

Lift system

The invention relates to a lift system according to the introductory part of claim 1.

Lift systems of this kind are known per se, for example from EP 1 329 412 A1. The lift system described there has two lift cages in a common lift shaft, each with a respective drive and with only one, common counterweight.

It is disadvantageous with this known system that inter alia each of the lift cages, due to the special suspension, is not balanced. This can have the consequence of friction and wear at guide rails if the lift cages are asymmetrically loaded. Moreover, audible or detectable knocks occur during travel.

It is now the task of the invention to propose a lift system of the kind stated in the introduction by which the disadvantages of the state of the art are avoided.

According to the invention this object is fulfilled for the lift system of the kind stated in the introduction by the features of independent claim 1.

Preferred developments and details of the lift system according to the invention are defined by the dependent claims.

Further details and advantages of the invention are described in the following by way of example than with reference to the drawing, in which:

Fig. 1A shows a first example of embodiment of the invention, from the side;

Fig. 1B shows the embodiment of the invention illustrated in Fig. 1A, in a section along the line A-A' in Fig. 1A;

Fig. 1C shows the embodiment of the invention illustrated in Fig. 1A, in a section along the line B-B' in Fig. 1A;

Fig. 2 shows a second example of embodiment of the invention with additional tensioning means, in the same illustration as Fig. 1A;

- Fig. 3A shows a second example of embodiment with fastening regions for the support means strands and tensioning means stands in the same region of the cage, for the upper cage in the lower region and for the lower cage in the upper region;
- Fig. 3B shows the upper cage illustrated in Fig. 3A, but with fastening regions for the support means strands and tensioning means strands in the upper region of the cage;
- Fig. 3C shows the lower cage illustrated in Fig. 3A, but with fastening regions for the support means strands and tensioning means strands in the lower region of the cage;
- Fig. 4 shows a third example of embodiment of the invention, with enlarged looping angle of the support means strands about the drive pulleys, in the same illustration as Fig. 1A and Fig. 2;
- Fig. 5 shows a fourth example of embodiment of the invention, similarly with enlarged looping angle of the support means strands around the drive pulleys; and
- Fig. 6 shows Fig. 1B with further details, in enlarged illustration.

The following generally applies to the drawing and the further description:

- The figures are not to be regarded as true to scale.
- The same or similar constructional elements, or constructional elements with the same or similar function, are provided in all figures with the same reference numerals.
- Statements such as right, left, above, below refer to the respective arrangement in the figures.
- Deflecting rollers and deflecting auxiliary rollers are illustrated in sections generally perpendicular to their axes of rotation as black circles.
- Drive pulleys are illustrated generally in sections perpendicular to their axes of rotation as circular or oval lines.
- Those parts or runs of support means strands and tensioning means strands,

which are disposed between one of the lift cages and an upper counterweight deflecting roller, are illustrated by lines differently from those parts of the support means strands and tensioning means strands which are disposed between the other lift cage K2 and the upper counterweight deflecting roller.

- It is additionally indicated for each run by a usual diameter signature and with one of the numerals 1 and 2 whether the corresponding locations respectively relate to a support means strand or tensioning means strand or two support means strands or tensioning means strands; moreover it is indicated which support means strands or tensioning means strands are concerned.
- Looping angle of flexible support means strands around drive pulleys are in general indicated in multiples of 90° , even when these looping angles slightly depart from the indicated values. The looping angles can be substantially influenced by the number, dimension and position of the deflecting rollers. The statements with respect to these parameters of the deflecting rollers in the following description and drawings are therefore to be regarded as examples.

Figs. 1A, 1B and 1C show a first example of embodiment of a lift system 10 according to the invention. These are strongly schematic side views or sections, on the basis of which the fundamental elements of the invention are explained. A lower lift cage K1 and an upper lift cage K2 of the new lift system 10 are disposed one above the other in a common lift shaft 11, in which they can move independently of one another.

A common counterweight 12 is additionally disposed in the lift shaft 11. The counterweight 12 is suspended at an upper counterweight deflecting roller arrangement 12.1 in a so-called 2:1 suspension. A roller arrangement with more than one roller is also to be understood by the term counterweight deflecting roller. A speed of the lower lift cage K1 is indicated by v_1 , a speed of the upper lift cage K2 by v_2 and a speed of the counterweight 12 by v_3 .

A first drive M1 for the lower lift cage K1 and a second drive M2 for the upper lift cage K2 are disposed in the upper region of the lift shaft 11. A first drive pulley 13.1 is coupled with the first drive M1 and a second drive pulley 13.2 is coupled with the second drive M2.

In addition, a first deflecting roller 14.1 is associated with the lower lift cage K1 and a second deflecting roller 14.2 is associated with the upper lift cage K2, the two deflecting

rollers being located in the upper region of the lift shaft 11.

The lower lift cage K1 has, in its upper region, a first fastening point 15.1 on the left and a second fastening point 15.11 on the right. The upper lift cage K2 similarly has, in its upper region, a third fastening point 15.2 on the right and a fourth fastening point 15.22 on the left. The lift cages K1 and K2 are suspended in a so-termed 1:1 suspension at flexible support means TA, TB, as is described in detail further below.

The support means substantially consist of a first support means strand TA and a second support means strand TB, each of which has a first and a second end. The support means strands TA, TB are fixed to the lift cages K1 and K2 at the fastening points 15.1, 15.11, 15.2, 15.22 in such a manner that each of the lift cages K1 and K2 is suspended at each of the support means strands TA and TB. Advantageously each of the support means strands TA and TB is formed by two or more parallel support means elements, such as, for example, by two belts or two cables. Each support means strand TA and TB can, however, also comprise only one belt or one cable. The supporting structure of these support means strands TA and TB is advantageously made of steel, aramide or Vectran.

The first support means strand TA is fastened by its first end at the first fastening point 15.1 to the lower lift cage K1, runs from there upwardly to the first deflecting roller 14.1 and further to the right to the first drive pulley 13.1, around which it is led with a looping angle of at least 90°.

The second support means strand TB is fastened by its first end at the second fastening point 15.11 to the lower lift cage K1 and runs from there upwardly to the first drive pulley 13.1, around which it is led with a looping angle of at least 180°.

The two support means strands TA and TB run from the drive pulley 13.1 together in parallel downwardly to the upper counterweight deflecting roller 12.1, where they are deflected through 180°.

From the upper counterweight roller 12.1 the two support means strands TA and TB run together upwardly in upward direction to the second drive pulley 13.2. The first support means strand TA is led with a looping angle of at least 180° around the second drive pulley 13.2. The second support means strand TB is led with a looping angle of at least

90° around the second drive pulley 13.2. From the second drive pulley 13.2 the first support means strand TA runs downwardly to the third fastening point 15.2 at the upper lift cage K2, at which its second end is fastened. Similarly, from the second drive pulley 13.2 the second support means strand TB runs to the left to the deflecting roller 14.2 and then to the fourth fastening point 15.22 at the upper lift cage K2, at which its second end is fastened.

Figs. 1C and 6 show how the force introduction takes place through the support means strands TA and TB for each of the lift cages K1 and K2 at least approximately centrally symmetrical in such a manner that a tendency of the lift cages to tip about a horizontal tip axis lying in the centre plane E1 is counteracted. This form of suspension is here also termed balanced suspension, which is to ensure that even in the case of asymmetrical loading of the lift cages K1 and K2 a tipping of the same is prevented or that the degree of tipping is kept within manageable limits.

Figs. 1A, 2, 3A, 4 and 5 show an advantageous arrangement of the drive pulleys 13.1 and 13.2 in the uppermost region of the lift shaft. The drive pulleys 13.1 and 13.2 are arranged vertically, i.e. with horizontal axes A1 and A2, as apparent from Fig. 6.

A particularly favourable arrangement with a conflict-free guidance of the support means strands TA and TB is obtained by arranging the drives M1 and M2 to be offset in height one above the other, wherein the offset advantageously at least corresponds with the radius of the drive pulleys 13.1 and 13.2.

In the case of the arrangement described above with reference to Figs. 1A, 1B and 1C the support means strands TA, TB to a certain extent exchange their places, i.e. the support means strand TA is fastened to the lower lift cage K1 on the left and to the upper lift cage K2 on the right and the support means strand TB is fastened to the lower lift cage K1 on the right and to the upper lift cage K2 on the left. It is thus achieved that the overall lengths of the two support means strands TA, TB are not significantly different, which is advantageous with respect to their behaviour, particularly thermal expansion and resilient stretching. However, the support means strands TA, TB can also be arranged uncrossed.

A guide device for the vertical guidance of the cages K1 and K2 in the lift shaft 11 comprises two stationary guide rails 19 which extend vertically along opposite sides of the

lift shaft 11 and are fastened in a manner which is not illustrated. The guide device additionally comprises guide bodies, which are not illustrated. Two guide bodies which cooperate with the respective guide rails 19 are preferably fastened in vertically aligned arrangement at both sides at each of the lift cages K1 and K2. The guide bodies at each side of the cages K1 and K2 are advantageously mounted at a largest possible vertical spacing.

The configuration according to the invention is such that the counterweight 12 is arranged in the region of one of the guide rails 19 and moves, with vertical guidance, similarly along this guide rail 19 at counterweight guide rails (not shown), wherein the guide rail 19 is arranged between the cages K1 and K2 on the one hand and the counterweight 12 on the other hand.

Fig. 2 shows a second example of embodiment of the invention. This comprises all constructional elements described with reference to Figs. 1A, 1B and 1C as well as an additional device (also known as compensating cable tensioning device (ASS)) in order to better tension the support means strands TA and TB and to better guide the lift cages K1 and K2 as well as the counterweight 12.

The lift system 10 according to Fig. 2 comprises for this purpose a lower counterweight deflecting roller 12.2 which is suspended at the bottom at the counterweight 12. A fifth fastening point 15.3 is disposed at the lower region of the lower lift cage K1 at the left bottom and a sixth fastening point 15.33 at the right bottom. A seventh fastening point 15.2 is disposed at the lower region of the upper lift cage K2 at the right bottom and an eighth fastening point 15.44 at the left bottom.

Moreover, two deflecting rollers, which are termed first auxiliary roller 16.1 and second auxiliary roller 16.2, are located in the lower region of the shaft 11 on the left. Moreover, two further deflecting rollers are provided, which are termed third auxiliary roller 17.1 and fourth auxiliary roller 17.2. In addition, the lift system 10 according to Fig. 2 comprises tensioning means which substantially consist of a first tensioning means strand SA and a second tensioning means strand SB.

The first tensioning means strand SA is fastened by its first end at a fifth fastening point 15.3 of the lower lift cage K1 and runs from there around the auxiliary rollers 16.1 and

17.1. The second tensioning means strand SB is fastened at its first end at the sixth fastening point 15.33 of the lower lift cage K1 and runs from there around the auxiliary roller 17.1. The two tensioning means strands SA and SB then run together from the deflecting roller 17.1 to the lower counterweight deflecting roller 12.2, where they are deflected and subsequently led together to the auxiliary roller 17.2. Going out from the auxiliary roller 17.2 the first tensioning means strand SA runs upwardly to the seventh fastening point 15.4 of the upper lift cage K2. Similarly, going out from the auxiliary roller 17.2 the second tensioning means strand SB runs to the auxiliary roller 16.2 and from there upwardly to the eighth fastening point 15.44 of the upper lift cage K2. The statement made with respect to the change of place of the support means strands TA and TB with regard to Fig. 1 equally applies to a crossing of the tension means strands SA and SB.

Advantageously, each of the tensioning means strands SA, SB is formed by two or more parallel tensioning means elements, such as, for example, by two belts or two cables. Each tensioning means strand SA, SB can, however, comprise only one belt or one cable. The supporting structure of these support means strands SA, SB is advantageously made of steel, aramide or Vectran.

Tensioning aids are preferably provided in or at the shaft 11 in the region of the tensioning means strands SA, SB so as to be able to mechanically tension the tensioning means strands SA, SB. These tensioning aids are not shown in the figures.

The first and second fastening regions 15.1, 15.11 as well as the fifth and sixth fastening regions 15.3, 15.33 are either located each on a lower region or an upper region of the cage K1, as shown in Fig. 2, or in common in the lower or upper region of the cage K1, as shown in Figs. 3A and 3B. If the first and second fastening regions 15.1, 15.11 are located in the upper region of the cage K1 and the fifth and sixth fastening regions 15.3, 15.33 in the lower region of the cage K1 then the advantage resides in the use of shorter support means strands TA, TB. In principle, a reverse arrangement of the first and second fastening regions 15.1, 15.11 in the lower region and the fifth and sixth fastening regions 15.3, 15.33 in the upper region of the cage K1 is also possible. If the first and second fastening regions 15.1, 15.11 together with the fifth and sixth fastening regions 15.3, 15.33 are located in the lower or upper region of the cage K1 the advantage resides in the simple construction of the cage K1. The force-introducing structure then substantially consists of a single beam.

Analogous arguments also apply to the third, fourth, seventh and eighth fastening regions 15.2, 15.22, 15.4, 15.44, which are located either in common in the upper or lower region of the cage K2, as shown in Figs. 3A and 3C, or each in an upper region or lower region B2 of the cage K2, as shown in Fig. 2. If the seventh and eighth fastening regions 15.4, 15.44 are located in the lower region B2 of the cage K2 and the third and fourth fastening regions 15.2, 15.22 in the upper region of the cage K2 the advantage resides in the use of shorter tensioning means strands SA, SB. In principle, a reverse arrangement of the third and fourth fastening regions 15.2, 15.22 in the lower region and the seventh and eighth fastening regions 15.4, 15.44 in the upper region of the cage K2 is also possible. If the seventh and eighth fastening regions 15.4, 15.44 together with the third and fourth fastening regions 15.2, 15.22 are located in the upper or lower region of the cage K2 the advantage resides in the simple construction of the cage K1. The force-introducing construction then substantially consists of a single beam.

The forms of positioning, which are shown in Figs. 2, 3A, 3B and 3C, of the fastening regions 15 are also analogously usable for the following examples of embodiment shown in Figs. 4 and 5. In addition, it will be clear to the expert that the examples of embodiment of Figs. 4 and 5 can similarly be equipped with an ASS system according Figs. 2, 3A, 3B, 3C.

Fig. 4 shows an example of embodiment similar to Fig. 1, in fact without the shaft 11, but with a different guidance of the support means strands TA and TB in order to improve the traction thereof or in order to ensure the traction thereof by a looping angle of the support means strands TA, TB around the drive pulleys of more than 90° and preferably from 180° to 270°.

For this purpose, according to Fig. 4 the first support means strand TA runs upwardly from the first fastening point 15.1 to the lower lift cage K1 and around the deflecting roller 14.1 and from there to the right to the first drive pulley 13.1. The first support means strand TA is then led in a first looping phase, as in the case of the arrangement according to Fig. 1, through 90° and subsequently through a further 90° around the first drive pulley 13.1. From there it passes to the left and thus back to the deflecting roller 14.1 and from this again to the right to the first drive pulley 13.1, around which it is now guided in a second looping phase once more along at least 90°. The entire looping angle of the first support

means strand TA around the first drive pulley 13.1, which according to Fig. 1 is 90° , is now, according to Fig. 4, 270° . Of that, 180° is apportioned to the first looping phase and 90° to the second looping phase. From the first drive pulley 13.1 the first support means strand TA runs downwardly to the counterweight deflecting roller 12.1 and subsequently upwardly to the second drive pulley 13.2. The first support means strands TA is then led 180° around the drive pulley 13.2 and finally passes to the third fastening point 15.2 at the upper lift cage K2.

The second support means strand TB runs from the second fastening point 15.11 at the lower lift cage K1 around the first drive pulley 13.1, wherein its looping angle around the first drive pulley 13.1 is 180° . Going out from the first drive pulley 13.1 the second support means strand TB runs, together with the first support means strand TA, to the upper counterweight deflecting roller 12.1 and from this upwardly to the second drive pulley 13.2. There the second support means strand TB is led in a first looping phase with a looping angle of 90° around the second drive pulley 13.2. From the second drive pulley 13.2 the second support means strand TB then passes to the left to the deflecting roller 14.2, where it is deflected through 180° and is thus led back to the right to the second drive pulley 13.2. Here it is led in a second looping phase once more around the drive pulley 13.2 and, in particular, this time with a looping angle of 180° . In addition, it is led once again to the left to the deflecting roller 14.2 and from this it finally goes downwardly to the fourth fastening point 15.22 of the upper lift cage K2. The entire looping angle of the second support means strand TB around the second drive pulley 13.2, which according to Fig. 1 is 90° , is now, according to Fig. 4, 270° . Of that, 90° is apportioned to the first looping phase and 180° to the second looping phase.

Fig. 5 shows a further form of embodiment of the new lift system 10 in which similarly, as according to Fig. 4, looping angles around the drive pulleys 13.1, 13.2 by more than 90° are achieved, wherein this is shown in Fig. 5 merely with respect to the upper lift cage K2 and the second drive pulley 13.2. The upper lift cage K2, the counterweight 12 with the upper counterweight deflecting roller 12.1, the deflecting roller 14.2, the drive pulley 13.2 and those runs of the support means strands TA and TB which are disposed on the one hand between the fastening points 15.2 and 15.22 and the upper counterweight deflecting roller 12.1 are illustrated. The form of embodiment shown in Fig. 5 comprises additional deflecting rollers 14.3 and 14.4.

The first support means strand TA runs, going out from the third fastening point 15.2, upwardly to the deflecting roller 14.4 and further to the drive pulley 13.2, along which it is guided in a first looping phase through approximately 90° . From there the first support means strand TA runs downwardly, around the deflecting roller 14.3 and back to the drive pulley 13.2, along which it is now led in a second looping phase through approximately 180° . Overall, the support means TA thus encircles the drive pulley 13.2 by 270° . From the drive pulley 13.2 the support means strand TA runs downwardly to the counterweight deflecting roller 12.1.

The second support means strand TB runs, going out from the fourth fastening point 15.22 at the upper lift cage K2, upwardly to the deflecting roller 14.2 and further to the drive pulley 13.2, around which it is led in a first region phase through approximately 90° . From there the second support means strand TB runs downwardly, around the deflecting roller 14.3 and further to the drive pulley 13.2, along which it is now led in the second looping phase through approximately 180° . Overall the support means strand TB thus encircles the drive pulley 13.2 by 270° . The second support means strand TB, together with the first support means strand TA, subsequently runs downwardly to the counterweight deflecting roller 12.1. The further course of the support means strands TA and TB is not illustrated, but is clearly evident to any expert from the above description.

Fig. 6 is an enlarged illustration of Fig. 1B, in which details are shown which do not appear or are not clearly apparent in Fig. 1B. Illustrated are, in particular, the vertical centre plane E1, which is defined by the two longitudinal axes of the guide rails 19, and the vertical centre plane E2 oriented perpendicularly thereto. The two centre planes E1 and E2 intersect at a vertical centre axis, which is visible in Fig 6 only as an uppermost point X.

Not only the first fastening point 15.1, but also the second fastening point 15.11 at the lower lift cage K1 are spaced from the first centre plane E1 and, in particular, by paths s_1 which are the same or at least approximately the same. The two fastening points 15.1, 15.11 lie on opposite sides of the first centre plane E1 and the second centre plane E2 in order to achieve the balanced suspension of the lower lift cage K1. They are preferably arranged rotationally symmetrically or at least approximately rotationally symmetrically with respect to a point on the vertical centre axis. However, depending on the respective application a uniform spacing s_1 in relation to the plane E1 suffices.

Equally, the third fastening point 15.2 and the fourth fastening point 15.22 at the upper lift cage K2 are spaced from the first centre plane E1 and, in particular, by paths s_2 which are the same or at least approximately the same. The two fastening points 15.2, 15.22 lie on opposite sides of the first centre plane E1 and the second centre plane E2 and in each instance also on different sides of the two centre planes from the fastening points 15.1 and 15.11. This arrangement also achieves a balanced suspension. They are preferably arranged rotationally symmetrically or at least approximately rotationally symmetrically with respect to the point X on the vertical centre axis. However, depending on the respective use a uniform spacing s_2 with respect to the plane E1 suffices.

It is achieved by this special arrangement of the fastening points 15.1, 15.11 or 15.2, 15.22 that the lift cages K1 and K2 are suspended in balanced manner in such a way that tipping movements of the lift cages about horizontal tip axes, which lie in the vertical centre plane E1, are largely prevented.

The first drive pulley 13.1 has a first axis A1 and the second drive pulley 13.2 a second axis A2. The deflecting roller 14.1 has a third axis A3 and the deflecting roller 14.2 a fourth axis A4.

The projections of the first axis A1 and the second axis A2 intersect at a point P on the first centre plane E1 and include an angle W. This angle W preferably lies between 180 degrees and 90 degrees.

Due to the fact that the two cages K1, K2 are connected by way of common support means TA, TB with only one counterweight 12 and due to the special form of 1:1 suspension of the cages K1, K2 and the 2:1 suspension of the counterweight 12 different speeds v_1 , v_2 and v_3 result according to the respective travel situation. If the cage K1 moves upwardly at the speed v_1 while the cage K2 is stationary the counterweight 12 then moves downwardly at $v_3 = v_1/2$. If the cage K2 moves downwardly at the speed v_2 while the cage K1 is stationary the counterweight 12 then moves upwardly at $v_3 = v_2/2$. If the cages K1, K2 move towards one another at the same speed $v_1 = v_2$ then v_3 is equal to zero. If the cage K1 and the cage K2 move downwardly at the same speed $v_1 = v_2$ the counterweight 12 then moves upwardly and $v_3 = v_1 = v_2$.

CLAIMS:

1. Lift system (10) with
 - a lower lift cage (K1),
 - an upper lift cage (K2),
 - a counterweight (12),
 - a first drive (M1) for driving the lower lift cage (K1),
 - a second drive (M2) for driving the upper lift cage (K2),
 - two parallelly extending guide rails (19), which lie in the region of a vertical centre plane (E1) and between which the lower lift cage (K1) and the upper lift cage (K2) are guided and
 - with a support means (TA, TB) for the lift cages (K1, K2) and the counterweight (12),
 characterised in that the support means (TA, TB)
 - comprises a first support means strand (TA) with a first and a second end and
 - a second support means strand (TB) with a first and a second end, wherein
 - the lower lift cage (K1) is suspended
 - on a first side of the centre plane (E1) and a first side of a second vertical centre plane (E2), which is oriented perpendicularly to the first centre plane (E1), at the first end of the first support means strand (TA) and
 - on the second side of the first centre plane (E1) and the second side of the second centre plane (E2) at the first end of the second support means strand (TB), and
 - the upper lift cage (K2) is suspended
 - on the first side of the first centre plane (E1) and the second side of the second centre plane (E2) at the second end of the first support means strand (TA) and
 - on the second side of the first centre plane (E1) and the first side of the second centre plane (E2) at the second end of the second support means strand (TB).

2. Lift system (10) according to claim 1, characterised in that in the upper region of the lower lift cage (K1)
 - the first end of the first support means strand (TA) is fastened at a first fastening point (15.1) and

- the first end of the second support means strand (TB) is fastened at a second fastening point (15.11),

wherein spacings (s1) of the two fastening points (15.1, 15.11) from the first centre plane (E1) are at least approximately equal.

3. Lift system (10) according to claim 1, characterised in that in the lower region of the lower lift cage (K1)

- the first end of the first support means strand (TA) is fastened at a first fastening point (15.1) and
- the first end of the second support means strand (TB) is fastened at a second fastening point (15.11),

wherein spacings (s1) of the two fastening points (15.1, 15.11) from the first centre plane (E1) are at least approximately equal.

4. Lift system (10) according to claim 2 or 3, characterised in that the first fastening point (15.1) and the second fastening point (15.11) lie laterally adjacent to the lower lift cage (K1) in order to guide the first support means strand (TA), starting from the first fastening point (15.1), and the second support means strand (TB), starting from the second fastening point (15.11), upwardly and laterally past the upper lift cage (K2).

5. Lift system (10) according to claim 1 to 4, characterised in that in the upper region of the upper lift cage (K2)

- the second end of the first support means strand (TA) is fastened at a third fastening point (15.2) and
- the second end of the second support means strand (TB) is fastened at a fourth fastening point (15.22),

wherein spacings (s2) of the two fastening points (15.2, 15.22) from the first centre plane (E1) are at least approximately equal.

6. Lift system (10) according to claim 1 to 4, characterised in that in the lower region of the upper lift cage (K2)

- the second end of the first support means strand (TA) is fastened at a third fastening point (15.2) and
- the second end of the second support means strand (TB) is fastened at a fourth fastening point (15.22),

wherein spacings (s2) of the two fastening points (15.2, 15.22) from the first centre plane (E1) are at least approximately equal.

7. Lift system (10) according to claim 1, characterised in that the first support means strand (TA), starting from a first fastening point (15.1) at the lower lift cage (K1),

- runs upwardly over a first deflecting roller (14.1), from the latter laterally over a first drive pulley (15.1), which is driven by the first drive (M1), to an upper counterweight deflecting roller (12.1), which supports the counterweight (12), from the latter
- upwardly around a second drive pulley (13.2), which is driven by the second drive (M2), and from the latter
- downwardly to a third fastening point (15.2) at the upper lift cage (K2),

wherein the section of the first support means strand (TA) disposed between the first fastening point (15.1) and the first deflecting roller (14.1) is led laterally past the upper lift cage (K2) and that the second support means strand (TB), starting from a second fastening point (15.11) at the lower lift cage (K1), runs

- upwardly around the drive pulley (13.1), which is driven by the first drive (M1), from the latter
- downwardly to the upper counterweight deflecting roller (12.1), which supports the counterweight (12), and from the latter
- upwardly around the second drive pulley (13.2), which is driven by the second drive (M2), from the latter
- laterally to a second deflecting roller (14.2) and then
- downwardly to a fourth fastening point (15.22) at the upper lift cage (K2),

wherein the section of the second support means strand (TB) disposed between the second fastening point (15.11) and the first drive pulley (13.1), which is driven by the first drive (M1), is led laterally past the upper lift cage (K2).

8. Lift system (10) according to claim 1, characterised in that the support means strands (TA, TB) loop around the drive pulleys (13.1, 13.2) in two looping phases in total by more than 180°.

9. Lift system (10) according to claim 8, characterised in that

- the first support means strand (TA), starting from the first fastening point (15.1) at the lower lift cage (K1), after deflection by the first deflecting roller (14.1) and after looping around the first drive pulley by 90° in a first looping phase loops around the

first drive pulley (13.1) in this first looping phase by a further 90° , runs again to the first deflecting roller (14.1) and back to the first drive pulley (13.1) and loops around this in a second looping phase again by 90° , and that

- the second support means strand (TB), starting from the fourth fastening point (15.22) at the upper lift cage (K2), after deflection by the second deflecting roller (14.2) and after looping around the second drive pulley (13.2) by 90° in a first looping phase loops around the second drive pulley (13.2) in this first looping phase by a further 90° , runs again to the deflecting roller (14.2) and back to the second drive pulley (13.2) and loops around this in a second looping phase again by 90° .
10. Lift system (10) according to claim 9, characterised in that
- a third deflecting roller (14.3) for deflection of the two support means strands (TA, TB) and
 - a fourth deflecting roller (14.4) for deflection of the first support means strand (TA) are arranged and that
 - the first support means strand (TA), starting from the third fastening point (15.2) at the upper lift cage (K2), is led via the fourth deflecting roller (14.4) to the second drive pulley (13.2), loops around the second drive pulley (13.2) in a first looping phase by 90° , runs from there to the third deflecting roller (14.3) and back to the second drive pulley (13.2) and loops around this in a second looping phase again by at least 180° , and that
 - the second support means strand (TB), starting from the first fastening point (15.22), runs via the second deflecting roller and, after looping around the second drive pulley (13.2) by 90° in a first looping phase, to the third deflecting roller (14.3) and back to the second drive pulley (13.2) and loops around this in a second looping phase again by at least 180° .
11. Lift system according to any one of the preceding claims, characterised in that tensioning means (16.1, 16.2, 17.1, 17.2, 12.2, SA, SB) which exert a downwardly directed tension force on the lift cages (K1, K2) are provided.
12. Lift system (10) according to claim 11, characterised in that the tensioning means (16.1, 16.2, 17.1, 17.2, 12.2, SA, SB) comprise
- a first tensioning means strand (SA) with a first end and a second end,

- a second tensioning means strand (SB) with a first and a second end,
- a fifth fastening point (15.3) at the lower region of the lower lift cage (K1) for fastening the first end of the first tensioning means strand (SA),
- a sixth fastening point (15.33) at the lower region of the lower lift cage (K1) for fastening the first end of the second tensioning means strand (SB),
- a seventh fastening point (15.4) at the lower region of the upper lift cage (K2) for fastening the second end of the first tensioning means strand (SA),
- an eighth fastening point (15.44) at the lower region of the upper lift cage for fastening the second end of the second tensioning means strand (SB),
- four deflecting auxiliary rollers (16.1, 16.2, 17.1, 17.2) and
- a lower counterweight deflecting roller (12.2), which is suspended at the counterweight (12), wherein

the first tensioning means strand (SA) runs from the fifth fastening point (15.3) at the lower lift cage (K1) downwardly and around the first auxiliary roller (16.1), from the latter laterally and around the third auxiliary roller (17.1), from the latter upwardly and around the lower counterweight deflecting roller (12.2), from the latter downwardly and around the fourth auxiliary roller (17.2) and from the latter upwardly to the seventh fastening point (15.4) at the upper lift cage (K2), wherein the second tensioning means strand (SB) runs from the sixth fastening point (15.33) at the lower lift cage (K1) downwardly and around the third auxiliary roller (17.1), from the latter upwardly and around the lower counterweight deflecting roller (12.2), from the latter downwardly and around the fourth auxiliary roller (17.2), from the latter laterally and around the second auxiliary roller (16.2) and from the latter upwardly to the eighth fastening point (15.44) at the upper lift cage (K2), and wherein the section of the first support means strand (SA) running between the seventh fastening point (15.4) at the upper lift cage (K2) and the fourth auxiliary roller (17.2) as well as the section of the second tensioning means strand (SB) running between the eighth fastening point (15.44) and the second auxiliary roller (16.2) are led laterally past the lower lift cage (K1).

13. Lift system (10) according to one of the preceding claims, characterised in that the support means strands (TA, TB) are formed from cables or belts.

14. Lift system (10) according to claim 11 or 12, characterised in that the tensioning means strands (SA, SB) are formed from cables or belts.