable in the other shaft is, moreover, operated conventionally with a call notification.

In the method, which is described in EP 1 489 033 A1, for modernisation of a lift installation an existing engine room in the region of the shaft head is converted into a passing space. For this purpose initially the engine room floor is removed. Cage guide rails and counterweight guide rails are subsequently installed near the walls of the shaft

and reach into the newly created passing space. These guide rails are constructed as a self-supporting structure and serve at the same time for supporting the drive and the electrical system. Two lift cages are subsequently installed and are movable at the common guide rails and independently of one another in the shaft.

In this method for modernisation of the lift installation it has proved disadvantageous that extensive rebuilding measures are required, particularly the demounting of the previous guide rails, installing of new guide rails and demounting of the existing drive with subsequent reattachment of this drive.

The invention has the object of proposing a method of modernising a lift installation, which has a first lift cage movable in a shaft by means of a first drive, wherein the method enables an increase in the transport capacity of the lift installation.

According to the invention for fulfilment of this object in a method of the kind stated in the introduction it is provided in correspondence with claim 1 that the method comprises the following steps:

- a) installing of at least one second drive without changing the first drive;
- b) installing at least one second lift cage in the shaft;
- c) connecting the second drive with the second lift cage and
- d) installing and/or configuring a control unit so that this controls the first drive and the second drive.

The method according to the invention is based on the recognition of modernising an existing lift installation, in which a first existing lift cage is movable in a shaft by means of a first drive, in that at least one additional second lift cage with an associated second drive is installed, wherein the first drive remains unchanged, i.e. remains at the originally installed location and maintains the former equipment.

In other words, the invention primarily proposes, in a shaft of a lift installation with a first lift which comprises a first lift cage and a first drive, maintaining this first lift unchanged and within the scope of modernisation installing in the shaft an additional lift comprising a second lift cage and an associated second drive, wherein depending on the respective need or exchange requirement as few existing subassemblies as possible have to be exchanged or added. The first lift cage can remain completely unchanged. Alternatively,

areas possibly visible to the users, such as, for example, the interior space cladding, can be changed or the first lift replaced entirely by a modern lift cage.

In the preferred variant with installation of a new central control unit and connection of this control unit with the first and second drives a possibility is created of moving the first lift cage and the second lift cage in suitable manner independently of one another. Such a new control unit can, however, also be provided additionally to an existing control. If the existing control is equipped in suitable manner, this can also be retained and configured for control of the first drive and the second drive in correspondence with the new requirements. In order to make this possible, also only individual components of the existing control unit can be exchanged.

Moreover, it can be provided that the already present guide rails for the first lift cage are similarly maintained unchanged. In principle, also the previous communications elements, such as, for example, conventional storey call transmitters, can be maintained in the storeys served by the first lift cage after the modernisation.

Overall, the method according to the invention enables an increase in transport capacity, by comparison with the lift installation which existed in the building prior to the modernisation, without building on a further lift shaft being required. Moreover, the possibility is created of being able to continue to use the original existing lift at least in restricted operation even during the reconstruction measures for modernisation. Depending on the funds available, components of the first lift, such as, for example, the inner lining of the first lift cage and/or existing storey call transmitters, can also be renewed.

Advantageous developments of the method according to the invention are described in claims 2 to 11.

In an advantageous development of the method it is provided that the second lift cage is installed in such a manner that the first lift and the second lift cage are guided at guide rails of the first lift cage. In this manner it is possible to dispense with exchange of the existing guide rails. This can also be realised, for example, by means of a hydraulic drive for the second drive. In this connection the hydraulic drive can be equipped with a centrally arranged hydraulic piston, with two hydraulic pistons arranged to be laterally

parallel or with two hydraulic pistons arranged to be laterally offset.

Advantageously the control unit is configured in such a manner that the first lift cage and the second lift cage are movable independently of one another. This has proved particularly advantageous in order to keep the requisite safety spacings between the first and second lift cages and for the case that the first and second lift cages have overlapping areas of responsibility.

In a further advantageous development the control unit is configured in such a manner that the first lift cage and the second lift cage each travel to predetermined storeys. It can then be provided, for example, that all destination calls delivered in a storey region which can be travelled to not only by the first existing lift cage, but also by the second additional lift cage are assigned, for example, as a matter of priority to the second lift cage, since this, for example, makes possible faster travel times. Priorities of that kind can also be established on the basis of other operating parameters, for example in dependence on the operating times or the incidence of transport traffic.

Moreover, the control unit can be configured in such a manner that in the modernisation phase, i.e. while the steps a) to c) are carried out, the first lift cage travels only to predetermined storeys. In other words, the existing lift installation remains in operation even if with restricted service range, i.e. movable over only a smaller number of storeys.

In a further advantageous refinement of the method the control unit is configured in such a manner that the first lift cage can serve a first storey zone and the second lift cage a second storey zone, wherein the first storey zone and the second storey zone preferably have at least one storey in common. In this manner it is possible to create a so-termed interchange zone, i.e., for example, equipping a storey which can be travelled to not only by the first lift cage, but also by the second lift cage. Alternatively, however, this interchange zone can also comprise several storeys each able to be served by the first lift cage and the second lift cage.

In a further advantageous development of the method it is provided that the communications elements which exist for use of the first lift cage are replaced by modern communications units. Thus, conventional storey call transmitters comprising merely input means for announcement of the desired travel direction (upwards or downwards) can be

replaced by modern destination call panels or destination call terminals. By means of such modern storey destination call panels the user can specify not only the desired travel direction, but also the destination storey. Installation of storey terminals enables, for example, an automatic destination call output by means of a mobile telephone or other, preferably wire-free, communications units. The aforesaid modern communications units are, according to the respective need, disposed in data exchange communication with the control unit by means of wire-bound or wire-free data transmission. Moreover, it can also be provided, for example, that an existing conventional cage call transmitter of the first lift cage is replaced by a modern cage panel.

With respect to the design of the second drive there can be provided a drive form which is the same as or different from the first drive. Thus, a driving pulley drive or a hydraulic drive can be installed as second drive. Moreover, the second drive can, depending on whether a lower or an upper building zone is to be equipped with an increased transport capacity, be installed in the region of the pit or the head of the shaft.

The invention is further explained in the following with reference to the drawings, in which:

Fig. 1 schematically shows a schematic vertical section through a lift installation prior to modernisation and

Fig. 2 schematically shows the lift installation according to Fig. 1 after modernisation by means of the method according to the invention.

Fig. 1 schematically shows a lift installation 10, which exists in the building, in the form of a passenger lift. The building has eight storeys 11 to 18 which can be reached by persons in the building by way of the lift installation 10. The existing lift installation 10 comprises a shaft 20 in which merely a first lift cage 30 is arranged to be upwardly and downwardly movable by means of a first drive 32 in the form of a driving pulley drive. The first drive 32 comprises a motor unit and a brake unit (not illustrated), which are arranged in an engine room 22. Guide rails 34 which guide the first lift cage 30 along its travel path are mounted at the inner side of the shaft walls of the shaft 20.

Disposed on the outer side of the shaft walls on each of the storeys is a conventional storey call transmitter 60 comprising an upward button and a downward button, which

make it possible for the user to indicate a travel destination direction (upwardly or downwardly). Moreover, the first lift cage 30 is provided with a conventional cage call transmitter 70 which makes it possible for the user to deliver, after entering the lift cage 30, a destination call with the desired destination storey.

In addition, the lift installation 10 comprises an existing control unit 50 connected with the first drive 32. Moreover, the control unit 50 is disposed in data exchange with all storey call transmitters 60 and the cage call transmitter 70.

On the basis of the afore-described existing lift installation 10 according to Fig. 1 there is described in the following the method according to the invention for modernisation of this lift installation 10, by which the modernised lift installation depicted in Fig. 2 is obtained.

In a first step initially the existing control unit 50 is exchanged for a modern control unit 52. Parallel thereto the conventional storey call transmitter 60 and the cage call transmitter 70 of the first lift cage 30 are removed and modern storey destination call panels 62 are installed in the region of the storeys 11 to 18, and a modern cage panel 72 is installed in the first lift cage 30. All storey destination call panels 62 and the cage panel 72 are connected with the control unit 52, so that a data exchange is possible. Moreover, the first drive 32 is connected with the control unit 52.

The control unit 52 is equipped in such a manner that it can fulfil not only the functions of the former control unit 50, but also the functions of modern controls. After performance of these operations the lift installation 10 is already functionally capable again, i.e. the first lift cage 30 could now already accept again a restricted operation, for example only in the upper storeys.

Next, the newly installed control unit 52 is placed in the mode 'conversion operation', which can be already input in advance or set on site. In this mode the first lift cage 30 is blocked for a specific storey zone which must be kept free for the following installation operations. In addition, a reduced maximum travel speed can also be set. In the case of need, further safety precautions of mechanical nature can also be undertaken, such as, for example, the temporary installation of a safety brake.

A second drive 42 in the form of a hydraulic drive is now installed in the region of the pit of

the shaft 20. The hydraulic drive is indicated in Fig. 2 only schematically and can, for example, be equipped with a centrally arranged hydraulic piston, with two hydraulic pistons arranged laterally parallel or two hydraulic pistons arranged laterally offset.

Furthermore, a second lift cage 40 is installed in the shaft. This installation is carried out in such a manner that the second lift cage 40 is guided in the guide rails 34 which already guide the first lift cage 30. The second drive 42 is connected with the second lift cage 40 so that the second lift cage 40 is movable by the second drive 42. The second lift cage 40 is equipped with a modern cage panel 72. This cage panel 72 and the second drive 42 are connected with the control unit 52.

The now completely modernised lift installation 10 is illustrated in Fig. 2. According to that, disposed in the shaft 20 are a first lift cage 30 and a second lift cage 40 which are movable upwardly and downwardly independently of one another, wherein the first lift cage 30 is driven by a first drive 32 and a second lift cage 40 by a second drive 42. In this connection the first drive 32 comprises a driving pulley drive and the second drive 42 a hydraulic drive. The driving pulley drive can be constructed as a cable drive or belt drive. Alternatively it can be provided to similarly construct the second drive 42 as a driving pulley drive. In this case the engine room 22 present in the shaft head could accept this second drive 42 without the first drive 32 having to be changed.

In the case of need several test journeys for functional checking of the subsequently installed hydraulic lift can now be carried out. After successful conclusion of this test operation the mechanical safety measures undertaken for the first lift cage 30 can be deinstalled or the control unit 52 converted from the mode 'conversion operation' to the mode 'normal operation'.

A predetermined storey association for the two lift cages 30, 40 is provided for the normal operation. In the present example of embodiment, for example, it is provided by way of example that the first lift cage 30 is associated with an upper storey zone B and the subsequently installed second lift cage 40 is associated with a lower storey zone A. In that case the storeys 11, 12, 13 and 14 form the first storey zone A and the storeys 14, 15, 16, 17 and 18 form the second storey zone B. The two storey zones A, B thus overlap in the storey 14, which forms an interchange zone C. Alternatively, the interchange zone can also comprise several storeys. The number of storeys associated with the interchange

zone C can be variably fixed on the basis of operating parameters such as, for example, the time of day or the incidence of transport traffic. In addition, the position of the individual interchange storey or interchange zone C can be defined to be variable.

Instead of installing a new modern control unit 52, the conventional control unit 50 could, in the alternative, be maintained and so adjusted or configured that it can communicate in suitable manner not only with the first drive 32, but also with the second drive 42. In addition, the conventional storey call transmitters 40 and also the cage call transmitter 70 could be retained.

The afore-described variants of the method are distinguished particularly by the fact that with a low outlay, namely with maintenance of the previous lift cage 30 and the associated drive 32, an increase in transport capacity can be achieved in that an additional lift cage 40 and an associated additional drive 42 are installed in the shaft 20. Advantageously, at the same time a modern control unit 52 is installed, which controls the first lift cage 30, the second lift cage 40, the first drive 32 and the second drive 42. Moreover, the method according to the invention makes it possible, during the modernisation measures, to maintain an at least restricted operation by the former first lift cage 30.

Finally, it is expressly mentioned that the method, which for the sake of simplicity was explained by means of only one existing first lift cage 30 and one subsequently installed second lift cage 40, for modernisation of a lift installation can be readily carried out also on a lift installation 10 already comprising several existing lift cages 30 and also several lift cages 40 can be subsequently installed.

Patent Claims

1. Method of modernising a lift installation (10), which comprises a first lift cage (30) movable in a shaft (20) by means of a first drive (32), wherein the method comprises the following steps:
 - a) installing at least one second drive (42) without changing the first drive (32);
 - b) installing at least one second lift cage (40) in the shaft (20);
 - c) connecting the second drive (42) with the second lift cage (40);
 - d) installing or configuring a control unit (50, 52) so that this controls the first drive (32) and the second drive (42) and
 - e) placing the control unit (50, 52) in a conversion operation mode wherein the first lift cage (30) is blocked for a specific floor zone which must be kept free for installation operations according to the steps a) to c).
2. Method according to claim 1, characterised in that the second lift cage (40) is installed in such a manner that the first lift cage (30) and the second lift cage (40) are guided at guide rails (34) of the first lift cage (30).
3. Method according to claim 1 or 2, characterised in that the control unit (50, 52) is configured in such a manner that the first lift cage (30) and the second lift cage (40) are movable independently of one another.
4. Method according to any one of claims 1 to 3, characterised in that the control unit (50, 52) is configured in such a manner that the first lift cage (30) and the second lift cage (40) each travel to predetermined storeys.
5. Method according to any one of claims 1 to 4, characterised in that the control unit (50, 52) is configured in such a manner that the first lift cage (30) travels only to predetermined storeys during the steps (a) to (c).
6. Method according to any one of claims 1 to 5, characterised in that the control unit (50, 52) is configured in such a manner that the first lift cage (30) serves a first storey zone (A) and the second lift cage (40) a second storey zone (B), wherein the first storey zone (A) and the second storey (B) preferably have at least one storey in common.

7. Method according to any one of claims 1 to 6, characterised in that the communications elements (60, 70) existing for the use of the first lift cage (30) are replaced by modern communications units (62, 72).
8. Method according to claim 7, characterised in that existing storey call transmitters (60) are replaced by modern destination call panels (62) or destination call terminals.
9. Method according to claim 7, characterised in that an existing cage call transmitter (70) of the first lift cage (30) is replaced by a modern cage panel (72).
10. Method according to any one of claims 1 to 9, characterised in that a driving pulley drive or a hydraulic drive is installed as second drive (42).
11. Method according to any one of claims 1 to 10, characterised in that the second drive (42) is installed in the region of the pit or the head of the shaft (20).