

DESCRIPTION

Braking device for a lift

The invention relates to a braking device for a lift with a lift cage and a counterweight, which are movable along guide rails in a lift shaft, wherein the braking device is arranged at the lift cage or at the counterweight and in the case of excess speed stops the lift cage or the counterweight at the guide rails by means of spring elements and brake chocks.

There has become known from the patent specification US 5 782 319 a braking device for a lift, which stops the lift cage in the case of emergency. The lift cage drives, by means of an endless cable, a rotating speed limiter, which blocks in the case of a specific excess speed of the lift cage. The blocked speed limiter also blocks the endless cable, but the lift cage moves further downwardly, wherein the blocked endless cable, which is connected with a release lever mechanism of the braking device, trips the braking device. In that case two guided chocks of the braking device are pushed upwardly. The braking force is generated by friction between the chocks and the guide rail of the lift cage. The braking force is on the one hand dependent on the friction of the chocks on the guide rail and on the other hand dependent on a C-shaped compact spring packet, at the ends of which guides for the chocks are provided.

A disadvantage of the known device consists in that the spring packet and the guides are cast from one piece. The spring packet unit has to be manufactured in accordance with the respective braking force to be exerted, which increases the cost of the braking device.

Here the invention will create a remedy. The invention as characterised in claim 1 meets the object of avoiding the disadvantages of the known device and of creating a brake device with a universal construction for stopping a lift cage or a counterweight.

The advantages achieved by the invention are essentially to be seen in that a simple construction of the braking device is possible. The braking device consists of only a few different components. Further, it is advantageous that the braking device is adaptable, with the same components, to different braking forces. The braking device is thus usable without great outlay for lift cages or counterweights with different masses to be braked. Moreover, the braking device according to the invention offers the possibility of fine

adjustment with respect to the braking force. The spring elements consist of lamellae producible in simple manner. A greater or lesser number of lamellae can be used in accordance with the respective braking force.

The present invention is explained in more detail by reference to the accompanying figures, in which:

- Fig. 1 shows a lift cage with the braking device according to the invention,
- Fig. 2 shows details of the braking device acting on a guide rail,
- Fig. 3 shows a support body with spring elements,
- Fig. 4 shows a section along the line A-A of Fig. 3 and
- Fig. 5 shows a perspective illustration of the support body with the spring elements.

Fig. 1 shows a lift cage 1 movable in a lift shaft which is not illustrated, wherein the lift cage 1 is guided by means of guide rails 2 extending over the shaft height. The lift cage 1 provided with a door 1.1 is carried by a support frame 3 with a lower yoke 4 and an upper yoke 5. A support cable (not illustrated), one end of which is connected with, for example, the upper yoke 5 and the other end of which is connected with a counterweight (not illustrated), is guided over a drive pulley (not illustrated). A respective braking device 6, which stops the lift cage in the case of emergency, is arranged at the lower yoke 4 per guide rail 2. The lift cage 1 drives, by means of an endless cable 7, a rotating speed limiter (not illustrated) which blocks in downward direction in the event of a specific excess speed of the lift cage 1. The blocked speed limiter also blocks the endless cable 7 guided over a tensioning roller (not illustrated) arranged in the shaft pit, but the lift cage 1 moves further downwardly, whereby the blocked endless cable 7 connected with a trigger lever mechanism 8 trips the braking device 6. The trigger lever mechanism 8 connected with the endless cable 7 consists of a rotational axle 8.1 at which an actuating fork 8.2, which trips the braking device 6, is arranged. The actuating fork 8.2 of the opposite braking device 6 is actuated by means of a connecting rod 8.3 arranged at the rotational axle 8.1. When the endless cable 7, also termed limiter cable, is blocked, the rotational axle 8.1 is

rotated in clockwise sense as seen from the cage door 1.1. In that case the actuating fork 8.2 is raised at the free end.

If the braking device is analogously arranged at the upper yoke 5, the lift cage 1 can be stopped in upward direction for cases of emergency. The braking device can also be arranged at the counterweight.

Fig. 2 shows details of the braking device 6 acting on a guide limb 2.1 of the guiderail 2. In order to make the details of the braking device 6 visible the guide rail 2 is illustrated broken away in the region of the braking device 6. The braking device 6 consists of a housing 9 which is arranged at the yoke 4, 5 and which serves as a support for spring packets 10 and/or for adjusting packets 11. The housing 9 also serves as a support and guide for chock guide elements 12, which in turn retain and guide brake chocks 13 with brake linings 14. A pushrod 15 engages at one end at the brake chock 13, and at the other end the pushrod 15 is pivotably connected with the actuating fork 8.2.

The spring packets 10 of modular construction and the adjusting packets 11 of modular construction are detachably connected at each end with a respective one of the wedge guide elements 12 by means of a respective spring bracket 16, wherein lugs 10.1 or 11.1 of the spring packets 10 or adjusting packets 11 prevent the packets 10, 11 from slipping off the chock guide elements 12. The packets 10, 11 are interconnected at each end by means of, for example, a threaded pin 17 and nuts 17.1, wherein first seats 12.2 of the chock guide elements 12 and at least one second seat 9.2 of the housing 9 hold the overall packet consisting of spring packets 10 and adjusting packets 11.

In the illustrated example a spring packet 10 consists of ten lamellae 10.2 of the same thickness and same material. The geometrically somewhat smaller adjusting packets 11 consist, in the illustrated example, of three lamellae 11.2. The lamellae 10.2, 11.2 are, for example, punched out of sheet metal. Other lamella materials or different lamella thicknesses are also possible. The lamellae 10.2, 11.2 can also have a shape departing from the illustrated C shape. The individual spring packets or adjusting packets of the braking device 6 can also have a different number of lamellae. Different spring constants, which have a direct effect on the braking force, can be produced in accordance with the respective number of lamellae, material, lamella thickness or lamella shape.

The chock guide element 12 is guided in first grooves 9.1 of the housing 9 and has an extension 12.1. In the case of normal operation the brake chock 13 is held in rest position by means of the extension 12.1 and the pushrod 15.

In the case of emergency the limiter cable 7 is blocked by the speed limiter detecting excess speed. The actuating fork 8.2 is thereby, as illustrated further above, moved at the pushrod end in the direction of the braking device 6. The brake chocks 13, which are guided in second grooves 12.3 of the chock guide elements 12, with the brake linings 14 slide in the braking device 6. At the same time the brake linings 14 are moved against the guide limb 2.1 of the guide rail 2. Due to the wedge-shaped arrangement of the chock guide elements 12 and the friction between the brake linings 14 on the guide limb 2.1, the brake chocks 13 are moved in the braking device 6 and the spring and adjusting packets 10, 11 stressed, wherein the braking force, which is dependent on the friction constant between the brake linings 14 and the guide limb 2.1 as well as on the spring constant, for stopping the lift cage or the counterweight is generated.

As illustrated in Figs. 3 to 5, the spring packets can be arranged at a support body 20, wherein the support body 20, which is, for example, C-shaped, acts on the chock guide elements 12. The spring packets 21 consist of at least one lamella 21.1 and are laid in grooves 22 of the support body 20. In the illustrated example, three grooves or three spring packets 21 are provided. A greater or lesser number than three grooves 22 can also be provided, wherein the grooves 22 can also be of different widths. The spring packets 21 laid in narrow grooves 22 can serve as adjusting packets. During the braking process the support body 20 and the spring packets 21 are stressed and the braking force for stopping the lift cage or the counterweight is produced. The braking device 6 can be provided with one or more support bodies 20.

Patent Claims:

1. Braking device for a lift with a lift cage and a counterweight, which are movable along guide rails in a lift shaft, wherein the braking device is arranged at the lift cage or at the counterweight and in the case of excess speed stops the lift cage or the counterweight at the guide rails by means of spring elements and brake chocks, wherein the spring elements (10, 11, 21) are of modular construction and by means of the elements different braking forces can be generated, characterised in that spring elements (10, 11, 12) are constructed from lamellae (10.2, 11.2, 21.1) producible in simple manner.
2. Braking device according to claim 1, characterised in that spring packets (10, 21) and/or adjusting packets (11, 21) are provided as spring elements.
3. Braking device according to claim 1 or 2, characterised in that the spring packets (10, 21) or the adjusting packets (11, 21) are C-shaped.
4. Braking device according to claim 3, characterised in that the spring packets (10) or the adjusting packets (11) are detachably connected at the ends with chock guide elements (12) guiding the brake chocks (13).
5. Braking device according to one of claims 1 to 3, characterised in that the spring packets (21) are arranged at a support body (20) which acts on the chock guide elements (12).
6. Braking device according to claim 5, characterised in that the support body (20) has grooves (20) serving for reception of the spring packets (21).