COMMONWEALTH OF AUSTRALIA

Patents Act 1952-1969 61898/86

CONVENTION APPLICATION FOR A PATENT

APPLICATION ACCEPTED AND AMENDMENTS

ALLOWED 10-1-88

(1) Here insert (in full) Name or Names of Applicant or Applicants, followed by Address(s).

(2) Here insert Title of Invention.

(3) Here insert number(s) of basic Application(s).

(4) Here insert Name of basic Country or Countries, and basic date or dates.

We hereby apply for the grant of a Patent for an invention entitled:

EQUIPMENT FOR THE PRELIMINARY SWITCHING-OFF

OF A CAM WHEEL SPEED LIMITER FOR LIFTS

which is described in the accompanying complete specification. This application is a Convention application and is based on the application numbered (3)

03715/85-8

for a patent or similar protection made in (4) Switzerland on 29th August 1985.

My address for service is Messrs. Edwd. Waters & Sons, Patent Attorneys, 50 Queen Street, Melbourne, Victoria, Australia.

DATED this 26th day of August 1986.

INVENTIO AG

by L. J. Dyson

Registered Patent Attorney

To:

THE COMMISSIONER OF PATENTS.

Edwd. Waters & Sons.
DECLARATION IN SUPPORT OF A CONVENTION APPLICATION FOR A PATENT OR PATENT OF ADDITION

In support of the Convention Application made by

INVENTIO AG

(hereinafter referred to as the Applicant)

for a patent for an invention entitled:

EQUIPMENT FOR THE PRELIMINARY SWITCHING-OFF OF A CAM WHEEL SPEED LIMITER FOR LIFTS

(1) HUGO REICHHUTH and MAX HAAS, both

of CH-6052 Hergiswil NW, Switzerland

do solemnly and sincerely declare as follows:

1. authorised by the applicant for the patent to make this Declaration on its behalf.

2. The basic application as defined by Section 141 of the Act was made in Switzerland on the 29th day of August 1985, by INVENTIO AG.

3. ANTON NIEDERBERGER, Fahr, CH-6034 Inwil, CHRISTIAN MATHYS, Im Baurenccker 43, CH-8902 Urdorf and HANS KOCHER, Schlossistr. 19, CH-6045 Meggen, Switzerland are

the actual inventors of the invention and the facts upon which the Applicant is entitled to make the application, are as follows:

The Applicant is the assignee of the said actual inventors.

4. The basic application referred to in paragraph 2 of this Declaration was the first application made in a Convention country in respect of the invention the subject of the application.

DECLARED at

this 25th day of April 1986

INVENTIO AG

To: THE COMMISSIONER OF PATENTS. Hugo REICHHUTH Max HAAS

Edw. Waters & Sons, Melbourne.
Equipment, for the preliminary switching-off of a cam wheel speed limiter, including a switch adapted to be fastened on the frame of the cam speed limiter and upon actuation stops a lift drive, and actuating equipment arranged on a rocker lever to actuate the switch upon the normal speed of travel of the lift being exceeded at a predetermined lift travel speed lying below the tripping speed of the cam speed limiter, wherein the actuating equipment is an actuating lever, carried on the rocker arm of the rocker lever, a rocker lug co-operating with a ratchet wheel of the cam speed limiter, having a switch-actuating bracket and a tripping lug held relative to the rocker lever by means of at least one detent arranged
between the lug and the rocker lever and exerts a biasing force, in a rest position, in which the tripping lug lies closer to the movement path of the ratchet wheel than the rocker lug of the rocker lever and is pivoted out into the actuating position against the bias force by one of the ratchet wheel teeth upon attainment of the predetermined lift travel speed.
Complete Specification for the invention entitled:

EQUIPMENT FOR THE PRELIMINARY SWITCHING-OFF
OF A CAM WHEEL SPEED LIMITER FOR LIFTS

The following statement is a full description of this invention, including the best method of performing it known to:

1.

Fig. 1
Equipment for the preliminary switching-off of a cam wheel speed limiter for lifts

The invention concerns an equipment, for the preliminary switching-off at a cam wheel speed limiter, which displays a switch which is fastened at the frame of the speed limiter and on its actuation stops the lift drive, and an actuating equipment, which is arranged at a rocker lever and actuates the switch on the normal speed of travel of the lift being exceeded at a predetermined lift travel speed lying below the tripping speed of the speed limiter.

Lifts must be equipped with a catching device which is tripped at least during the downward travel by a speed limiter on the normal travel speed being exceeded by a predetermined value. When the catching device comes to be tripped, then the cage is stopped with a great negative acceleration which is unpleasant for the passengers and moreover requires appreciable effort for the restoration of the operational readiness of the lift. It is therefore advantageous in the case of small excess speeds of the lift cage to slow down the travel of the same up to standstill through switching-off of the drive and tripping of the brake. Should the cage speed rise further in spite of switching-off of the drive, then the speed limiter trips the catching device. Thereby, the cage is held in the guide rails. For the switching-off of the drive in the case of excess speed of the lift cage and for the tripping of the catching device on further rise in speed, ratchet wheel speed limiters are used very frequently. They are simple in build-up, cheap in the manufacture and because of their simplicity display fewer faults.
Such cam wheel speed limiters operate with a two-armed rocker lever which is rotatably borne on a frame and set into rocking motions by a rocker roller. That side of the rocker lever, which is opposite to the rocker roller, is constructed as rocker lug which in the case of excess speed engages into the path of the ratchet wheel. For the preliminary switching-off of the drive, an equipment actuating a switch is mounted on the rocker lever.

An equipment of that kind is known from the CH-PS 387 902. The equipment for the preliminary switching-off according to a first kind of construction consists of a compression spring, an inertia body and a switch fastened at the frame. An inertia force produced by the rocker lever movement acts with continuously changing magnitude and direction on the inertia body. The dimensions of the compression spring and of the inertia body are so chosen that, on a certain lift speed being exceeded, the inertia force acting on the inertia body is greater than the sum of the body weight and the compression spring force. The force component resulting therefrom displaces the inertia body upwardly out of the rest position, which by way of a pin actuates the switch fastened at the frame. According to a second kind of construction, the equipment for the preliminary switching-off consists of a tension spring, an inertia body and a contact at the rocker lever and, according to a third kind of construction, of a compression spring, a magnet and a contact at the rocker lever. All three kinds of construction however display the same mode of operation in principle. They operate as described above with a movable inertia body, at which engages a force resulting from an inertia force, inertia body weight and spring force and displaces the inertia body out of its rest position in the case of
excess speed of the lift.

A disadvantage of this known equipment lies in the great mechanical effort and the great manufacturing costs connected therewith. A further disadvantage is the high effort in setting-up and maintenance operations. The tripping point for the electrical and mechanical switching-off must be set individually and is not quite simple because of the mutual influencing. An alteration or adaptation of the nominal lift speed also always requires a two-fold adjustment of the tripping points, wherein the setting of the electrical switching-off depends not only on the newly chosen nominal lift speed, but also still on the setting of the mechanical switching-off.

An equipment for the preliminary switching-off, known from DGM 7238999.2, is mechanically separated from the rocker lever. Thereby, the tripping points let themselves be set separately and independently. Apart from the simplified setting operations, this equipment for the preliminary switching-off however displays the same disadvantages as those according to CH-PS 387 902.

The main disadvantage in both equipments lies in the tripping directly through the inertia force of moved masses. If the frictional forces of the moved parts increase, then the inertia force no longer suffices for the secure tripping. Coming in addition is the wear of the continuously moved parts. Great mechanical effort, high effort in setting and maintenance operation, increased liability to faults and correspondingly reduced reliability are the substantial disadvantages of the known equipments for preliminary switching-off.

The invention has the purpose of the creation of an equipment for the preliminary switching-off of the drive of a lift installation
at a predetermined excess speed, which equipment possesses a simple mechanical build-up and minimum liability to faults as well as makes possible a simple setting. This problem is solved by the invention which is characterised in the claims and defines an equipment at a speed limiter on the principle of the rocker cam. The lift cage drives a cable pulley with integrated ratchet wheel by way of a wire cable. A rocker roller transmits the cam movement onto a two-armed rocker lever. The rocker lever end lying opposite the rocker roller is constructed as rocker lug. Sitting on this rocker lever end is an actuating equipment with a two-armed actuating lever which is rotatably borne on the rocker lever and fixed by a holding-back equipment.

The advantages attained by the invention are to be seen substantially in that the force for the tripping of the equipment for the preliminary switching-off is exerted directed by the ratchet wheel, the actuating equipment displays no sliding parts, the build-up of the preliminary switching-off mechanism is simpler than in the case of the hitherto known and thereby contributes substantially to the reduction in the manufacturing costs, the work for the setting of the tripping speed of the electrical preliminary switching-off becomes completely superfluous and thereby a source of faults is excluded and the functional reliability is increased correspondingly and that due to the simple mechanical build-up, fewer parts are exposed to the wear, whereby the susceptibility to faults is significantly reduced.

An example of the invention is illustrated on the accompanying drawings and more closely explained in the following. There show:

Fig. 1 an elevation of a speed limiter, operating on the principle of the rocker cam, with an equipment for the preliminary switching-off,
Fig. 2 a plan view of the speed limiter of the Fig. 1,

Fig. 3 an enlarged detail elevation of the equipment, for the preliminary switching-off, of the Fig. 1 with a holding-back equipment consisting of a spring with a ball placed thereon,

Fig. 4 an enlarged detail elevation of the equipment, for the preliminary switching-off, of the Fig. 1 with a holding-back equipment consisting of a biassed restoring spring and

Fig. 5 a detail elevation of the holding-back equipment in the plan view of the Fig. 4.

In the Figs. 1 to 5, a frame is designated by 1, at which - fastened one to the other - a cable pulley 2 provided with a cable groove 2.1, a cam wheel 3 displaying a cam 3.1 and a ratchet wheel 4 with ratchet wheel teeth 4.1 provided with notches 4.11 are rotatably borne on an axle 1.1. Pivotably borne on a further axle 1.2 at the frame 1 is a two-armed rocker lever 5, at the one arm 5.1 of which is mounted a rotatably rocker roller 5.11 and the other arm 5.2 of which displays a rocker lug 5.21 and carries an actuating equipment 6. Designated by 7 is a holding-back spring which at one end is fastened at the frame 1 and at the other end at the rocker lever arm 5.1 and endeavours to press the rocker roller 5 onto the facing surface of the cam wheel 3. The setting of the spring tension of the spring 7 takes place by way of an adjusting equipment 7.1 mounted at the frame 1. The actuating equipment 6 consists of a two-armed actuating lever 6.2, which is rotatably borne on an axle 6.1 and displays a V-shaped actuating lever 6.21 at the upper end and a tripping lug 6.22 at the lower end. Sitting
between the actuating lever 6.2 and the rocker lever 5 is a holding-back equipment 8, which in a first example of embodiment consists of a spring with a ball placed thereon, called spring latch in the following. In a further example of embodiment, the holding-back equipment 8 consists of a restoring spring 8.1, which is held by a spring fastening 8.1.1 and a fastening screw 8.1.2 and which together with an abutment 8.2 sits on the rocker lever 5. An actuating setting of the restoring spring 8.1 is designated by 8.3. A switching-off device 9 fastened at the frame 1 displays a switch 9.1 with switch head 9.11.

The afore-described equipment operates as following: A lift cage drives the cable pulley 2 with integrated ratchet wheel 4 and cam wheel 3 in known manner by way of a wire cable. The rocker roller 5.11 follows the path of the cam wheel 3. The holding-back spring 7 is so set that the rocker roller 5.11 follows the cam 3.1 of the cam wheel 3 up to the nominal lift speed. The rocker lever 5 is displaced by the cams 3.1 by way of the rocker roller 5.11 into rocking movements of alternating direction. When the lift speed exceeds a certain tripping value preset by the holding-back spring 7, the rocker roller 5.11 lifts off from the cam wheel 3. The inertia moment of the rocker lever 5 becomes greater than the holding-back moment of the holding-back spring 7. The rocker lug 5.21 remains entered in the path of the ratchet wheel 4, which leads to the blocking of the cable pulley 2. The force for the engagement of the catching device is built up by the friction in the cable groove 2.1.

The actuating equipment 6 serves for the preliminary switching-off of the lift drive. The holding-back equipment 8 holds the actuating
equipment in a rest position relative to the rocker lever 5. The tripping lug 6.22 in the rest position lies more closely at the path or enters more deeply into the path of the ratchet wheel 4 than the rocker lug 5.21. Both lugs in this example of embodiment always lie between two ratchet wheel teeth 4.1 when the rocker roller 5.11 stands on the cam 3.1. When the rocker roller 5.11 stands between two cams 3.1, both lugs are lifted by way of the rocker lever 5 out of the path of the ratchet wheel teeth 4.1. Thereby, the ratchet wheel teeth 4.1 move past the tripping lug 6.22 and the rocker lug 5.21 without effect.

In the case of excess speed, the rocker roller 5.11 lifts off from the cam wheel 3. The ratchet wheel tooth 4.1 engages at the tripping lug 6.22 and brings the actuating equipment 6 into an actuating position. In the rest position of the actuating lever 6.2, the actuating bracket 6.21 does not touch the switch head 9.11, the actuating bracket 6.21 pushing over the switch head 9.11 only in the actuating position and thereby changing the switching state of the switch 9.1. During the movement of the two-armed rocker lever 5, no danger of actuation exists in the rest position of the actuating lever 6.2. In the first example of embodiment, the actuating lever 6.2 must be turned back into the position of the holding-back equipment 8 for the restoration of operation after the deflection. In the further example of embodiment, the holding-back equipment 8 resets the deflected actuating lever 6.2 back automatically into the rest position. In the case of excess speed of the lift cage in upward direction, the tripping lug 6.22 engages into the notch 4.11 of the ratchet wheel teeth 4.1. Due to the leftward rotation of the ratchet wheel 4, the actuating lever 6.2 with the actuating bracket 6.21 is pivoted out in clockwise sense and the drive is
thereby stopped by way of the switch head 9.11 and the switch 9.1.

In the first example of embodiment, the holding-back equipment 8 can be constructed as commercially usual spring latch which operates as following:

5 A spring guide let into the rocker lever 5 contains a spring which presses the ball sitting on it against the actuating lever 6.2. The ball diameter is smaller than the diameter of the spring guide. At the side of the actuating lever, the spring guide is closed off by a ring. The internal ring diameter is so dimensioned that the ball cannot pass through the ring opening. The ball can thereby come out of the spring guide by at most about half the ball diameter. In the actuating setting of the actuating equipment 6, the actuating lever 6.2 presses the ball into the spring guide. A bore with a diameter, which is smaller than the ball diameter, lies above the ball in the rest setting of the actuating equipment 6. The ball is pushed so far into the bore by the spring force until the diameter of the entering ball portion is equal to the diameter of the bore. The ball thus acts as binding member between the rocker lever 5 and the actuating lever 6.2. Due to the deflection of the actuating lever 6.2, the bore is turned away from the ball. Thereby, the ball comes out of the bore and is pressed by the actuating lever 6.2 into the spring guide.

In place of a spring latch, a small magnet could also be mounted on the rocker lever 5. A countermagnet would then be mounted on the actuating lever 6.2 in the place of a bore.

As illustrated in the Figs. 4 and 5 in the further example of embodiment, in place of a spring latch, a holding-back equipment 8
can be used, which automatically resets the actuating lever 6.2 and operates as following:

The U-shaped restoring spring 8.1, biased by way of the abutment 8.2, holds the actuating lever 6.2 in the rest position by limb ends respectively engaging on one side of the V-shaped actuating bracket 6.21. In the case of excess speed of the lift cage in downward direction, the actuating lever 6.2 with the actuating bracket 6.21 is pivoted out in counterclockwise sense. In that case, the one limb of the restoring spring 8.1 is entrained by the actuating bracket 6.21 and deflected against a spring force into the actuating setting 8.3. As soon as the ratchet wheel teeth 4.1 no longer engage at the tripping lug 6.22, the restoring spring 8.1, which in the actuating setting 8.3 stores a spring energy, resets the actuating equipment 6 back into the rest position.

In the case of excess speed of the lift cage in upward direction, the deflection of the other limb of the restoring spring 8.1 and the resetting of the actuating equipment 6 take place in analogous manner.
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Equipment, for the preliminary switching-off of a cam wheel speed limiter, including a switch adapted to be fastened on the frame of the cam speed limiter and upon actuation stops a lift drive, and actuating equipment arranged on a rocker lever to actuate the switch upon the normal speed of travel of the lift being exceeded at a predetermined lift travel speed lying below the tripping speed of the cam speed limiter, wherein the actuating equipment is an actuating lever, carried on the rocker arm of the rocker lever, a rocker lug co-operating with a ratchet wheel of the cam speed limiter, having a switch-actuating bracket and a tripping lug held relative to the rocker lever by means of at least one detent arranged between the lug and the rocker lever and exerts a biasing force, in a rest position, in which the tripping lug lies closer to the movement path of the ratchet wheel than the rocker lug of the rocker lever and is pivoted out into the actuating position against the bias force by one of the ratchet wheel teeth upon attainment of the predetermined lift travel speed.

2. Equipment according to claim 1, characterized thereby that the detent is constructed as spring latch.

3. Equipment according to claim 1, characterized thereby, that the detent is constructed as a magnet.
4. Equipment for the preliminary switching-off of a cam wheel speed limiter in lifts substantially as hereinbefore described with reference to the accompanying drawings.

DATED the 14th day of November, 1988.

INVENTIO AG

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