CONVENTION APPLICATION FORM

COMMONWEALTH OF AUSTRALIA
Patents Act 1952-1962

CONVENTION APPLICATION FORM

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

"Improvements in overload protection device for hoists"

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

7400/72

for a patent or similar protection made in Sweden on 6th June 1972.

Our address for service is Messrs. Edwd. Waters & Sons, Patent Attorneys, 30 Russell Street, Melbourne, Victoria, Australia.

DATED this 1st day of June, 1973.

LINDEN-ALIMAK AB

by

John E. McGregor

To:

THE COMMISSIONER OF PATENTS.

[Address: Edwd. Waters & Sons, Melbourne.]
COMMONWEALTH OF AUSTRALIA

Patents Act 1952-1962

DECLARATION IN SUPPORT OF A CONVENTION APPLICATION FOR A PATENT OR PATENT OF ADDITION

In support of the Convention Application made by (1)

LINDEN-ALIMAK AB

(hereinafter referred to as the applicant) for a Patent

for an invention entitled (2)

IMPROVEMENTS IN OVERLOAD PROTECTION DEVICE FOR HOISTS

I, (3) GUNNAR BERGLUND

of Skelleftea, Sweden

do solemnly and sincerely declare as follows:

1. I am 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 (4) Sweden on the 5th day of June 1972, by

LINDEN-ALIMAK AB

and is the actual inventor of the invention and the facts upon which the applicant is entitled to make the application are as follow:

The applicant is the assignee of the said HANS-GORAN STADIGH

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 Skelleftea, Sweden this 29th day of May 1973.

Signature,

(Gunnar Berglund) man. dir.

To: THE COMMISSIONER OF PATENTS.

LINDEN-ALIMAK AB
The following statement is a full description of this invention, including the best method of performing it known to the inventor: -
This invention relates to a so-called overload protection device at hoists, and particularly at such hoists, of which the driving unit, i.e. the machinery, is located in connection to the hoist cage.

The object of an overload device is, as known, to control to an extent necessary the size of the load to be hoisted and to prevent from each level the starting of the hoist if the load exceeds the highest permissible load for the hoist in question. Such overload protection devices exist with different constructions specially and almost exclusively only for passenger elevators and for such elevators, at which the lift machinery is separated entirely from the lift cage and placed separately, for example above the lift shaft. An overload protection device of this kind may be a force-sensing electromagnetic transmitter of some kind, which is actuated by incoming wire forces to transmit impulses for controlling the drive means of the lift so that it cannot start at overload of the lift.

The known overload protection devices, however, usually cannot be applied at such hoists, at which the machinery and hoist cage are located in direct connection to each other, as for example building hoists with rack and pinion operation for both passenger and material transports. There exists for this kind of hoists at present no simple and sufficiently safe overload protection device.

It is, therefore, the object of this invention to eliminate said deficiency and to produce a simple and reliable overload protection device at hoists where the machinery and hoist cage are located in direct connection to each other. This object is achieved in that the overload protection device...
according to the invention shows the characterizing features defined in the claims.

The invention is described in greater detail in the following, with reference to the accompanying drawings, in which

Fig. 1 shows a perspective view of a pole-climbing hoist drafted only partially and provided with an overload protection device according to the invention, Fig. 2 shows a lateral view of a load transmitter unit comprised in the overload protection device according to the invention,

Fig. 3 shows in a schematic way a switch system for a load transmitter unit with two microswitches, and

Figs. 4-9 show schematically different alternative locations of a hoist machinery and a hoist cage relative to each other.

In Fig. 1, a pole generally designated by 1 comprises four corner tubes 2-5, two of which - 4 and 5 in Fig. 1 - act as guides for the hoist cage 6 proper, of which only some parts are drafted in Fig. 1. More precisely, the only parts shown are an upper frame beam 7, which is located on that side of the hoist cage which faces the pole 1, and two vertical beams 8 fastened on said frame beam which are located at a distance from each other exceeding the distance between the guides 4 and 5 and provided at their ends with guide rollers 9 and roller holders 10. Said rollers coact with the guides 4, 5 to guide the hoist cage and to prevent it from moving in a direction perpendicular to the guides.

Between the vertical beams 8 of the hoist cage, a plate 11 is shown, at which the machinery of the hoist is
mounted and which on the side facing the pole comprises a number of driven pinions 12 for coaction with a rack 13 fastened on the pole 1 between the guides 4, 5 and at least two rollers 14 abutting the rear side of the rack. The plate 11 with the hoist machinery, not shown in detail in Fig. 1, is arranged movably in relation to the hoist cage and guided laterally by the driven pinions 12 and the thrust rollers 14 against the rack 13, and in a direction perpendicular thereto indirectly by the guide rollers of the hoist cage, due to the fact that cage 6 and plate 11 are movably connected relative one another, for example by means of links and link rod heads with spherical sliding bearings, as schematically shown at 15 in Fig. 1, in such a manner, that the machinery and hoist cage can move relative to one another in the vertical direction, and that no forces resulting from the load are transferred via these connections.

The machinery, which is movable relative to the hoist cage 6, is connected according to the invention with the hoist cage via a load transmitter unit generally designated by 16, which constitutes the only direct load or force transferring connection between said two parts. The load transmitter unit 16 used may be of a kind known per se for either traction or pressure forces, depending on the location of the machinery and hoist cage relative one another and on the location of the load transmitter unit in relation to the machinery and hoist cage.

The load transmitter unit 16 shown in Fig. 1 is intended for pressure forces. It comprises, as shown in Fig. 2, two main parts 17, 18 movable relative one another, which hereinafter are called yoke 17 and, respectively, damper
The yoke 17 is designed with two legs 19 with a steel strip 20 mounted therebetween and carries at its side facing the steel strip a U-shaped breaking load transmitter 21 known per se. Said breaking load transmitter abuts by means of a ball 22, preferably of hardened steel, a preferably hardened steel plate 23 on the steel strip 20, which relieves the breaking load transmitter of lateral forces. The breaking load transmitter shown in Fig. 2 comprises two microswitches A and B, the function of which will be explained in the following. It is also possible to apply a breaking load transmitter with one or more microswitches though not shown in the drawings. In order to protect the breaking load transmitter, the yoke is provided on both sides with a metal sheet 24, one of which includes a cable passage sealed by a sealing sleeve, which passage is not shown in the Figure.

The second part 18 comprised in the load transmitter unit 16, i.e. the damper, comprises a damping layer 25 of a suitable material and mounted thereon a plate 26, which is provided with three adjustable and lockable screws 27 having flattened heads. The central screw is capable of transferring force to the breaking load transmitter 21 via the steel plates 23 arranged on both sides of the steel strip and the steel ball 22. Possible lateral forces are taken up by the steel strip 20. The two outer screws 27 are intended to protect the breaking load transmitter 21 against shock and diagonal loads. A further object of the damper 18 is to prevent vibrations from the machinery to propagate to the breaking load transmitter, which may give rise to mechanical damages. In consideration of possible vibrations, the yoke 17 should be fastened at the hoist cage, and the damper 18 in connection
to the hoist machinery.

At the embodiment shown in Fig. 1 the yoke 17 of the load transmitter unit is rigidly connected with the hoist cage, and the damper 18 with the plate 11 carrying the machinery. This load transmitter unit is intended for pressure forces and will upon actuation bring about mechanical movement of the breaking load transmitter 21, so that the microswitches comprised in the breaking load transmitter are actuated according to a predetermined pattern.

At the embodiment shown in Figs. 1 and 2, comprising two microswitches A and B in the load transmitter unit 16, the load transmitter unit, thus, will record via these switches a force $F_1$, which is equal to $E + L_1 - M + k - 1$, and, respectively, a force $F_2$, which is equal to $E + L_2 - M + k - 1$, where

- $F_1$ = nominal setting force for microswitch A
- $F_2$ = nominal setting force for microswitch B
- $E$ = own weight of cage without machinery
- $L_1$ = rated load of cage $\times 80\%$
- $L_2$ = rated load of cage $110\%$
- $M$ = own weight of counterweight
- $k$ = own weight of cage cable ($kg/m \times$ height of hoist above bottom parking level)
- $l$ = own weight of counterweight wires ($kg/m \times$ height of hoist above bottom parking level).

It is to be observed that the above percentages are to be regarded merely as reference values and can be changed from one case to the other.

It appears from the above, that the variables $k$ and $l$ in the expressions $F_1$ and, respectively, $F_2$ during operation...
can result in that the hoist cannot be started from a position above the bottom parking level, if the cage has a load L₂ at the bottom parking level, i.e. where \( k \) exceeds 1. This inconvenience (particularly for hoists without floor selection equipment), however, is eliminated in that cage cables and counterweight wires according to the invention are fastened in connection to the machinery, as it is indicated only schematically in Figs. 4 to 9. When using two microswitches in the load transmitter unit, the switches can be given a switching function as illustrated schematically in Fig. 3 where the arrow 28 marks the switching of switch A at a load equal to or exceeding L₁, and where the arrow 29 marks the switching of switch B at a load equal to or exceeding L₂. The expressions there indicated in parenthesis apply specially to hoists with floor selection equipment where programmed memories prior to the achieving of the load L₁ and, respectively, L₂ remain. The microswitches, further, are set so that the hoist can be started both from parking levels and from the hoist cage when the load is smaller than L₁, that the hoist can be started only from the hoist cage when the load exceeds L₁ but is smaller than L₂, that the hoist cannot be started at all when the load exceeds L₂.

The device according to the invention, further, is set so that at the arrival of an order from a parking level or hoist cage in a certain point in the control circuit the function of the microswitches is switched off whilst simultaneously the hoist starts, and remain switched off as long as the hoist motors are running. Hereby the effect of the acceleration forces is eliminated.

In Figs. 4 to 9 are shown in a schematic manner
some alternative locations of a hoist machinery in relation to the hoist cage. In all Figures the same reference characters are used for corresponding parts. In Figs. 4 and 5 the hoist machinery 30 is located above and, respectively, below the hoist cage 31 and is guided by help of own guide rollers by the same guides 32 as the hoist cage 31. The only connection between hoist cage and machinery thereby is the load transmitter unit 33, which thus all of its own transfers all forces between the two units.

In Figs. 6 and 7 the hoist machinery is located above the hoist cage 31 between a pair of vertical guide bars 34, which are secured on the hoist cage and in Fig. 7 connected with each other by a cross-piece 35. In Fig. 6 the hoist machinery and hoist cage are interconnected by a load transmitter unit for traction forces, and in Fig. 7 by a load transmitter unit for pressure forces, which is located between hoist machinery and cross-piece 35. Figs. 8 and 9 finally show substantially the same as Fig. 6 and 7, but here the machineries are arranged in the respective hoist cage, which is the case also in Fig. 1. Different to the devices shown in Figs. 4 and 5, the devices according to Figs. 6 to 9 and also the device according to Fig. 1 are guided laterally by pinions coacting with a rack and by thrust rollers, and perpendicularly thereto, i.e. vertically, indirectly by the guide rollers of the respective hoist cage, in such a manner that, as mentioned above, the hoist cage and machinery are connected movably relative one another in some suitable way, for example by links and link rod heads with spherical sliding bearings as schematically shown in Figs. 6 to 9 at 36, or via rubber sleeves, which may be located in about the same manner.
as the links designated by 36. 37 designates cage cables.

The present invention is not restricted to what is set forth above and shown in the Figures, but may be modified and changed in many different ways within the scope of the claims.
CLAIMS
The claims defining the invention are as follows:

1. A device at such hoists, at which the hoist machinery and hoist cage are arranged in connection to each other to prevent the hoist from starting at overload, characterized in that the hoist cage and hoist machinery are arranged movably relative one another and a load transmitter unit is connected in between hoist machinery and hoist cage, said load transmitter unit being adapted to transfer all forces between the hoist cage and machinery for recording at least one predetermined load, which must not exceed the maximum permissible load, and thereby to produce a signal or pulse, which effects the hoist machinery to be prevented from starting.

2. A device as defined in claim 1, characterized in that the load transmitter unit is adapted to transfer either pressure forces or traction forces, depending on where in relation to the hoist machinery said unit is located.

3. A device as defined in claim 1 or 2, characterized in that the load transmitter unit is located above the hoist cage but below the hoist machinery.

4. A device as defined in claim 1 or 2, characterized in that the load transmitter unit is located below the hoist cage but above the hoist machinery.

5. A device as defined in any one of the preceding claims, characterized in that the hoist machinery is adapted
by means of guide rollers or the like to be guided by the same guides as the hoist cage.

6. A device as defined in any one of the claims 1 - 4, at a hoist driven by a rack, characterized in that the hoist machinery is adapted to be guided laterally by the rack and the driven pinions and thrust rollers coacting therewith, and perpendicularly thereto by links and link rod heads with spherical sliding bearings or by rubber sleeves coacting with guide bars arranged at the hoist cage.

7. A device as defined in any one of the preceding claims, characterized in that both cage cables and counter-weight wires are fastened in connected to the hoist machinery.

8. A device as defined in any one of the preceding claims, characterized in that the load transmitter unit comprises two main parts movable relative one another, of which one includes a per se known breaking load transmitter with one or more microswitches set for predetermined forces, and the other one comprises a damping layer and placed thereon a plate with means for actuating the breaking load transmitter at forces, which are at least equal to the predetermined forces for which the microswitches are set.

9. A device as defined in claim 8, characterized in that the part of the load transmitter unit which is provided with the microswitches is rigidly connected with the hoist cage and that part of the hoist machinery which is provided with damping layer.
10. A device substantially as hereinbefore described with reference to and as illustrated by the accompanying drawings.

DATED this 1st day of JUNE, 1973

LINDEN-ALIMAK AB

I certify that this and the preceding 11 pages are a true and exact copy of pages of the specification originally lodged.

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- 3 JUL 1973
END