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(54) **SAFETY DEVICE FOR AN ELEVATOR**

SICHERHEITSVORRICHTUNG FÜR EINEN AUFZUG

DISPOSITIF DE SECURITE POUR ASCENSEUR

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- **PATENT ABSTRACTS OF JAPAN** vol. 1997, no. 07, 31 July 1997 (1997-07-31) & JP 09 058942 A (MITSUBISHI DENKI BILL TECHNO SERVICE KK), 4 March 1997 (1997-03-04)
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Description

[0001] The present invention relates to an elevator safety device as defined in the preamble of claim 1.

[0002] When elevators are installed in old buildings, it is often necessary to use solutions that take up as little space as possible. If the spaces at the top and bottom of the elevator shaft are to be enlarged, the work is often either impossible to implement in view of constructional aspects or expensive to carry out. Still, safety spaces for maintenance purposes as required by safety regulations have to be provided above and below the car.

[0003] According to Finnish application 980594, to ensure the required safety space, a safety buffer arrangement provided for maintenance purposes at the bottom of the elevator shaft is known. The safety buffers according to said application can be arranged in the path of the elevator car so as to prevent the car from moving downward beyond a certain distance from the bottom of the shaft and likewise below the counterweight to prevent the car from moving upward beyond a certain distance from the top of the shaft. The safety devices according to this specification are arranged on the bottom of the shaft in a lying position, from which they can be raised into the path of the car or counterweight when necessary. However, when lying on the bottom of the shaft, they take up some space in the vertical direction as well, and so they are not applicable in solutions where the space below the car is very small. Another way of providing a safety space is to use removable buffer beams, which are mounted in place temporarily to allow maintenance operations when a safety space is needed. However, the known solutions occupy a space under the car when it is moving and are difficult to automate.

[0004] The SE-A 456417 shows an elevator with the features of the preamble of claim 1.

[0005] The object of the invention is to disclose a new type of safety device designed to ensure a sufficient space above and below the elevator car in a maintenance situation in the case of elevators having a small shaft space.

[0006] The invention is based on the idea of making as efficient use of the empty space at the shaft bottom as possible so that the safety device need not take up any space in the vertical direction under the car unit (consisting of the car and the car frame) during normal operation of the elevator. Placing the safety device in the space between the counterweight and the car unit on the bottom of the shaft allows it to remain out of the way of the car unit when the latter is moving. When necessary, the safety device of the invention prevents the motion of the car unit by being turned to a position under the car unit, with the result that buffers attached to the underside of the car unit hit the safety device and the car unit stops at a certain height from the shaft bottom.

[0007] The invention is characterized by what is presented in claim 1. Other embodiments of the invention are characterized by what is presented in the other

claims.

[0008] By using a safety device according to the invention, an advantageous implementation of a safety space with a small movement is ensured. The safety device of the invention can be easily automated. Being placed between the car unit and the counterweight, it does not occupy any space under the elevator when the latter is moving. Therefore, it can be used in elevators having a very small space below the car. This safety device can also be used in other types of elevator. The safety device has a plate-like structure that also allows it to function as a guard structure between movable parts in the shaft.

[0009] In the following, the invention will be described in detail with reference to the attached drawings.

Fig. 1 presents a safety device according to the invention

Fig. 2 presents the safety device in normal position.

Fig. 3 presents the safety device in operating position.

[0010] Fig. 1 presents a safety device 1 according to the invention, made of a durable material, such as steel, comprising a plate-like stopping device hinged on the shaft bottom by pivots 6. Fitted on the upper end of the stopping device is a rail 5 provided with two supports 8 designed to meet safety buffers attached to the underside of the car unit 9. The safety buffers may also be mounted on the safety device, and their function is to dampen the impact. The car unit comprises the car and the car frame or only the car. The safety device turns on its pivots 6 between a normal position and an operating position. The safety device also comprises a locking device 7, which locks the safety device 1 in the operating position. The locking device can be opened and closed manually. In addition to the locking device, the safety device also comprises a holding mechanism 20, such as a magnet, designed to hold the safety device in the operating position. The magnet grabs the elevator guide rails. The holding mechanism also holds the safety device in the normal position, with the magnet grabbing a shaft structure and thus holding the device in an upright position. The safety device is provided with a micro switch for identifying its position and giving the elevator control system data indicating a safety guarding position.

[0011] In Fig. 2, the safety device 1 is in the normal position, which is used when the elevator is operating normally between floors. The safety device is placed on the bottom 10 of the shaft in a space 14 between the counterweight and the car unit. The car unit comprises a car 19 and a car frame 18 or only a car 19. Space 14 comprises the space between one outer edge 15 of the car unit and a shaft wall 13, in which space the counterweight 16 is moving. The figure shows the counterweight 16, although in reality it cannot be in the lower part of the shaft when the car unit is at the bottom floor. In the situ-

ation presented in the figure, the car unit 9 has reached the bottom floor. It can be seen that the safety device is well applicable for use in a solution with a small space below the car as it does not take up any space under the car unit when the latter is moving.

[0012] When there is a need to work above the car unit 9 on the top of the car, the car unit is first stopped at a position where the serviceman can get onto the car top after having opened the doors 11. To ensure a top safety space for the serviceman, the top of the car unit is provided with a rail-like safety device 12 that can be turned on the top of the car unit into a safety guarding position.

[0013] Fig. 3 presents the safety device 1 in an operating position, in which it stops the car unit at a certain height from the shaft bottom 10, thus ensuring a safety space. The safety device 1 is mounted on the bottom by pivots 6, of which there are a total of two for one safety device. When a serviceman wants to work on the shaft bottom, he first opens the door on the bottom floor, thereby preventing movement of the elevator. Next, the serviceman enters the shaft pit and releases the safety device 1 from its holding mechanism and turns it into the operating position, into the path of the car unit. The safety device is now locked by the locking device and the holding mechanism, ensuring that a safety space exists in the pit. To restore the normal operating state of the elevator, the safety device is turned into its normal position, the upright position, whereupon the person leaves the pit and the elevator control system is given data indicating that the elevator is allowed to move.

3. Elevator as defined in claim 2, **characterized in that** the stopping device (4) is of a plate-like structure and is mounted on the bottom (10) of the shaft via pivots (6) located at its lower edge.

4. Elevator as defined in claim 2 or 3, **characterized in that** the stopping device (4) has a rail (5) at its upper end.

5. Elevator as defined in any one of the preceding claims, **characterized in that** the safety device comprises a micro switch that gives the elevator control system data indicating a safety guarding position and an inhibition of normal operation.

6. Elevator as defined in any one of the preceding claims, **characterized in that** the safety device comprises a locking device (7) and a holding mechanism (20) for locking the safety device in the operating position.

7. Elevator as defined in claim 4, **characterized in that** the rail (5) of the safety device (1) is provided with supports (8) which in the operating position are hit by safety buffers provided on the underside of the car unit.

8. Elevator as defined in claim 1, **characterized in that** the top of the car unit is provided with a safety rail (12) to implement a sufficient overhead safety space.

Claims

1. Elevator comprising a safety device (1) for implementing a safety space, said elevator comprising an elevator shaft, a shaft bottom (10), a car unit (9), a counterweight (16), landing doors (11), a space (14) defined by an outer edge (15) of the car unit and the corresponding wall (13) of the shaft, in which space the counterweight can be moved, the safety device (1) has been arranged on the bottom (10) of the shaft in the space defined by an outer edge of the car unit and the corresponding shaft wall so that it is not in the path of the counterweight, and that in an operating position the safety device (1) can be brought into the path of the car unit (9), wherein in the normal position, when the elevator is travelling, the safety device (1) is in a substantially up right position relative to the bottom (10) of the shaft, **characterized in that** in the normal position the safety device (1) is located between the car unit (9) and the counterweight (16).
2. Elevator as defined in claim 1, **characterized in that** the safety device comprises a stopping device (4) hinged on the bottom (10) of the shaft.

Patentansprüche

1. Aufzug enthaltend einer Sicherheitseinrichtung (1) zum Bereitstellen eines Sicherheitsraums, welcher Aufzug einen Aufzugsschacht, einen Schachtboden (10), eine Kabineneinheit (9), ein Gegengewicht (16), Stockwerkstüren (11) und einen Raum (14) umfasst, der durch eine Außenkante (15) der Kabineneinheit und die entsprechende Wand (13) des Schachtes definiert ist, in welchem Raum das Gegengewicht bewegt werden kann, wobei die Sicherheitseinrichtung (1) auf dem Boden (10) des Schachtes in dem Raum angeordnet ist, der durch eine Außenkante der Kabineneinheit und die entsprechende Schachtwand definiert ist, sodass sie sich nicht im Weg des Gegengewichts befindet, und dass die Sicherheitseinrichtung (1) in einer Betriebsposition in den Weg der Kabineneinheit (9) gebracht werden kann, wobei in einer normalen Position, wenn der Aufzug fährt, die Sicherheitseinrichtung (1) sich in einer im Wesentlichen aufrechten Position relativ zum Boden (10) des Schachtes befindet, **dadurch gekennzeichnet, dass** die Sicherheitseinrichtung (1) in der normalen Position zwischen der Kabineneinheit (9) und dem Gegengewicht (16) angeordnet ist.

2. Aufzug nach Anspruch 1, **dadurch gekennzeichnet, dass** die Sicherheitseinrichtung eine Stoppeinrichtung (4) aufweist, die an dem Boden (10) des Schachtes angelenkt ist. 5
3. Aufzug nach Anspruch 2, **dadurch gekennzeichnet, dass** die Stoppeinrichtung (4) eine plattenförmige Struktur aufweist und an dem Boden (10) des Schachtes mittels Gelenken (6) montiert ist, die an deren Unterkante angeordnet sind. 10
4. Aufzug nach Anspruch 2 oder 3, **dadurch gekennzeichnet, dass** die Stoppeinrichtung (4) eine Schiene (5) an ihrem oberen Ende hat. 15
5. Aufzug nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Sicherheitseinrichtung einen Mikroschalter hat, der dem Aufzugssteuerungssystem Daten übermittelt, die eine Sicherheitsschutzposition und eine Verhinderung des normalen Betriebs anzeigen. 20
6. Aufzug nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Sicherheitseinrichtung eine Verriegelungseinrichtung (7) und einen Haltemechanismus (20) zum Festlegen der Sicherheitseinrichtung in der Betriebsposition aufweist. 25
7. Aufzug nach Anspruch 4, **dadurch gekennzeichnet, dass** die Schiene (5) der Sicherheitseinrichtung (1) mit Stützen (8) versehen ist, welche in der Betriebsposition durch Sicherheitspuffer an der Unterseite der Kabineneinheit getroffen werden. 30
8. Aufzug nach Anspruch 1, **dadurch gekennzeichnet, dass** die Oberseite der Kabineneinheit mit einer Sicherheitsschiene (12) versehen ist, um einen ausreichenden oberen Sicherheitsraum zu bereitzustellen. 35

Revendications

1. Ascenseur comprenant un dispositif de sécurité (1) pour mettre en oeuvre un espace de sécurité, ledit ascenseur comprenant une cage d'ascenseur, un fond de cage (10), une unité de cabine (9), un contrepoids (16), des portes palières (11), un espace (14) défini par un bord extérieur (15) de l'unité de cabine et la paroi correspondante (13) de la cage, dans lequel espace le contrepoids peut être déplacé, le dispositif de sécurité (1) a été agencé sur le fond (10) de la cage dans l'espace défini par un bord extérieur de l'unité de cabine et la paroi de cage correspondante de telle sorte qu'il n'est pas dans la trajectoire du contrepoids, et que, dans une position de service, le dispositif de sécurité (1) peut être amené sur la trajectoire de l'unité de cabine (9), dans lequel, 45 50 55

en position normale, lorsque l'ascenseur se déplace, le dispositif de sécurité (1) est dans une position essentiellement verticale par rapport au fond (10) de la cage, **caractérisé par le fait que**, en position normale, le dispositif de sécurité (1) est situé entre l'unité de cabine (9) et le contrepoids (16).

2. Ascenseur selon la revendication 1, **caractérisé par le fait que** le dispositif de sécurité comprend un dispositif d'arrêt (4) articulé sur le fond (10) de la cage.
3. Ascenseur selon la revendication 2, **caractérisé par le fait que** le dispositif d'arrêt (4) présente une structure en forme de plaque et est monté sur le fond (10) de la cage par pivots (6) situés sur son bord inférieur.
4. Ascenseur selon la revendication 2 ou 3, **caractérisé par le fait que** le dispositif d'arrêt (4) présente un rail (5) à son extrémité supérieure.
5. Ascenseur selon l'une quelconque des revendications précédentes, **caractérisé par le fait que** le dispositif de sécurité comprend un micro-commutateur qui donne à l'ascenseur des données de système de commande indiquant une position de protection de sécurité et une interdiction de service normal.
6. Ascenseur selon l'une quelconque des revendications précédentes, **caractérisé par le fait que** le dispositif de sécurité comprend un dispositif de verrouillage (7) et un mécanisme de maintien (20) pour verrouiller le dispositif de sécurité en position de service.
7. Ascenseur selon la revendication 4, **caractérisé par le fait que** le rail (5) du dispositif de sécurité (1) est pourvu de supports (8) qui, en position de service, sont frappés par des amortisseurs de sécurité fournis sur la face inférieure de l'unité de cabine.
8. Ascenseur selon la revendication 1, **caractérisé par le fait que** le dessus de l'unité de cabine est pourvu d'un rail de sécurité (12) pour mettre en oeuvre un espace de sécurité supérieur.

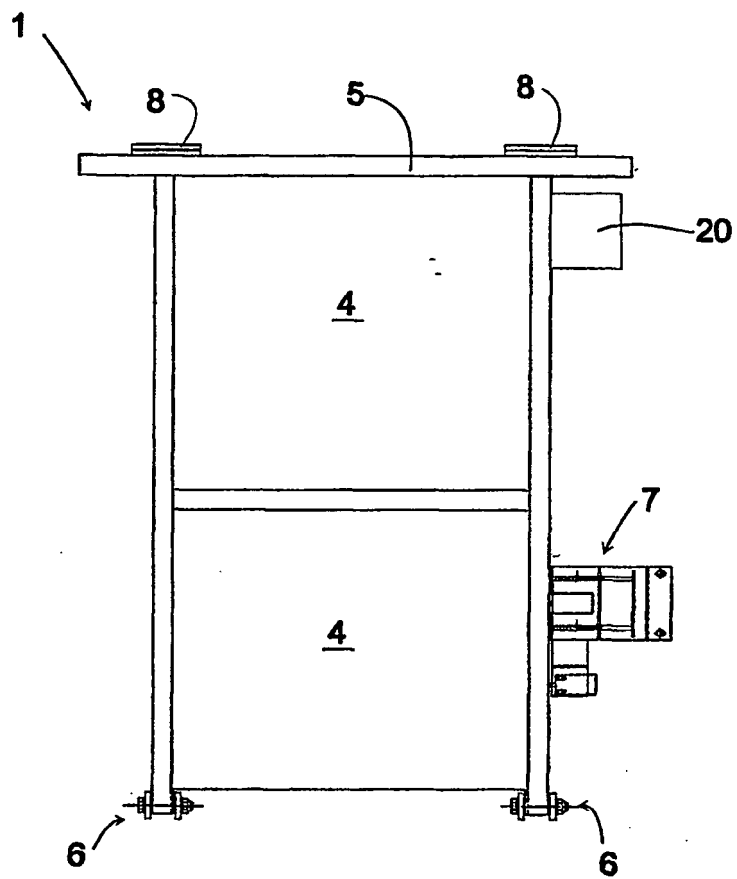


Fig. 1

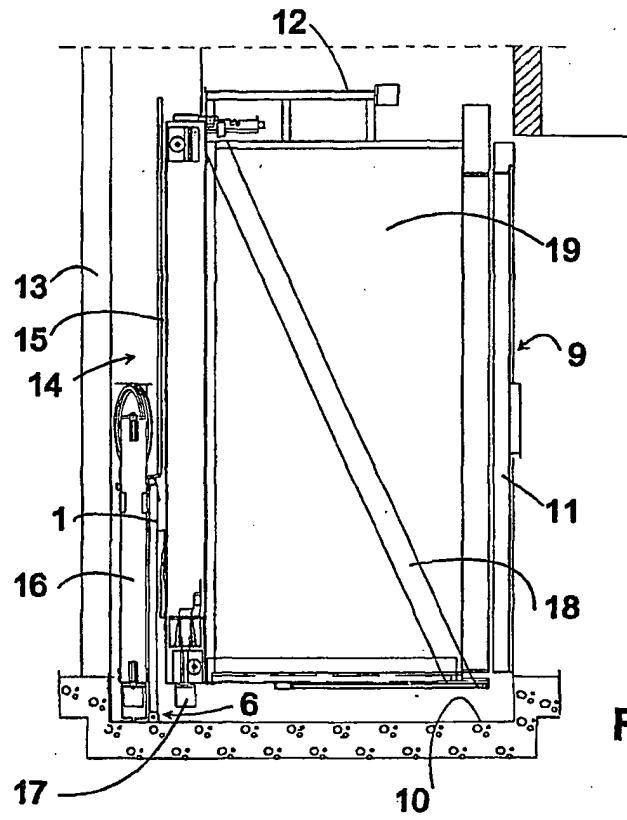


Fig. 2

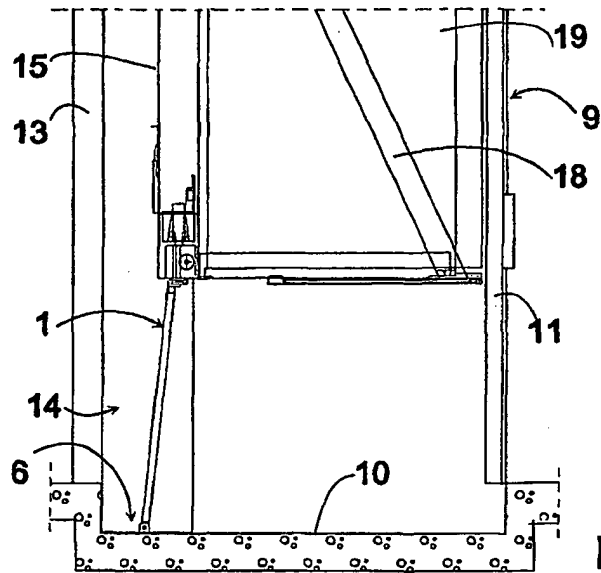


Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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