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(54) **ELEVATOR CONSTRUCTION**

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- **PATENT ABSTRACTS OF JAPAN vol. 1998, no. 08, 30 June 1998 (1998-06-30) & JP 10 081463 A (OTIS ELEVATOR CO), 31 March 1998 (1998-03-31)**

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Description

TECHNICAL FIELD

[0001] The present invention relates to a traction lift for passengers or goods and more particularly to a traction lift of the type with load car hoisting machine located beside the top of the hoistway (also termed "Traction Top Side" or TTS type).

BACKGROUND

[0002] Frequently in the installation of a traction lift for passengers or goods it may prove impossible or at least inconvenient for reasons of space economy to provide for a machine room located over the hoistway.

[0003] Possible solutions to this problem are at present offered by hydraulic lifts or traction lifts with machine room located at the base of the hoistway.

[0004] Systems with hydraulic hoist devices display shortcomings concerning the travel which at most can be accomplished (on the order of 20 meters) and the high energy expenditure due to absence of the car counterweight which is present in traction systems.

[0005] Systems with traction lifting devices with machine room located at the base of the hoistway entail displacement of beams at the top of the hoistway for installation of diverting pulleys taking the ropes from the car to the drive winch and counterweight. This implies walls sizing designed to bear the vertical load of the lift and counterweight and makes difficult any subsequent system modification. In addition the movable frame supporting the car is usually the portal type and this involves the need for two or three bearing walls to which to fasten the car and counterweight guide track anchor brackets and a resulting waste of space.

[0006] A traction lift for passenger or goods, with car hoisting machine located beside the hoistway is known for example from EP-A-0 686 594.

OBJECTS

[0007] The general purpose of the present invention is to remedy the above mentioned shortcomings by making available a traction lift with car hoisting machine located beside the upper end of the hoistway and which, in addition to obviating the prior art shortcomings, would display at least one of the following advantages:

- saving of useful space and making more rational use of the hoistway,
- having only one bearing wall of the hoistway, designed to bear only the forces coming from the guide track anchors,
- having much reduced machine room space not burdened by the vertical load of the car and of the counterweight, and
- allowing car access doors on three sides.

SUMMARY OF THE INVENTION

[0008] The traction lift according to the invention is of the type with load car hoisting machine located beside the top of the hoistway, and in which are a fixed frame supporting the hoisting machine, a counterweight and movable frame supporting the car, a traction pulley for operation of the hoisting ropes and a diverting pulley designed to locate the vertical section of the counterweight support ropes in the desired position, guide tracks for guiding the movement of the movable frame and counterweight, and brackets for fastening the tracks to the hoistway walls. It is characterized in that:

- the above mentioned movable frame presents a cantilever structure and comprises horizontal support beams for the car base and a pair of vertical beams abreast of one of the car walls,
- the vertical beams of the above mentioned pair are also abreast of the said guide tracks with which they are engaged with the possibility of vertical running,
- the above mentioned traction and diverting pulleys are both supported by the above mentioned fixed frame,
- the movable frame and counterweight guide tracks are located near a same hoistway wall, and
- the fixed frame supporting the hoisting machine discharges the overall load force on the above mentioned guide tracks which in turn discharge this overall force into the pit located at the bottom of the hoistway.

DRAWINGS

[0009] In the following a preferred embodiment of the present invention is described with the aid of the annexed drawings, in which:

FIG.1:	shows a vertical cross section view of a machine room in accordance with the present invention with the car in upper limit-stop position,
FIG.2:	shows a horizontal cross section view of the hoistway and car of FIG 1,
FIG.3:	shows a perspective view of a movable car-rack frame in accordance with the present invention,
FIG.4:	horizontal cross section view of the machine room of FIG 1,
FIGS. 5 and 6:	show side and front views of the fixed frame supporting the hoisting machine of FIG 1, and
FIG.7:	shows a variant of FIG 5 concerning the different positioning of the hoisting machine.

PREFERRED EMBODIMENTS

[0010] FIGS. 1, 2 and 3 show a preferred embodiment of the traction lift in accordance with the present invention displaying a housing ("car") 1 for passengers and goods to be conveyed, fastened to a movable frame 2 (car-rack frame) running along guide tracks 31,32 arranged at its sides.

[0011] The car rests on the movable frame through a base 11 and along one of its walls. The car can have one or more accesses 12 arranged on any of its sides except the side in contact with the frame.

[0012] The movable frame presents a cantilever structure. In fact the movable frame has as its main components two beam pairs with each pair made up of a horizontal beam 21 and a vertical beam 22 arranged according to an L position.

[0013] The two horizontal beams act as a support for the base 11 of the car while each vertical beam accommodates at its ends two shoes 24, 25 designed to hold the movable frame on its guide tracks 31, 32. The two horizontal beams are connected together by two crosspieces 26 which give additional stiffness to the system. A third crosspiece 27 connects the upper end of the two vertical beams.

[0014] The first two beams 26 also support a beam 29 to which are anchored (at its intersection with the vertical plane passing through the tracks 31, 32) the hauling ropes.

[0015] The third crosspiece also acts as a support for two plates 28 with L cross section serving for the upper fastening of the car.

[0016] Starting from their anchoring point with the beam 29 the hauling ropes 40 (more than two) rise vertically to the driving pulley 41 moved by the hoisting machine 5 and after running through said pulley return downward obliquely to the diverting pulley 42 (idling) and thence vertically to the counterweight 7. The section of the ropes descending vertically to the counterweight lies in the vertical plan passing through the counterweight guide tracks.

[0017] As shown in FIGS. 4, 5 and 6 (to be interpreted in combination with FIGS. 2 and 3) the hoisting machine 5 is positioned on a fixed frame 6 supported by four pillars constituted by the movable frame guide tracks 31, 32 and by another pair of tracks 33, 34 guiding the counterweight 7. Said pillars depart from beneath said frame 6 to descend to the bottom of the hoistway (the system "pit").

[0018] The two left-hand pillars 31, and 33 are connected together and to the wall behind through metal brackets like no. 35 of FIG 2 while the two right-hand pillars 32, 34 are connected together and to the wall behind through metal brackets like no. 36 of the same figure.

[0019] The frame 6 is fastened to the tracks 31, 32, 33, 34 through bolts and blocks 37 welded outside the upper end of the tracks.

[0020] To damp any vibration transmitted from the machine 5 to the tracks there are provided buffers 38 placed between the blocks 37 and frame 6 as well as buffers 20 placed between the car base and the car-rack frame.

[0021] On the wall behind the above mentioned pillars at the height of the frame 6 is an opening designed to allow partial emergence of the frame 6 and the machine 5 from the hoistway.

[0022] This opening communicates with an adjacent compartment 8 (machine room) in which is located (at the point considered most appropriate) the electronic control system (control panel) 81 of the system.

[0023] To prevent the danger of falling of the car and of the car-rack frame in case of breakage of the hauling ropes, in the lower part of the car-rack frame is installed a stop device (parachute, not shown in the figures) capable of mechanically stopping the car-rack frame by means of blocks clamping on the guide tracks.

[0024] Operation of this stop device is caused by a speed limiting device 9 (FIG 3) having pulleys 43, 44 (with the pulley 43 having a microswitch operated when the centrifugal force generated by rotation exceeds a certain value, and with the pulley 44 having a tensioning device) whose peripheral speed is held equal to that of the car by means of a cable 45 fastened at one of its points to the car-rack frame.

[0025] When cable speed exceeds a predetermined peak value whether rising or falling the limiter stops movement by causing the operation of the parachute device. The car-rack frame guide tracks must therefore be sized not only in relation to the peak load to which they are subjected by the forces exerted by the car-rack frame on its tracks and the bending moment exerted by the shoes 24, 25 but also in relation to the dynamic stresses to which they would be subjected in case of parachute operation.

[0026] The speed limiter 9 is located in the high part of the hoistway at the level of the frame 6 while, as already explained, the control panel 81 is located in the machine room. Inspection and maintenance thereof are thus easy and safe as is operation in case of emergency control to free passengers trapped in the car. The connection opening between the hoistway and the machine room allows easy inspection of the speed regulator.

[0027] Rotation of the hoisting machine motor is controlled by an encoder allowing extrapolation of the position and speed of the car in the hoistway. A device for regulation of the level and frequency of the power supply voltage allows fine adjustment of motor rotation speed.

[0028] It is clear from the foregoing description that a traction lift in accordance with the present invention allows achievement of the purposes indicated above and in particular the following advantages:

- elimination of a machine room over the hoistway,
- considerably reduced space occupied by the machine room thanks to location of the hoisting ma-

chine partly in the hoistway and partly in the machine room,
- considerably reduced space occupied (in horizontal section) of the hoistway thanks to location of the supporting steel-structural work (vertical beams of the car-rack frame, counterweight, guide tracks, anchor brackets) near a same hoistway wall,
- confining the transverse forces exerted by the pulleys inside the frame 6 because of the common location on said frame of the hoisting machine and pulleys,
- discharging of all the vertical loads in the pit due to resting of the frame 6 on the guide track pillars, resulting elimination of loads in the machine room and reduction of the bearing function of the hoistway wall behind the tracks to only the strength necessary to support the horizontal forces transmitted by the car-rack frame shoes to the tracks in the most critical situations (sudden stopping of the car with full load due to operation of the parachute), and
- possibility of access to the car from three sides.

[0029] Naturally the above embodiment of the present invention is given by way of non-limiting example, many obvious variant being possible.

[0030] For example a variant could concern arrangement of the machine 5 on the frame 6. Indeed, said machine could be positioned with its motor axis arranged vertically as indicated in FIG. 7 instead of with its motor axis arranged horizontally as shown in FIG. 5. This would have the advantage of better practicability of the machine room or the possibility of further reduction of its occupied space.

[0031] Other variants could concern the structural characteristics of the frames 2 and 6. In particular the buffers 38 for damping the vibrations coming from the hoisting machine could be located between the machine and the frame 6 rather than between the frame and the guides.

Claims

1. Traction lift for passenger or goods, with car hoisting machine locatable beside the top of the hoistway, comprising:

- a fixed frame (6) supporting the hoisting machine (5),
- a counterweight (7) and movable car-rack frame (2) for supporting the car (1),
- a traction pulley (41) for operation of the hauling ropes and a diverting pulley (42) designed to locate the vertical section of the counterweight support ropes in the desired position,
- guide tracks (31-34) guiding the movement of the car-rack frame and counterweight, and
- brackets (35, 36) for fastening said tracks to the hoistway walls,

characterized in that:

- the above mentioned car-rack frame presents a cantilever structure and comprises horizontal beams (21) for support of the car base (11) and a pair of vertical beams (22) abreast of one of the car walls,
- the vertical beams of the above mentioned pair are also abreast of the car-rack frame guide tracks (31, 32) with which they are engaged with possibility of vertical running,
- the above mentioned traction and diverting pulleys (41, 42) are both supported by the above mentioned fixed frame (6),
- the said guide tracks (31-34) of the car-rack frame and counterweight are located near a same wall of the hoistway, and
- the fixed hoisting machine support frame (6) discharges the overall load force on the above mentioned guide tracks (31-34) of the car-rack frame and counterweight, which in turn is suitable for discharging said overall force inside the pit located at the bottom of the hoistway.

2. Traction lift in accordance with the above claim **characterized in that** the guide tracks of car-rack frame and counterweight are fastened to the above mentioned same hoistway wall and that the brackets fastening the car-rack frame guide tracks to the wall are the same as those which fasten the counterweight guide tracks.

3. Traction lift in accordance with claim 1 **characterized in that** the vertical section of the hauling ropes leading to the anchoring point with the above mentioned car-rack frame lies substantially in the plane passing through the guide tracks of the frame itself and that the vertical section of the supporting cables of the above mentioned counterweight lies substantially in the plane passing through the counterweight guide tracks.

4. Traction lift in accordance with claim 1 **characterized in that** the hoisting machine is located partly in the hoistway and partly in a machine room abreast of the hoistway.

5. Traction lift in accordance with claim 1 **characterized in that** the hoisting machine is located over the above mentioned fixed frame with its motor rotation axis arranged vertically.

6. Traction lift in accordance with claim 1 **characterized in that** buffers for damping the vibration which could be transmitted from the hoisting machine to the guide tracks and the car are placed between the

car base and the car-rack frame as well as between the above mentioned fixed frame and the guide tracks, i.e. between the hoisting machine and the fixed frame.

7. Traction lift in accordance with the above claim **characterized in that** to prevent the danger of falling of the car in case of breakage of the hauling cables, in the lower part of the car-rack frame is installed a stop device capable of mechanically stopping the car-rack frame by means of blocks clamping on the guide tracks and that operation of this stop device is caused by a speed limiting device having pulleys whose peripheral speed is held equal to that of the car be means of a cable fastened at one of its points to the car-rack frame, with said limiting device causing operation of the parachute device when the above mentioned cable exceeds a predetermined peak value whether rising or falling.

Patentansprüche

1. Gezogener Lift für Personen oder Waren mit einem oben neben dem Fahrstuhlschacht angeordneten Fahrstuhlmotor mit

- einem den Fahrstuhlmotor (5) tragenden festen Rahmen (6),
- einem Gegengewicht (7) und einem Kabinengestellrahmen (2) zum Tragen der Kabine (1),
- einer Zug-Seilscheibe (4) für die Zugseile und einer Umlenkseilscheibe (42), welche so ausgelegt ist, daß sie den senkrechten Abschnitt der das Gegengewicht tragenden Seile in die gewünschte Position bringen,
- Führungsschienen (31 bis 34), welche die Bewegung des Kabinengestellrahmens und Gegengewichts führen,
- Verankerungen (35,36) zur Befestigung der Schienen an den Schachtwänden,

dadurch gekennzeichnet, daß

- der Kabinengestellrahmen eine Tragstruktur mit horizontalen Balken (21) zur Unterstützung der Kabinenunterseite (11) und mit einem Paar vertikaler Balken (22) neben einer der Kabinenwände bildet,
- die vertikalen Balken des Balkenpaares sich ebenfalls neben den Führungsschienen (31,32) für den Kabinengestellrahmen befinden, in welche sie vertikal verschiebbar in Eingriff stehen,
- sowohl die Zug- als auch die Umlenkseilscheiben (41,42) auf dem festen Rahmen (6) gelagert sind,
- die Führungsschienen (31 bis 34) für den Kabinengestellrahmen und das Gegengewicht sich dicht bei ein und derselben Wand des Schachtes befinden und
- der Tragrahmen (6) für den Fahrstuhlmotor die Gesamtbelastungskräfte auf die Führungsschienen (31 bis 34) für den Kabinengestellrahmen und das Gegengewicht übertragen, welche ihrerseits zur Einleitung der gesamten Kräfte in die am Boden des Fahrstuhlschachts befindliche Grube geeignet sind.

2. Lift nach Anspruch 1, **dadurch gekennzeichnet, daß** die Führungsschienen für den Kabinengestellrahmen und das Gegengewicht an der oben genannten selben Schachtwand befestigt sind und daß die Verankerungen der Kabinengestellrahmen-Führungsschienen an der Wand dieselben sind, mit welchen die Gegengewichts-Führungsschienen befestigt sind.

3. Lift nach Anspruch 1, **dadurch gekennzeichnet, daß** der vertikale Teil der Zugseile, welcher zum Verankerungspunkt am Kabinengestellrahmen führt, im wesentlichen in derjenigen Ebene liegt, welche durch die Führungsschienen des Rahmens selbst verlaufen, und daß der vertikale Abschnitt der Tragseile für das Gegengewicht im wesentlichen in derjenigen Ebene liegt, welche durch die Gegengewicht-Führungsschienen verläuft.

4. Lift nach Anspruch 1, **dadurch gekennzeichnet, daß** der Fahrstuhlmotor zum Teil innerhalb des Fahrstuhlschachtes und zum Teil in einem neben dem Fahrstuhlschacht befindlichen Maschinenraum angeordnet ist.

5. Lift nach Anspruch 1, **dadurch gekennzeichnet, daß** der Fahrstuhlmotor oberhalb des festen Rahmens mit vertikaler Motorachse angeordnet ist.

6. Lift nach Anspruch 1, **dadurch gekennzeichnet, daß** Puffer zur Dämpfung von Vibrationen, welche vom Fahrstuhlmotor auf die Führungsschienen und die Kabine übertragen werden könnten, zwischen der Kabinenunterseite und dem Kabinengestellrahmen sowie zwischen dem festen Rahmen und den Führungsschienen, also zwischen dem Fahrstuhlmotor und dem festen Rahmen, vorgesehen sind.

7. Lift nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, daß** zur Vermeidung eines Abstürzens der Kabine im Fall eines Reißens der Zugseile im unteren Teil des Kabinengestellrahmens eine Bremsvorrichtung installiert ist, welche in der Lage ist, den Kabinengestellrahmen mit Hilfe von an den Führungsschienen klemmenden Blökken mechanisch zu stoppen, und daß die Betätigung dieser Bremsvorrichtung durch eine Ge-

schwindigkeits-Begrenzungseinrichtung mit Seilscheiben ausgelöst wird, deren Umfangsgeschwindigkeit gleich der Kabinengeschwindigkeit mit Hilfe eines Kabels gehalten wird, das an einem seiner Punkte mit dem Kabinengestellrahmen verbunden ist, wobei die Begrenzungseinrichtung den Betrieb der Bremsvorrichtung auslöst, wenn das Kabel oder Seil beim Steigen oder Sinken einen vorbestimmten Spitzenwert überschreitet.

Revendications

1. Ascenseur à traction pour passagers ou charges à machine de levage de cabine pouvant être disposée à côté du haut de la cage d'ascenseur comprenant :

un châssis fixe (6) portant la machine de levage (5),
un contrepoids (7) et un châssis mobile support de cabine (2) pour porter la cabine (1),
une poulie de traction (41) pour faire fonctionner les cordes de traction et une poulie de dégagement (42) destinée à disposer la partie verticale des cordes support de contrepoids à la position souhaitée,
des pistes de guidage (31-34) guidant le mouvement du châssis support de cabine et du contrepoids, et
des consoles (35, 36) pour fixer les pistes aux parois de la cage d'ascenseur,

caractérisé en ce que :

le châssis support de cabine susmentionné présente une structure en saillie et comprend des poutres horizontales (21) pour porter le plancher de la cabine (11) et deux poutres verticales (22) accolées à l'une des parois de la cabine,
les poutres verticales parmi les deux poutres susmentionnées sont également accolées aux pistes de guidage du châssis support de cabine (31, 32) avec lesquelles elles sont en contact avec une possibilité de translation verticale,
les poulies de traction et de dégagement susmentionnées (41, 42) sont toutes deux portées par le châssis fixe susmentionné (6),
les pistes de guidage (31-34) du châssis support de cabine et du contrepoids sont disposées près d'une même paroi de la cage d'ascenseur, et
le châssis fixe support de la machine de levage (6) décharge la force de charge totale sur les pistes de guidage susmentionnées (31-34) du châssis support de cabine et du contrepoids qui est elle-même propre à décharger la force latérale à l'intérieur de la fosse disposée en bas de la cage d'ascenseur.

2. Ascenseur selon la revendication précédente, **caractérisé en ce que** les pistes de guidage du châssis support de cabine et du contrepoids sont fixées à la même paroi de levage que celle mentionnée ci-dessus et que les consoles liant les pistes de guidage de châssis support de cabine à la paroi sont identiques à celles qui lient les pistes de guidage de contrepoids.

3. Ascenseur selon la revendication 1, **caractérisé en ce que** la partie verticale des cordes de levage conduisant au point d'ancrage avec le châssis support de cabine susmentionné se trouve sensiblement dans le plan passant par les pistes de guidage du châssis lui-même et **en ce que** la partie verticale des câbles support du contrepoids susmentionné se trouve sensiblement dans le plan passant par les pistes de guidage de contrepoids.

4. Ascenseur selon la revendication 1, **caractérisé en ce que** la machine de levage est disposée partiellement dans la cage d'ascenseur et partiellement dans une salle de machine accolée à la cage d'ascenseur.

5. Ascenseur selon la revendication 1, **caractérisé en ce que** la machine de levage est disposée au dessus du châssis fixe susmentionné, son axe de rotation moteur étant disposé verticalement.

6. Ascenseur selon la revendication 1, **caractérisé en ce que** des amortisseurs de vibrations qui pourraient être transmises de la machine de levage vers les pistes de guidage et la cabines sont placés entre le plancher de la cabine et le châssis support de cabine ainsi qu'entre le châssis fixe susmentionné et les pistes de guidage, c'est-à-dire entre la machine de levage et le châssis fixe.

7. Ascenseur selon la revendication précédente, **caractérisé en ce que**, pour empêcher le risque de chute de la cabine en cas de rupture des câbles de levage, dans la partie intérieure du châssis support de cabine est installé un dispositif d'arrêt apte à arrêter mécaniquement le châssis support de cabine au moyen de blocs verrouillant les pistes de guidage, et **en ce que** le fonctionnement de ce dispositif d'arrêt est provoqué par un dispositif de limitation de vitesse comportant des poulies dont la vitesse périphérique est maintenue égale à celle de la cabine au moyen d'un câble fixé en l'un de ses points au châssis support de cabine, le dispositif de limitation provoquant l'actionnement d'un dispositif de parachute quand le câble susmentionné dépasse une valeur de crête prédéterminée en montée ou en descente.

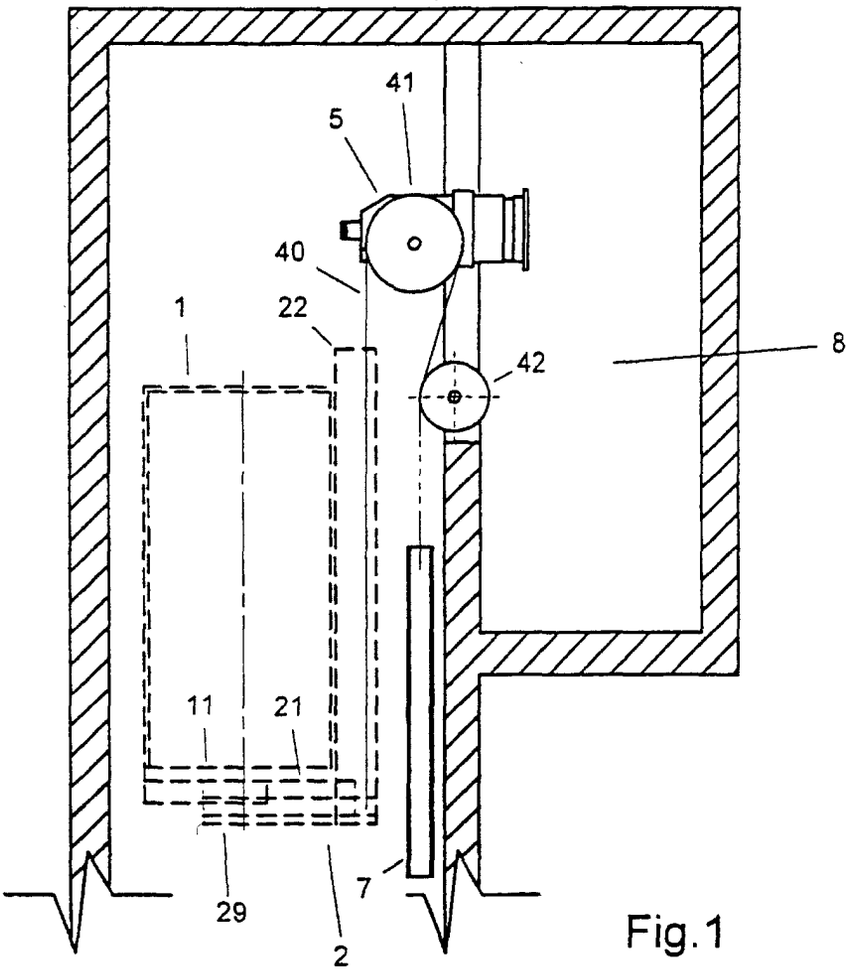

Fig.1

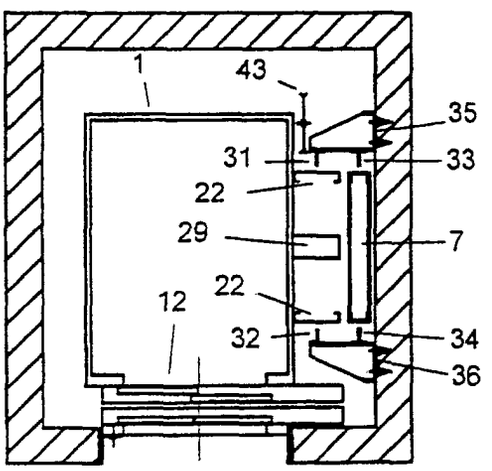

Fig.2

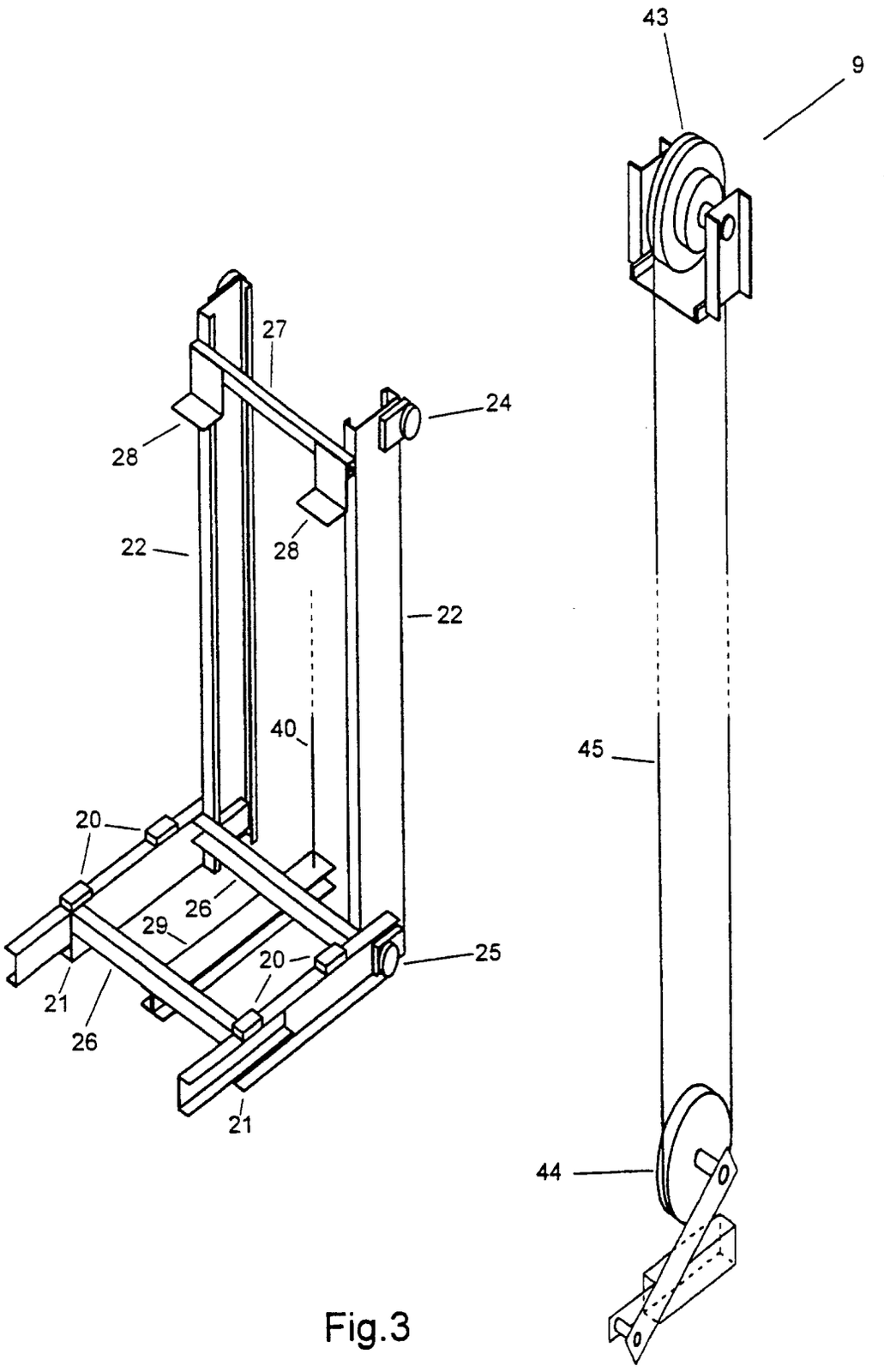

Fig.3

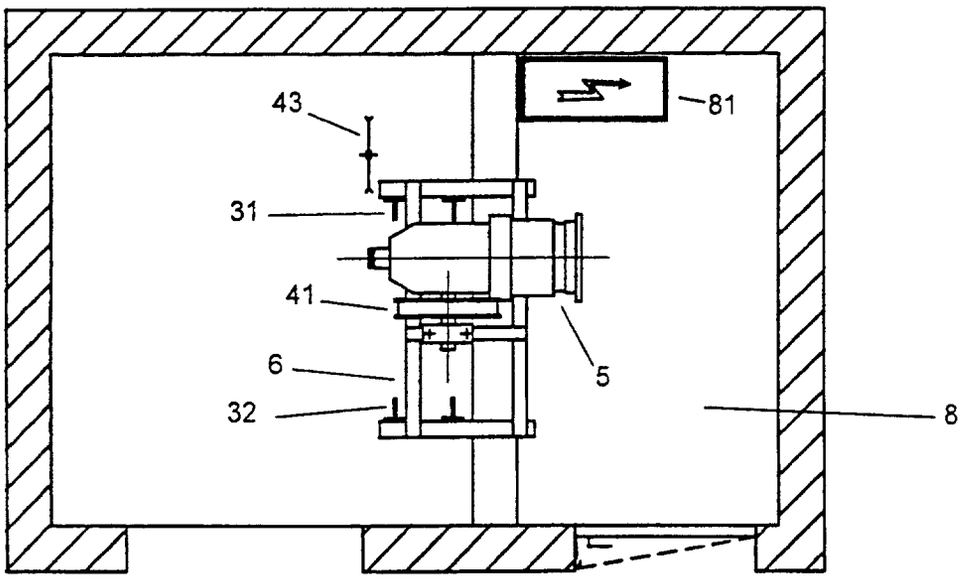

Fig.4

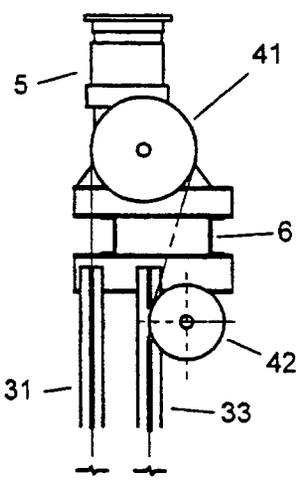

Fig.7

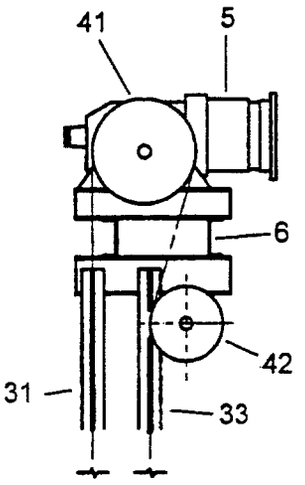

Fig.5

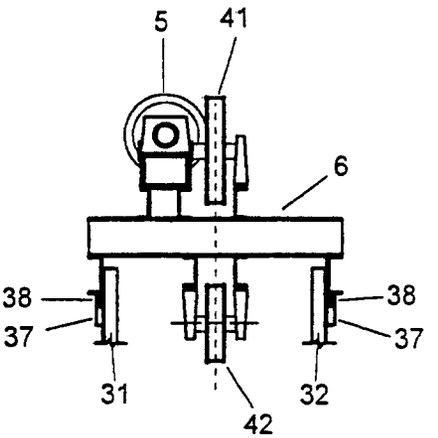

Fig.6