Mechanism for indenting a safety gear for an elevator car

The invention concerns a mechanism for indenting a safety gear for an elevator car or for a counterweight consisting of an overspeed governor supervising the speed of an elevator car, which is connected by means of hoist rope with the counterweight, whereby the motion of the elevator car or respectively of the counterweight is transferable to the overspeed governor by means of a governor rope and said overspeed governor triggers the stopping of the elevator installation in case of overspeed.

An overspeed governor supervising the driving speed of an elevator car is known from the patent document DE 36 15 270 C2. The elevator car moves a pulley with integrated locking rim over a wire rope. A valve timing gear displaces a swing catch with a swing lever in oscillating motions. An operating lever is fixed on the swing lever in a rotational manner, and said operating lever is held in a rest position opposite the swing lever by means of a retaining mechanism. The upper end of the operating lever is developed as operating bow, at the lower end is located the releasing catch, protuberant opposite a swing catch. Both catches are placed between two locking rim teeth whenever the swivel-join roller stands on a cam. When the swivel-join roller stands between two cams, both catches are raised from the track of the locking rim teeth. In that way, the locking rim teeth passes without acting on the catches. In case of overspeed, the swivel-join roller raises from the valve timing gear. The release catch remains immersed in the locking rim track. A locking rim tooth acts on the release catch and drives out the operating lever. In that way, the operating bow switches off the gear via a switch. With further rise of the car speed, the swing catch dips into the locking rim track and blocks the pulley over the locking rim teeth. The force for the release of a safety gear is developed through the friction in the rope groove.

A disadvantage of the well-known mechanism lies in the fact that the stopping of the elevator car can also take place if no necessity exists.

Here the invention wants to create remedy. The invention, as characterised in claim 1, responds to the objective of avoiding the disadvantages of the well-known mechanisms and of creating a mechanism, which stops the elevator car only in an emergency.

The advantages reached by the invention are to be seen essentially in the fact that during a travel on the hoistway pit buffer or during test travels, the force of inertia of the governor rope does not release the safety gear unnecessarily. The loosening of the elevator car or of the counterweight from the interceptor requires substantial effort. Besides, the wedges of the safety gear can damage the safety rails. With the mechanism conforming to the invention, the stopping of the elevator car by considerable hoisting heights is ensured in an emergency.

With the help of the enclosed figures, the invention will be described more in detail.

They show:

Fig. 1 a schematic view of an elevator installation with the mechanism for stopping the elevator installation as according to the invention,

Fig. 2 a schematic view of an overspeed governor for operating a rope brake acting on the governor rope,

Fig. 3 details of a release mechanic for engaging a safety gear operable by means of a governor rope,

Fig. 4 details of the release mechanics and

Fig. 5 details of a locking element for the production of a retaining force.

In Fig. 1 an elevator car travelling in an elevator shaft 1.1 is marked with 1, and such elevator car is connected with a counterweight by means of a hoist rope guided over a driving disk. Driving disk, hoist rope and counterweight are not represented. A car door 1.2 locks the elevator car 1. Safety rails 1.3 lead the elevator car 1 on its way. For monitoring the speed of the elevator car 1, respectively of the counterweight, an overspeed governor 5 operating on the swing lever principle is for example provided, whereby the movement of the elevator car 1, respectively of the counterweight, is transferred to the overspeed governor 5 by means of a governor rope 6. For example for speed monitoring, governors working on the centrifugal force principle or on the mass inertia principle can also be used. The governor rope 6 extends itself over the entire shaft height and it is deviated at the lower shaft end by means of a deflection sheave 7 and stretched by means of a counterweight 7.1 as well as led at the upper shaft end over a pulley 17 of the overspeed governor 5. The ends of the governor rope 6 are fastened at the release mechanic 8, which is arranged on the elevator car 1, and such release mechanic 8 operates in an emergency a safety gear 9, which is arranged on the elevator car 1. With overspeed of the elevator car 1 in the downward direction, a rope brake 15 is released by means of an actuating mechanic 14.

Fig. 2 shows details of the overspeed governor 5, the actuating mechanic 14 and the rope brake 15. The governor rope 6 is directed to a rope groove over a pulley 17, which is placed in a rotational manner on a first axle 16. The first axle 16 is carried from a housing 18. A locking rim 19 with locking rim teeth 20 and a valve timing gear 21 with cams 22 are arranged on the pulley 17. The housing 18 carries a second axle 23, on which a swing lever 24 with a swivel-join roller 25 are fixed in a rotational manner. With normal speed, the swivel-join roller 25 follows

the cam track of the valve timing gear 21 constituted through the cam 22. With overspeed, the swivel-join roller 25 is not able to follow the cam track any longer due to the inertia of the swing lever 24.

At the end of the swing lever 24, laying opposite the swivel-join roller 25, is an operating lever 27 arranged in a rotational manner on a third axle 28 of the swing lever 24. The operating lever 27 is held in a rest position by means of a retaining mechanism, for example by means of a catcher relative to the swing lever 24. A second catch 29 of the operating lever 27 dips with normal velocity of the elevator car 1 between two locking rim teeth 20, when the swivel-join roller 25 stands on a cam 22 and is raised from the track of the locking rim teeth 20 when the swivel-join roller 25 stands between two cams 22. With overspeed of the elevator car 1 in the downward direction, the second catch 29 stops between two locking rim teeth 20, whereby the left flank of the following locking rim teeth 20 appears on the second catch 29 and shifts the operating lever 27 in a clockwise rotation. The locking rim 19 and thus the pulley 17 and the governor rope 6 move on. By the clockwise rotation of the operating lever 27, an operating leg 30 of the operating lever 27 shifts a second release lever 31 of the rope brake 15 into an counter-clockwise rotation around a fourth axle 32 of the rope brake 15, whereby a brake block 34 is released. The brake block 34 moves downwards and by means of a compression spring 33 is pressed against at least a counter-block 35 arranged on the housing 18, whereby between the blocks 34, 35 the running governor rope 6 is braked. In Fig. 2, an auxiliary rope brake with an auxiliary block 34.2 and with a compression spring 33.2 are provided, which are connected with the compression spring 33 by means of a bar 34.1 in an articulated way. Depending upon hoisting height, further auxiliary blocks, compression springs and bars can also be provided.

At the end of the swing lever 24, laying opposite the swivel-join roller 25, a first catch 26 is arranged, which with normal velocity of the

elevator car 1 dips between two locking rim teeth 20, when the swivel-join roller 25 stands on a cam 22 and is raised from the track of the locking rim teeth 20 when the swivel-join roller 25 stands between two cams 22. With overspeed of the elevator car 1 in the downward direction, the first catch 26 stops between two locking rim teeth 20, whereby the left flank of the following locking rim tooth 20 appears on the first catch 26 and blocks the locking rim 19 and thus the pulley 17.

By the relative motion of the elevator car 1 opposite the governor rope 6 is the safety gear 9 indented by means of the release mechanics 8 and the elevator car 1 fastened at the safety rails 1.3.

Fig. 3 shows details of the release mechanics 8 for indenting the safety gear 9 and such release mechanics is operable by means of the governor rope 6.

The elevator car 1 is carried by a supporting frame 1.4 with a lower hitch 1.6 and an upper hitch 1.5, whereby the carrying rope, led across the not represented driving disk, is connected on to an end with the upper hitch 1.5 and on the other end with the not represented counterweight. At the lower hitch 1.6 is arranged a safety gear 9 for each safety rail 1.3, and such safety gear stops the elevator car 1 in an emergency. The elevator car 1 moves the pulley 17 of the overspeed governor 5 by means of the governor rope 6, and such overspeed governor 5 releases the rope brake 15 and blocks itself with a certain overspeed of the elevator car 1 in the downward direction. The rope brake 15 and the blocked overspeed governor 5 block also the governor rope 6 led over the deflection sheave arranged on the shaft pit 7, the elevator car 1 however moves far downwards, whereby the blocked governor rope 6 connected with the release mechanics 8 indents the safety gear 9. The release mechanics 8, standing in connection with the governor rope 6, consists of a rotational axis 8.1 with release lever 8.11, on which an operating fork 8.2 indenting the safety gear 9 is arranged. The operating fork 8.2 of the

opposite laying safety gear 9 is operated by means of a connecting cod 8.3 arranged on the rotational axis 8.1. With blocked governor rope 6, the rotational axis 8.1 in a view from the car door 1.2, is turned in the clockwise direction. At the same time, the operating fork 8.2 is lifted at its free end and the safety gear 9 indented.

Fig. 4 shows details of the release mechanics 8, by which the rotational axis 8.1 is fixed at a housing 10 in a rotational manner. The release lever 8.11 arranged on the rotational axis 8.1 is connected with a governor rope 6 and with a retaining spring 11, which increases the releasing force applied through the governor rope 6. The retaining spring 11 prevents by normal operation unwanted releases of the safety gear 9. The elevator car 1 is stopped only in an emergency.

Fig. 5 shows details of the retaining spring 11 and of a locking element 50 for the production of a release force. The retaining spring 11 consists of two spring halves 11.1, whereby each half of 11.1 presents a cam 11.2. The cams 11.2 are mutually engaged with a pin 11.3 arranged on the release lever 11.3. The spring halves of 11.1 are arranged on a base 11.4 connected with the housing 10. The end of the release lever 8.11 is connected in a rotational manner to an axle 6.2 by an end of rope fixation 6.1 of the governor rope 6. The locking element 50, planned for the test operation, consists in the present example of a wirewrap 50, which comprises the housing 10 and the release lever 8.11. Other locking elements 50, as for example a catcher or an element with a predetermined breaking point, are also possible, whereby the catcher and the predetermined breaking point are dimensioned depending upon hoisting height. The number of wires in the wirewrap depends on the hoisting height. The bigger the hoisting height, more wires the wirewrap has. The release lever 8.11 is fastened at the housing 10 by means of the wirewrap. In an emergency, the overspeed governor 5 blocks together with the rope brake 15 the governor rope 6, whereby the release lever 8.11 breaks the wirewrap 50 and indents the safety gear 9. The force for

breaking the wirewrap 50 is generated by the auxiliary block 34.2 and by the counter-block 35 and transferred on the governor rope 6. The force for breaking the wirewrap 50 is generated by the auxiliary block 34.2, by the compression spring 33.2 and by the counter-block 35 and transferred on the governor rope 6. The force for overcoming the retaining spring 11 is produced in an emergency by the brake block 34 and by the counter-block 35 and transferred on the governor rope 6.

In case of pilot tests and/or with buffer tests at high elevator installations, the release mechanics 8 for the safety gear 9 of the elevator car 1 and/or the counterweight must be fastened in such a way that the safety gear 9 cannot be released by the force of inertia of the governor rope 6. However, the fastening of the release mechanics 8 may not have as a consequence that the safety gear 9 cannot be any more released via the overspeed governor 5 in an emergency. Starting from a certain height of the elevator installation, the necessary force for the establishment of the release mechanics 8 is larger than the release force of the overspeed governor 5. In this case, an auxiliary rope brake is necessary, which provides the force for the release of the established release mechanics 8. The installation, according to the invention, can also be applied to a safety gear of the counterweight.

Claims:

1. Mechanism for indenting a safety gear (9) for an elevator car (1) or for a counterweight consisting of an overspeed governor (5) supervising the speed of an elevator car (1), which is connected by means of hoist rope with the counterweight, whereby the motion of the elevator car (1) or respectively of the counterweight is transferable to the overspeed governor (5) by means of a governor rope (6) and said overspeed governor (5) triggers the stopping of the elevator installation in case of overspeed, characterised by the fact that a release mechanic (8), operable by means of the governor rope (6) is provided and said release mechanic (8) prevents unwanted indenting of the safety gear (9), whereby a locking element (50) for fastening the release mechanics (8) is provided and that an auxiliary rope brake (33.2,34.1,34.2) acting on the governor rope (6) is provided, said auxiliary rope brake (33.2,34.1,34.2) provides the force for the release of the established release mechanic (8).

2. Mechanism in accordance with claim 1, characterised by the fact that the locking element (50) for fastening the release mechanics (8) and/or the auxiliary rope brake (33.2,34.1,34.2,35) are dimensioned depending upon hoisting height.

3. Mechanism in accordance with claims 1 or 2, characterised by the fact that the locking element (50) is a wirewrap, which connects the release mechanics (8) with a housing (10).

4. Mechanism in accordance with one of the preceding claims, characterised by the fact that the auxiliary rope brake presents at least one auxiliary block (34.2), at least one compression spring (33.2) and at least a counter-block (35), which affect the governor rope (6).