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(54) Elevator with onboard driving means

(57) An improved elevator specifically designed for civil and industrial applications, comprises electric power supply means, load supporting means, sliding guides operatively coupled to said load supporting means, as well as load raising and lowering means, comprising a driving assembly rigid with said load supporting means and operatively coupled to the electric power supply means.

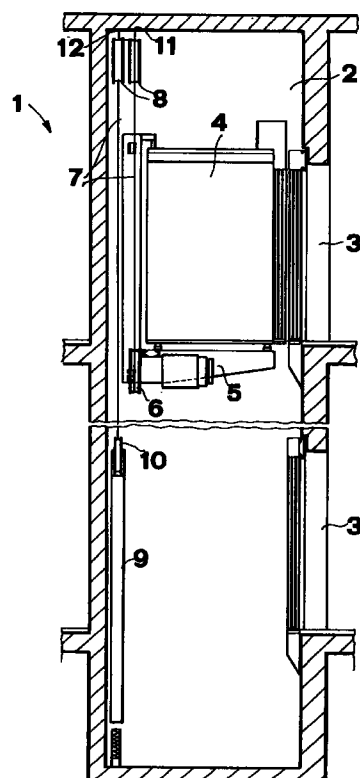


FIG.1

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an improved elevator, specifically designed for civil and industrial applications.

[0002] In the building construction field in general, the technical problem of vertically raising loads have been already solved by using elevators and load raising assemblies of different constructions, for achieving different objects.

[0003] In this connection it should be apparent that a load raising device would involve to solve problems which are very different from those which must be solved for designing person elevators in a very high building.

[0004] However, in each type of solution, it would be possible to identify some common elements. Actually, is always generally provided an elevator or loading lowering and raising shaft comprising a plurality of ports defining the access openings at each store, a bottom end called pit as well as a top end called head, and an elevator cabin sliding on suitable sliding guides inside the elevator shaft, a gear and pulley system, as well as a machine or apparatus room, suitably arranged depending on the elevator design, and including the driving motor assembly, a control panel as well as the required electric wiring.

[0005] A push-button panel arranged inside the cabin allows to control the elevator cabin or load raising and lowering device up to the desired store.

[0006] These prior elevators, while solving the mentioned technical problem, are however affected by the following disadvantages.

[0007] Their making and operation costs are comparatively high, both due to the requirement of meeting safety and maintenance rules, and because of the additional requirement of providing, as mentioned, a machine room provided for housing some main components, such as the driving motor.

[0008] In the case of a black-out or of a failure, a user of a prior elevator can not reach the nearest floor, by performing an emergency operation directly from the elevator cabin, but it is always necessary the intervention of an outer operator.

[0009] Moreover, the operation comfort is frequently poor, because of the provision of not optimally designed speed controlling devices, which do not provide an optimum comfort for the elevator passengers, in particular on comparatively extended displacement movements of the elevator cabin.

SUMMARY OF THE INVENTION

[0010] Accordingly, the aim of the present invention is to overcome the above mentioned drawbacks of the prior art elevators.

[0011] To that end, the invention relates to an improved elevator, specifically designed for civil and industrial applications, of novel and simple construction, allowing a great saving to be achieved, as well as having a small size, together with a high reliability and a very good comfort for the users.

[0012] Briefly, according to the invention, the above mentioned aim has been achieved by an improved elevator specifically designed for civil and industrial applications, comprising electric power supply means, load supporting means, sliding guides operatively coupled to said load supporting means and load raising and lowering means, wherein said load raising and lowering means comprise a driving assembly rigid with said load supporting means and operatively coupled to said electric power supply means.

[0013] The improved elevator specifically designed for civil and industrial applications according to the invention, is characterized in that it has the characterizing features of Claim 1.

[0014] The improved elevator specifically designed for civil and industrial applications according to the invention provides the following advantages.

[0015] The making and operation costs thereof are small, due to a great reduction of its size and, moreover, it may be designed in a much more simple manner and with a less driving power. In particular, owing to the solution proposed by the invention, it is possible to omit the machine room, with a consequent saving of the related cost.

[0016] The elevator according to the invention is much more simple than prior elevators, both of a counterweight type and of a hydraulic type.

[0017] The required driving power, moreover, is less than that required by a prior hydraulic elevator, and this due to the specific inventive construction.

[0018] A further advantage is that it is possible to carry out emergency operations to arrive at the nearest floor, directly from the elevator cabin; thus, no outside operator is required for performing emergency operations.

[0019] Finally, due to the provision of specifically designed speed control means, the driving comfort in the elevator cabin will be very high, and much greater than that of prior elevators.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] Further characteristics, advantages and details of the improved elevator specifically designed for civil and industrial applications according to the invention will become more apparent hereinafter from the following disclosure with reference to the accompanying drawing, illustrating, by way of an indicative but not limitative example, a preferred embodiment of the invention.

[0021] In the drawing:

Figure 1 is a vertical cross-sectioned view of the

improved elevator specifically designed for civil and industrial applications according to the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] With reference to the number references of the mentioned drawing figure, the improved elevator 1, specifically designed for civil and industrial applications, comprises a shaft 2 including a plurality of openings 3, defining the floor apertures or ports.

[0023] In said shaft a plurality of vertical sliding guides are provided, said guides connecting an elevator cab 4 for its translation displacement.

[0024] Said elevator cab 4 is provided with known electric power supply connecting means, a push-button panel, a light indicator assembly, inner lamps and inner automatic or manual doors, of any known type, which will be opened synchronously with the corresponding outer doors installed at the several apertures 3 of each floor.

[0025] Under the elevator can 4 a driving assembly 5 is provided, the driving motor of said assembly being specifically adapted to be controlled in its speed, by an inverter of the "VVVF" type, which is well known in the prior art.

[0026] The driving motor is operatively coupled, through suitable speed reducing means, to a winch 6 which is coupled by a rope 7 to a pair of pulleys 8 as well as to a further pulley 10 rigid with a counterweight 9, preferably in a size ratio 1:2.

[0027] On the bottom of the elevator cab 4 is moreover provided a driving lever, not shown, which is operatively coupled to the brake assembly of said elevator cab, in order to carry out possible manual braking emergency operations, as it will be disclosed in a more detailed manner hereinafter.

[0028] The ends of the mentioned rope 7 are both connected to the top of the cross member of the elevator shaft 2, at two discrete points 11 and 12.

[0029] More specifically, the rope 7, having its first end coupled at said point 11, is downward vertically directed, and entrained on the winch drum 6 for about 180°, and then it is vertically upwardly directed up to the pulleys 8, therefrom it is directed toward the pulley 10 of the counterweight 9. After having been entrained on said pulley 10 for about 180°, it will be upwardly directed again to be connected on the top cross member of the elevator shaft 2 at the connecting point 12.

[0030] Alternately, it would be possible to omit the counterweight, and connect differently the end portions of the rope 7: one to the bottom end of the elevator shaft 2 beam, by pivot connecting it to a rod including a counterweight in order to hold said rope under tension, and the other to the top end of the same beam arrangement.

[0031] In this case, the rope 7 coming from the top will be entrained through about 180° on the drum of the winch 6, rigid with the elevator cab 4, and then said rope

will be entrained through about 180° on a pulley rigid with the elevator cab 4, having its rotary axis parallel to the rotary axis of the winch 6 and lying on the same vertical plane, and finally being further downward directed to be fixed to the bottom end of said beam arrangement, by the above mentioned rod.

[0032] In this second arrangement, the counterweight would be not constitute an essential component, even if it could be provided coupled to the elevator cab 4 by a further rope and a plurality of coupling pulleys in order to reduce the working load on the driving motor.

[0033] In this connection it should be apparent that the size and shape of the several elements forming the improved elevator specifically designed for civil and industrial application according to the invention can be changed according to requirements, without departing from the invention scope.

[0034] The operation of the elevator 1 according to the invention can be easily deduced from the preceding disclosure.

[0035] In fact, the driving or motor assembly 5, as controlled by the push-button panel provided in the elevator cab 4, will actuate the winch 6 to operate the rope 7. Owing to the specifically designed rope 7 - pulley 8, 10 arrangement, and since the elevator cab 4 is connected to the driving assembly 5, the elevator cab 4 will be driven in the desired direction with a speed equal to the peripheral speed of the winch 6, whereas the counterweight 9 will be displaced in an opposite direction.

[0036] Moreover, the upward or downward displacement of the elevator cab 4 will be very accurate and noiseless, due to the provision of the "VVVF" type of inverter, as previously mentioned, provided for controlling the rotary speed of the motor.

[0037] In the second disclosed embodiment only the used kinematic mechanism is changed: in this case too, the elevator cab 4 is displaced along a rope, while sliding on its vertical guides, and holding a displacement speed equal to the peripheral speed of the winch 6. A possible counterweight provided in this embodiment will reduce the operating load on the driving or motor assembly 5.

[0038] In the case of a failure or a black-out, the user can, in both cases, operate a suitable dedicated operating lever provided on the bottom of the cab 4, to open the brake jaws.

[0039] In this case the winch 6 will be rotated, thereby the elevator cab will be raised or lowered depending on the equilibrium conditions of the possibly present counterweight. In the absence of any counterweight, the elevator cab will be lowered to the nearest floor.

[0040] A suitable light indicator will indicate, in each case, the arriving of the elevator cab at the nearest floor, thereby signalling the success of the operation.

Claims

1. An improved elevator, specifically designed for civil

and industrial applications, comprising electric power supplying means, load supporting means, vertical sliding guides operatively coupled to said load supporting means, and load raising and lowering means, characterized in that said load raising and lowering means comprise a driving assembly (5) rigid with said load supporting means and operatively coupled to said electric power supply means.

2. An improved elevator, specifically designed for civil and industrial applications, according to Claim 1, characterized in that said driving assembly (5) is coupled to a motion transmitting winch (6).

3. An improved elevator, specifically designed for civil and industrial applications, according to the preceding claims, characterized in that said load supporting means comprise an elevator cab (4), coupled to said sliding guides in order to vertically slide inside a shaft (2) of said elevator (1), said elevator cab (4) comprising at least a push-button panel and an indicating device assembly for controlling said elevator (1), as well as an operating lever operatively coupled to a brake assembly in order to carry out emergency operations.

4. An improved elevator, specifically designed for civil and industrial applications, according to the preceding claims, characterized in that said load raising and lowering means comprise at least a rope (7), the ends thereof are connected at two discrete points (11, 12) to the top beam arrangement of said shaft (2), said rope (7) being entrained about said winch (6), a pair of transmission pulleys (8) and finally a further pulley (10) connected to a counterweight (9), wherein the rotary axes of said winch (6) and pulleys (8, 10) are parallel to one another and lie on a same plane.

5. An improved elevator, specifically designed for civil and industrial applications, according to the preceding claims, characterized in that said load raising and lowering means comprise a rope the end portions thereof are coupled one on the top beam arrangement and the other on the bottom beam arrangement of said shaft (2), said rope being entrained about the drum of the winch (6) and on a further pulley also coupled to said elevator cab (4) and having the rotary axis thereof parallel to the axis of the winch (6) and lying on the same vertical plane.

6. An improved elevator, specifically designed for civil and industrial applications, according to the preceding claims, characterized in that said rope is coupled to said bottom beam arrangement of said shaft (2) by a rod pivoted to said bottom beam arrange-

ment and operatively coupled to a counterweight.

7. An improved elevator, specifically designed for civil and industrial applications, according to the preceding claims, characterized in that a counterweight is coupled to said elevator cab (4) by a further rope and a further plurality of pulleys.

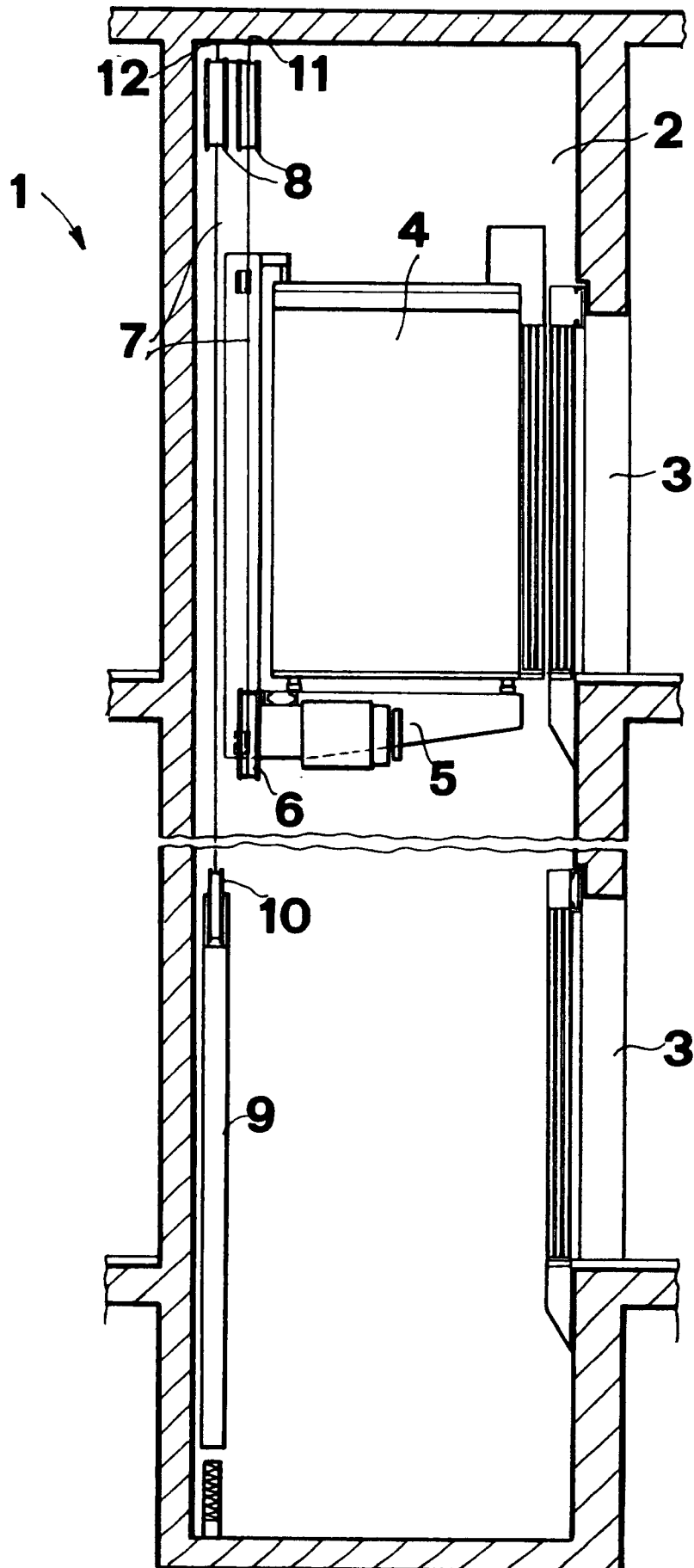


FIG.1