Claims

1. An active compensation unit for a counterweight system in an elevator system, the active compensation unit having a variable weight unit, the active compensation unit being arranged to vary an amount of weight of the variable weight unit coupled in the counterweight system in dependence of an operating condition of the elevator system.

2. The active compensation unit of claim 1 comprising an interfacing unit, the interfacing unit having a control unit configured to receive an input signal indicative of the operating condition of the elevator system and to control the variation of the amount of weight of the variable weight unit coupled in the counterweight system in dependence of the input signal.

3. The active compensation unit of claim 1 or claim 2, wherein the variable weight unit comprises a weight and a weight mounting structure, the weight mounting structure being arranged to be mechanically coupled in the counterweight system and for mounting of the weight.

4. The active compensation unit of claim 3, wherein the weight mounting structure is arranged for suspension in the counterweight system through a reeling mechanism.

5. The active compensation unit of claim 4, comprising a control unit, wherein the control unit is configured to control operation of the reeling mechanism in dependence of the operating condition of the elevator system to maintain the weight mounting structure in suspension in the counterweight system.

6. The active compensation unit of claim 3, wherein the weight mounting structure is arranged for suspension in the counterweight system with hoisting ropes of the elevator system.

7. The active compensation unit of claim 3, wherein the variable weight unit comprises a plurality of weights, and wherein the weight mounting structure is arranged for mounting of each of the plurality of weights.

8. The active compensation unit of claim 7, arranged to mount the one or more weights of the plurality of weights to the weight mounting structure using a corresponding one or more electromagnets.

9. The active compensation unit of claim 7, arranged to mount the one or more weights of the plurality of weights to the weight mounting structure using a corresponding one or more micro motors, each of which is arranged to engage a weight using a threaded screw.

10. The active compensation unit of claim 7, wherein the plurality of weights comprises individual weights having different weight values from one another, and the active compensation unit is configured to select which of the individual weights is to be mounted to the weight mounting structure in dependence of the operating condition of the elevator system.

11. The active compensation unit of claim 10, wherein individual weights of the plurality of weights are selected to be a percentage of a rated capacity of the elevator system.

12. The active compensation unit of claim 1 or claim 2, wherein the operating condition of the elevator system is one or more of: elevator load; speed of elevator

travel; direction of elevator travel; elevator position within an elevator riser; and elevator traction machine electrical current.

13. A method of providing active compensation in a counterweight system in an elevator system using an active compensation unit having a variable weight unit mechanically coupled in the counterweight system, the method comprising varying an amount of weight of the variable weight unit in dependence of an operating condition of the elevator system.

14. The method of claim 13, wherein the active compensation unit comprises an interfacing unit, the interfacing unit having a control unit, the method comprising the control unit receiving an input signal indicative of the operating condition of the elevator system and varying the amount of weight of the variable weight unit in dependence of the input signal.

Claims

1. An active compensation unit for a counterweight system in an elevator system, the active compensation unit having a variable weight unit, the active compensation unit being arranged for suspension in the counterweight system at a substantially fixed level or height and to vary an amount of weight of the variable weight unit coupled in the counterweight system in dependence of an operating condition of the elevator system.

2. The active compensation unit of claim 1 comprising an interfacing unit, the interfacing unit having a control unit configured to receive an input signal indicative of the operating condition of the elevator system and to control the variation of the amount of weight of the variable weight unit coupled in the counterweight system in dependence of the input signal.

3. The active compensation unit of claim 1 or claim 2, wherein the variable weight unit comprises a weight and a weight mounting structure, the weight mounting structure being arranged to be mechanically coupled in the counterweight system and for mounting of the weight.

4. The active compensation unit of claim 3, wherein the weight mounting structure is arranged for suspension in the counterweight system through a reeling mechanism.

5. The active compensation unit of claim 4, comprising a control unit, wherein the control unit is configured to control operation of the reeling mechanism in dependence of the operating condition of the elevator system to maintain the weight mounting structure in suspension in the counterweight system.

6. The active compensation unit of claim 3, wherein the weight mounting structure is arranged for suspension in the counterweight system with hoisting ropes of the elevator system.

7. The active compensation unit of claim 3, wherein the variable weight unit comprises a plurality of weights, and wherein the weight mounting structure is arranged for mounting of each of the plurality of weights.

8. The active compensation unit of claim 7, arranged to mount the one or more weights of the plurality of weights to the weight mounting structure using a corresponding one or more electromagnets.

9. The active compensation unit of claim 7, arranged to mount the one or more weights of the plurality of weights to the weight mounting structure using a corresponding one or more micro motors, each of which is arranged to engage a weight using a threaded screw.

10. The active compensation unit of claim 7, wherein the plurality of weights comprises individual weights having different weight values from one another, and the active compensation unit is configured to select which of the individual weights is to be mounted to the weight mounting structure in dependence of the operating condition of the elevator system.

11. The active compensation unit of claim 10, wherein individual weights of the plurality of weights are selected to be a percentage of a rated capacity of the elevator system.

12. The active compensation unit of claim 1 or claim 2, wherein the operating condition of the elevator system is one or more of: elevator load; speed of elevator

travel; direction of elevator travel; elevator position within an elevator riser; and elevator traction machine electrical current.

13. A method of providing active compensation in a counterweight system in an elevator system using an active compensation unit having a variable weight unit mechanically coupled in the counterweight system, the method comprising suspending the active compensation system in the counterweight system at a substantially fixed level or height and varying an amount of weight of the variable weight unit in dependence of an operating condition of the elevator system.

14. The method of claim 13, wherein the active compensation unit comprises an interfacing unit, the interfacing unit having a control unit, the method comprising the control unit receiving an input signal indicative of the operating condition of the elevator system and varying the amount of weight of the variable weight unit in dependence of the input signal.