

An Improved Lifting Mechanism for the Elevator

Technical Field of the Invention

The present invention relates to the mechanical fields, particularly to lifting
5 mechanism, and more particularly to an improved lifting mechanism for the
elevator.

Background of the Invention

In the prior art, the suspension center of an elevator is located in the center of the
10 cage structure with two conventional suspension points at left and right. For the
elevators with short cage depth, offset load could not be easily observed because
light load would not lead to large structure distortion. However, when the load
becomes heavier with the depth of the cage much longer than the width, the cage of
the left and right suspended type elevator would cause large distortion and tilt
15 towards the heavy side, affecting loading of cargo. The cage distortion is usually
reduced by adding the guide rails i.e. setting four or six guide rails, however, more
serious distortion may cause the blockage and stop of the cage.

Summary of the Invention

20 The aim of the present invention is to provide an improved lifting mechanism for the
elevator. The improved lifting mechanism for the elevator is to solve the technical
problem in the prior art that the left and right suspended type elevator cage
emerges large distortion, blockage and stop with heavy load.

25 The improved lifting mechanism for the elevator according to the present invention
consists of a supporting beam, a traction machine, a traction rope, a cage and a
counterweight. The traction machine is fixed on the supporting beam and provided
with a traction sheave on its power take-off shaft, the cage is provided with cage
frames on the top, outside and under the bottom, and the counterweight is provided
30 with counterweight deflector sheaves on its top. The cage frame which is set on the

- top of the cage is provided with two cage deflector sheaves on its top. The rotating planes of the cage deflector sheaves are both positioned in the direction of the cage depth and in the eudipleural center plane of the cage. The two cage deflector sheaves are fore-and-aft spaced. One end of the traction rope is fixed to the
- 5 supporting beam through a first rope hitch plate, while the other end of the traction rope wraps around the two cage deflector sheaves and the traction sheave, then wraps around the counterweight deflector sheaves and finally is fixed to the supporting beam through a second rope hitch plate.
- 10 Furthermore, the counterweight is positioned under the supporting beam and provided with two counterweight deflector sheaves on its top. The supporting beam is provided with a first deflector sheave, which is on the top of the counterweight, and a second deflector sheave and a third deflector sheave, which are on the top of the cage deflector sheaves. One end of the traction rope is fixed to the supporting
- 15 beam through a first rope hitch plate, while the other end of the traction rope wraps around a cage deflector sheave downward and the second deflector sheave and the third deflector sheave upward, then wraps around another cage deflector sheave downward and the traction sheave upward, then wraps around a counterweight deflector sheave downward and the first deflector sheave upward, then warps
- 20 around another counterweight deflector sheave downward and finally is fixed to the supporting beam upward through the second rope hitch plate.

Moreover, each left and right side of the cage is provided with a guide rail.

- 25 The operating principle of the present invention is that when the cage depth is much longer than the width, two fore-and-aft cage deflector sheaves are set on the top of the cage along the middle line of the cage width so as to get over the unbalance caused by the fore-and-aft offset load of the cage. The first deflector sheave, the second deflector sheave and the third deflector sheave positioned on the supporting
- 30 beam of the machine room serve as fixed pulleys, while the cage deflector sheaves

and the counterweight deflector sheaves serve as moveable pulleys. The above said fixed pulleys and moveable pulleys form a sheave group of 1:4. The cage can be driven with saved force by traction motor compared with regular roping.

- 5 Compared with the prior art, the present invention has positive and obvious effects. The fore-and-aft cage deflector sheaves are set on the top of the cage so as to get over the unbalance caused by the fore-and-aft offset load of the elevator cage, avoid the blockage of the cage, and reduce the number of guide rails. The elevator can be driven with saved force by roping of the moving sheave group.

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Brief Description of the Drawings

Figure 1 is the structure schematic view of the example 1 of the improved lifting mechanism for the elevator according to the present invention.

Figure 2 is the cage suspension structure schematic view of the example 1 of the

- 15 improved lifting mechanism for the elevator according to the present invention.

Figure 3 is the counterweight suspension structure schematic view of the example 1 of the improved lifting mechanism for the elevator according to the present invention.

Figure 4 is the cage suspension structure schematic view of the example 2 of the

- 20 improved lifting mechanism for the elevator according to the present invention.

Figure 5 is the counterweight suspension structure schematic view of the example 2 of the improved lifting mechanism for the elevator according to the present invention.

- 25 Detailed Description of the Invention

Example 1

As shown in Figures 1, 2 and 3, the improved lifting mechanism for the elevator according to the present invention consists of a supporting beam 8, a traction

- 30 machine 2, a traction rope 3, a cage 4 and a counterweight 5. A control cabinet 1 and

the traction machine 2 are set in the machine room 6 of the wellhole. A cage frame 10 is set on the outside of the cage 4 and provided with two cage deflector sheaves 41 on its top. The rotating planes of the cage deflector sheaves 41 are both positioned in the direction of the cage depth and in the eudipleural center plane of the cage 4. The two cage deflector sheaves are fore-and-aft spaced. The traction machine 2 is provided with a traction sheave. One end of the traction rope 3 is fixed to the supporting beam 8 through a first rope hitch plate 71, while the other end of the traction rope 3 wraps around the cage deflector sheaves 41 on the top of the cage 4 and the traction sheaves, then wraps around the counterweight deflector sheaves 51 on the top of the counterweight 5 and finally is fixed to the supporting beam 8 through a second rope hitch plate 72.

Furthermore, a cage deflector sheaves 41 is set close to the entrance of the cage 4, while another cage deflector sheaves 41 is set close to the backend of the cage. So the cage 4 would not tilt caused by large offset load.

Moreover, there are two counterweight deflector sheaves 51. A first deflector sheave 91, a second deflector sheave 92 and a third deflector sheave 93 are fixed on the supporting beam 8. One end of the traction rope 3 is fixed to the supporting beam 8 through the first rope hitch plate 71, while the other end of the traction rope 3 wraps around a cage deflector sheave 41 downward and the second deflector sheave 92 and third deflector sheave 93 upward, then wraps around another cage deflector sheave downward 41 and the traction sheave upward, then wraps around a counterweight deflector sheave 51 downward and the first deflector sheave 91 upward, then warps around another counterweight deflector sheave 51 downward and finally is fixed to the supporting beam 8 upward through the second rope hitch plate 72. So they form a sheave group of 1:4. The cage 4 can be driven with saved force by traction motor compared with regular roping.

Further, each left and right side of the cage is provided with a guide rail (not shown in the figures).

Example 2

- 5 As shown in Figures 4 and 5, the structures in example 2 are almost as same as that of example 1 but differ in the suspension pattern of the counterweight 5 and the cage 4. In the present example, deflector sheaves are not set neither between two counterweight deflector sheave 51 nor between two cage deflector sheave 41 so as to form a sheave group of 1:2.

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Of course, in the case of achieving functions of the present invention, three or more deflector sheaves can be set on the top of the counterweight 5 and the cage 6.

Claims

1. An improved lifting mechanism for the elevator according to the present invention consists of a supporting beam, a traction machine, a traction rope, a cage and a counterweight, said traction machine is fixed on the supporting beam and provided with a traction sheave on its power take-off shaft, said cage is provided with cage frames on the top, outside and under the bottom, and said counterweight is provided with counterweight deflector sheaves on its top;

wherein said cage frame which is set on the top of said cage is provided with two cage deflector sheaves on its top, the rotating planes of said cage deflector sheaves are both positioned in the direction of the cage depth and in the eudipleural center plane of the cage, the two cage deflector sheaves are fore-and-aft spaced;

wherein one end of said traction rope is fixed to the supporting beam through a first rope hitch plate, while the other end of the traction rope wraps around the two cage deflector sheaves and said traction sheave, then wraps around said counterweight deflector sheaves and finally is fixed to the supporting beam through a second rope hitch plate.

2. The improved lifting mechanism for the elevator as said in claim 1, wherein said counterweight is positioned under the supporting beam and provided with two counterweight deflector sheaves on its top, the supporting beam is provided with a first deflector sheave, which is on the top of the counterweight, and a second deflector sheave and a third deflector sheave, which are on the top of the cage deflector sheaves;

wherein one end of said traction rope is fixed to the supporting beam through a first rope hitch plate, while the other end of the traction rope wraps around a cage deflector sheave downward and the second deflector sheave and the third deflector sheave upward, then wraps around another cage deflector sheave downward and the traction sheave upward, then wraps around a counterweight deflector sheave downward and the first deflector sheave upward, then warps

around another counterweight deflector sheave downward and finally is fixed to the supporting beam upward through said second rope hitch plate.

3. The improved lifting mechanism for the elevator as said in claim 1, wherein
5 each left and right side of said cage is provided with a guide rail.