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(54) ELEVATOR ROPE TENSIONING DEVICE

(57) The invention concerns an overspeed governor assembly (3) controlling the speed of an elevator car (1) comprising a governor rope (5) which forms a closed loop by running over a governor sheave (4) and under a governor tension sheave assembly (7), characterized in that the overspeed governor tension sheave assembly (6) is equipped with at least two tension sheaves being each movably arranged, respectively.

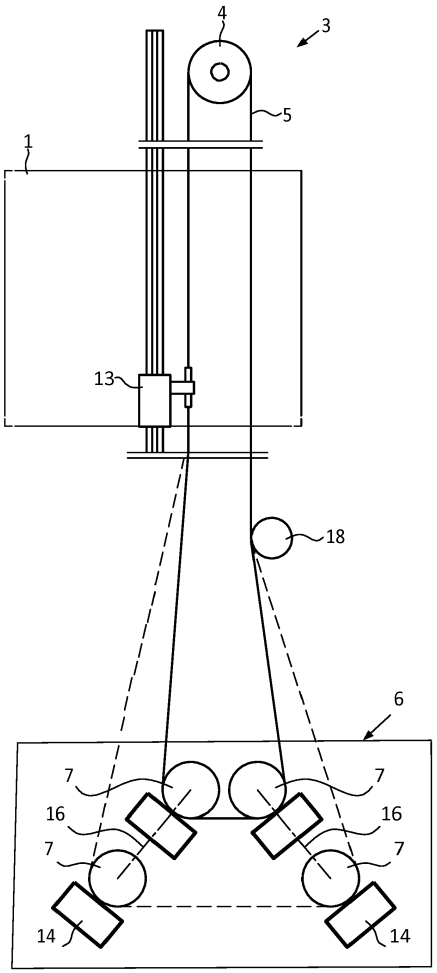

FIG.1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a device for keeping an elevator rope under tension and a respective elevator.

BACKGROUND OF THE INVENTION

[0002] An elevator comprises different kind of ropes. These are for example a hoisting rope by means of which a car or counterweight is suspended, a compensating rope which runs beneath the car and counterweight and forming a closed loop with the hoisting rope, the purpose of which is to reduce the force difference caused from the asymmetrical weight distribution of the elevator roping on the different sides of the traction sheave. At least there is also a rope for an overspeed governor.

[0003] An overspeed governor (OSG) is an elevator device which acts as a stop device in case the elevator runs beyond the rated speed. This device must be installed in traction sheave elevators as well as in roped hydraulic elevators. Such an overspeed governor thus belongs to conventional elevator safety equipment. A typical OSG comprises a sheave rotated by a governor rope that forms a closed loop and is coupled to the elevator car so that the rope moves along with the movement of the car. The governor sheave is at most at the upper end of the governor rope loop and it is coupled to an actuation mechanism that reacts in response to the speed of the elevator car. In order to maintain a sufficient friction to rotate the governor sheave without slippage the overspeed governor assembly may comprise a tension assembly with a sheave at the lower end of the governor rope loop. The tension assembly is typically equipped also with a weight that aims to keep the tension of the governor rope essentially constant. The sheave drives a shaft or spindle coupled to an actuation mechanism. The actuation mechanism may be a set of flyballs or flyweights adapted to extend radially when a predetermined level of centrifugal force is applied to them. Radial extension of the flyballs or flyweights causes them to contact an overspeed switch. In case the overspeed switch is actuated, power to the motor is cut off and the motor brake is actuated, thereby causing the motor brake to apply a braking force on the motor shaft. If the elevator car continues to increase in speed, a tripping assembly is triggered then. The tripping assembly actuates a mechanism to brake the governor rope. Braking of the governor rope in turn causes the safeties to be engaged and thereby stop the car by closing the car brake.

[0004] Because the overspeed switch remains open until it is manually reset, the elevator machine and brake power are not restored and the elevator system remains inoperable. In conventional elevator systems having machine rooms the switch to be reset is conveniently accessible in the machine room by a technician. Typically, the governor is located in an overhead machine room. In more recently developed machine room-less elevator systems, where the conventional machine room is eliminated, the governor and various other components are located in the hoistway. With the governor in the hoistway, the task of accessing and resetting a governor overspeed switch is time-consuming, complicated, and costly. Although a solution may be to provide a special door or hatch to get access to a governor in a hoistway, such a solution adds cost and space requirements.

[0005] As said, there is one diverting pulley for the rope and a weight which keeps the OSG rope under tension. The problem included therewith is that the position of the overspeed governor tension sheave assembly changes as caused by the elongation of the overspeed governor rope or by other reasons. This creates a need for adjustment, because if no adjustment is done, sooner or later the position change of the overspeed governor tension sheave assembly causes a safety switch activation and consequently cuts power to the elevator motor and closes the brake. In this respect the problem is more severe in high buildings since the longer the rope is, the earlier it stretches and thus triggers the safety switch. This causes the equipment to go out of use and it also generates a need for the maintenance technician to visit the site. For example: Having a length of an unstreched, namely new overspeed governor rope of 600 m, the distance between the governor and the governor tension-weight is approximately the half, i.e. 300 m. The safety switch then allows the weight to move down 250 mm before it trips. Thus, the rope can stretch to 600,50 m before triggering or tripping.

AIM OF THE INVENTION

[0006] It is an object of the present invention to provide an OSG with an overspeed switching system that operates safely and reliably, while reducing time and cost of restoring an elevator to operation after the overspeed switch has been tripped. In other words, the aim is to reduce the number of maintenance visits needed for shortening the overspeed governor rope of the elevator.

SUMMARY OF THE INVENTION

[0007] The above object is achieved by an overspeed governor assembly according to claim 1. Advantages embodiments are disclosed in the respective subclaims. An elevator comprising such assembly is claimed in claim 6.

[0008] Basic idea of the invention is to implement at least two tensioning sheaves or pulleys for an overspeed governor assembly. Taking two pulleys which are guided in their movement on one hand downwards and on the other hand with a component relative to each other, i.e. thereby increasing the relative distance between them, the OSG rope can stretch further than before.

[0009] According to a convenient embodiment at least

one tensioning pulley or sheave is guided in its movement angularly to the longitudinal axis of the running path of the governor rope. This increases the relative distance between the tensioning sheaves to one another and thus allows a longer stretching of the rope. A further progression is then to arrange two tensioning pulleys being both movable angularly to the longitudinal axis of the running path of the governor rope. This allows a further stretching of the rope.

[0010] A looped OSG rope is kept taut by a tension weight at each pulley hanging from the loop. However, it is also possible that there is only one single weight being coupled to the sum of tensioning sheaves. In case there is only one sheave installed movably - while the other is fixed - there would be only one weight for the movable sheave. In general, the tensioning force can be the mass of the sheaves, respectively, a mass attached to the sheaves, a spring load or any combination of the three.

[0011] According to a convenient embodiment the assembly comprises guiding means to guide those rope components to be parallel which run from the governor sheave down the shaft to the tension sheave. This aims to keep the running path of the OSG rope along the shaft in a predetermined and within this passage unchanged way the assembly can conveniently comprise guiding means to guide those rope components to be always parallel irrespective of the distance the tension sheaves have been already moved in the lower part of the shaft. Such guide can be implemented in a housing of the tension sheave assembly, the housing having diagonal slots each of which carries a tensioning sheave, wherein the slots are arranged such to enable the tension sheave to move downwards and away from each other, respectively. Said housing can be installed stationary in the elevator shaft.

[0012] In an advantageous embodiment of the present invention a tension weight arrangement of two pulleys is provided, pulling the rope diagonally each to their own direction so that the rope elongation is partly absorbed in the growing distance between the pulleys. It can be generalised as an OSG rope tensioner arrangement comprising two or more pulleys arranged such that the elongation of the rope is at least partly absorbed by the growing distance between pulleys. The position of the tension pulleys can be monitored by an upper and lower limit switch. If the housing is stationary, only the pulleys move down and away from each other but not necessarily in synchronicity. So, when one of the pulleys has reached its limit switch due to elongation of the OSG rope, another one may still have plenty of travel left. Hence, a service call for OSG rope readjustment is required only when the outer limit switch of each tension pulley is activated. Obviously, it can be advantageous not to place the limit switch at the very end of the pulley travel to allow some time for scheduling the maintenance call.

[0013] By means of the invention, the need for an OSG rope shortening is delayed. Taking for example a rope of a length of 600 m, the safety switch allows the tensioning weight to move down 250 mm each before it trips. Thus, the rope can stretch to 601,00 m before tripping.

[0014] At least, there is a possibility of arranging more than two tension sheaves. In any case it is decisive that the tension sheaves are arranged, advantageously hinged, movably such to vary a relative distance between any of them, respectively. In case of three tension sheaves this would mean to arrange them such that the two outermost tension sheaves can at least partly move to the outerward, i.e. away from the middle tension sheave. The middle tension sheave in turn should be movable only downwards.

[0015] Fig. 1 presents an overspeed governor assembly 3. For the sake of clarity an elevator car 1 is shown only in a dashed line. The elevator car 1 is running in an elevator shaft wherein its speed is monitored with the overspeed governor assembly 3 that is coupled to the car by means of a governor rope 5 that forms a closed loop running over an upper sheave called a governor sheave 4, and under lower sheaves called governor tension sheave 7 that belongs to an overspeed governor tension sheave assembly 6. So, the governor tension sheaves 7 and the whole overspeed governor tension sheave assembly 6 are supported by the governor rope 5. The governor tension sheave assembly 6 is accommodated in a stationary housing 8. The governor tension sheaves 7 are bearing-mounted in slots of the housing defining their moving paths 16, respectively. A tensioning weight 14 is fastened at the free second end so that influenced by the weight 14 each tension sheave 7 can freely move along a path being angularly with respect to the lengthwise direction of the running path of the rope along the shaft. The weight 14 has been selected so that it keeps the tension of the governor rope 5 correct and constant. The governor rope 5 forms a closed loop fastened to a lever mechanism of a safety gear 13 of the elevator. Reference numeral 18 denotes a guiding element to keep the running path of the OSG rope along the shaft in a predetermined and within this passage unchanged way, i.e. irrespective of the distance the tension sheaves have been already moved.

Reference Numerals:

[0016]

1	elevator car
3	overspeed governor assembly
4	governor sheave
5	governor rope
6	governor tension sheave assembly
7	governor tension sheave
8	housing
13	safety gear
14	tensioning weight
16	moving path
18	guide shoe

Claims

1. Overspeed governor assembly (3) controlling the speed of an elevator car (1) comprising a governor rope (5) which forms a closed loop by running over a governor sheave (4) and under a governor tension sheave assembly (7), **characterized in that** the overspeed governor tension sheave assembly (6) is equipped with at least two tension sheaves at least one of which is movably arranged.

2. Overspeed governor assembly (3) according to claim 1,
characterized in that the tension sheaves are arranged movably such to vary a relative distance between them.

3. Overspeed governor assembly (3) according to one of claims 1 or 2,
characterized in that to each tensioning sheave there is coupled a tensioning weight (12) or a tensioning spring or a combination of both.

4. Overspeed governor assembly (3) according to one of claims 1 to 3,
characterized in that to each tensioning sheave there is coupled a safety switch.

5. Overspeed governor assembly (3) according to one of claims 1 to 4,
characterized in that tension sheave assembly (6) is accommodated in a housing (8).

6. Elevator having an overspeed governor assembly (3) according to one of claims 1 to 5.

7. Elevator according to claim 6,
characterized in that the housing (8) of the tension sheave assembly (6) is stationary in the elevator shaft.

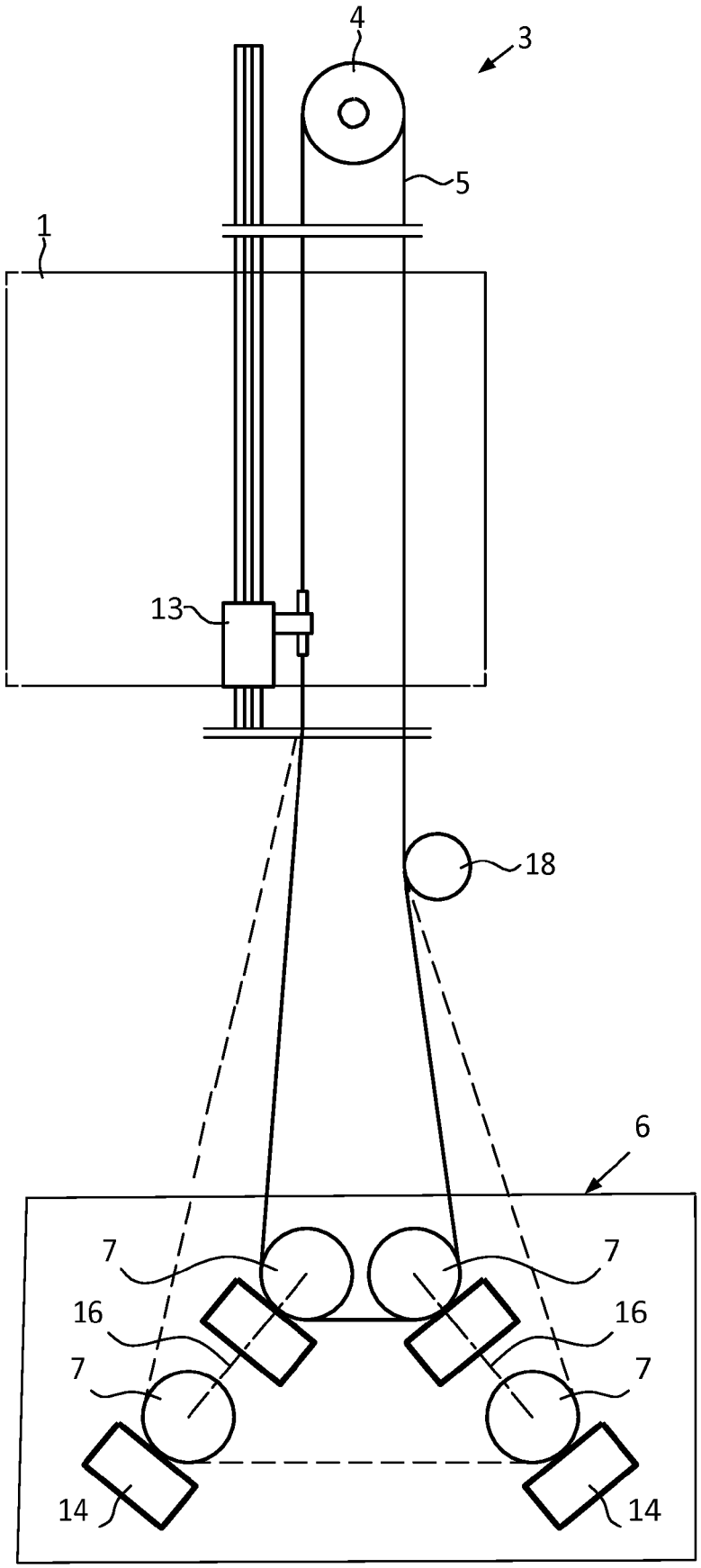

FIG.1

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EUROPEAN SEARCH REPORT

Application Number
EP 16 16 7963

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP S59 128176 A (HITACHI LTD) 24 July 1984 (1984-07-24) * figure 3 * -----	1-7	INV. B66B5/04

TECHNICAL FIELDS SEARCHED (IPC)

B66B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 October 2016	Dijoux, Adrien

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 16 7963

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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18-10-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP S59128176 A	24-07-1984	JP H06634 B2	05-01-1994
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82