

(19)



(11)

EP 2 025 635 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
04.11.2015 Bulletin 2015/45

(51) Int Cl.:
B66B 9/04 (2006.01)

(21) Application number: **08252698.9**

(22) Date of filing: **14.08.2008**

(54) **Movement apparatus**

Bewegungsvorrichtung

Appareil de mouvement

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT
RO SE SI SK TR**

(30) Priority: **16.08.2007 GB 0715921**

(43) Date of publication of application:
18.02.2009 Bulletin 2009/08

(73) Proprietor: **Adams, William Mark
Retford,
Nottinghamshire DN22 8PT (GB)**

(72) Inventor: **Adams, William Mark
Retford,
Nottinghamshire DN22 8PT (GB)**

(74) Representative: **Wood, Graham
Bailey Walsh & Co LLP
1 York Place
Leeds, LS1 2DR (GB)**

(56) References cited:
**GB-A- 1 082 925 GB-A- 1 500 271
US-A- 1 136 678 US-A- 4 063 619
US-A- 5 351 787 US-A1- 2006 249 334
US-B1- 6 182 798 US-B1- 7 143 869**

EP 2 025 635 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The invention to which this application relates is apparatus which can be used to move goods and articles carried on a platform between first and second positions along a substantially vertical axis.

[0002] The use of lifting apparatus for use in the movement of goods, is well known and the applicant has a number of granted patents and pending applications, which relate to this form of apparatus. The apparatus is found to be of particular use to allow the loading and unloading of goods to and from goods storage areas, which, in one example, may be in the form of a vehicle trailer, or a warehouse of, for example, a retail outlet. One use of the apparatus is at a distribution hub at which goods can be collected from vehicle deliveries and then allocated for subsequent delivery to specific retail outlets by loading the goods into specific vehicle trailers.

[0003] There is typically a problem in moving goods between goods storage areas of this type efficiently and successfully to and from the rear of the vehicle trailer, and into and from the opening of the warehouse using lifting apparatus as the apparatus can be difficult and expensive to install and typically will have a relatively limited range of movement.

[0004] The applicant has identified this problem and has developed a modular system which can be prefabricated under factory conditions, and then moved into position adjacent to a loading dock or opening into the warehouse and to which a vehicle trailer may be moved. The platform of the apparatus then allows goods to be moved from the goods storage area, onto the platform and the platform can then be moved to bring the same to a required height to allow the goods to then be moved into the trailer and vice versa. This is especially useful in the loading of goods onto a trailer with two floors, one spaced above the other. The movable platform allows the floors to be provided at fixed heights in the trailer, as the movement of the goods between heights is achieved by the movable platform on the apparatus. This avoids the need for movable floors to be provided in the trailer and therefore avoids the problems which are experienced with the provision of movable floors in the trailers themselves which are prone to failure and make the trailers expensive.

[0005] It has been found that this modular apparatus is particularly affective in that it allows the movement of the goods to be achieved without the need for significant infra-structure to be deployed and also, it is found that the range of movement of the platform is significantly greater than that in other previous systems.

[0006] A further problem which is experienced with apparatus of this type, whether it is movable across a surface or provided in a fixed position is that there is a need for the frame of the apparatus to be as thin as possible in order for the platform to be lowered to a sufficient extent so as to allow goods to be moved onto and from the floor and the platform. Conventionally this means that, when

scissor lifts are used, the minimum height of 150mm which is required to allow the scissor mechanism to operate is problematic and one typical solution is to countersink the apparatus below the floor surface. However this adds significant exposure in terms of excavation work required and makes the apparatus difficult to access for maintenance and repair.

[0007] Document GB1082925 discloses apparatus for use as a tail lift for vehicle in which there is provided a platform which is connected to slides which are connected to lifting cables provided in uprights and which are connected to a hydraulic ram. The slides are vertically movable along the uprights and allow movement to be exerted on one of the sides of the platform. The platform is also pivotably moveable between vertical and horizontal planes. Document US7143869 discloses a vehicle lift in which there is provided a platform on which the vehicle is supported. A hydraulic ram is mounted on the platform and cables connect the ram to the top of a number of movement guides along which the platform is vertically movable. US531787 discloses a platform mounted on a single guide for vertical movement and a ram is located alongside the same. US2006/0249334 discloses a buffer system for use with an elevator.

[0008] An aim of the present invention is to provide a lifting apparatus which has movement means for a platform provided in a manner which is unobtrusive while at the same time ensuring that the movement is uniform, efficient and reliable.

[0009] In a first aspect of the invention, there is provided movement apparatus, said apparatus comprising a frame having at least four spaced guides, said guides provided to guide movement of a platform along a substantially vertical axis, said guide means including movement means in the form of a plurality of flexible elongate members which cause the platform to be moved, at least one of the said elongate members being of different length and the elongate members are each connected to a common hydraulic ram, the movement of which causes movement of the said elongate members, and hence platform, along the guide means, said hydraulic ram mounted on the frame and the guide means are provided to act on at least two opposing sides of the platform and characterised in that an end of each of the elongate members is connected to the platform and at least one safety means is provided to act on and support the platform by reacting to failure of the movement means and prevent the platform from moving in an uncontrolled downward direction.

[0010] In one embodiment each member passes round a pulley, said pulley mounted at the top of a respective guide means.

[0011] Typically each of the elongate members is of a different length, said lengths selected to ensure that when the elongate members are connected to the platform and the ram via their respective ends, the platform is held in a substantially horizontal plane at all positions along the guide means. Thus, the lengths of each of the

elongate members is selected so as to hold the platform in the horizontal plane and with respect to the location of the particular guide means with which the particular elongate member is located, and the location of the ram on the apparatus.

[0012] In one embodiment, the ram may be provided at the base of the frame and adjacent one side edge thereof. In one embodiment the ram can be fitted at one edge of the lift which is to be positioned adjacent one of the goods storage areas. For example if the apparatus is used with a movable trailer then the ram may be fitted across the edge of the apparatus which lies adjacent the trailer in use. However, it should be appreciated that the particular location of the ram can be selected to suit particular operating requirements.

[0013] In one embodiment, the elongate members are steel cables.

[0014] The at least one safety means is mounted to act on and support the platform upon failure of the movement means. In one embodiment the safety means comprise one or more safety rams mounted in a vertical plane, one end of the same following the movement of the underside of the platform and the other end secured at a fixed location to the apparatus. Typically the ram is provided with a burst valve such that upon a significant increase in load on the ram from the platform the valve operates to lock the ram in the position at that instant and hence prevent the platform from moving further downwardly. Typically the safety rams are powered via a mains motor or a secondary unit running in tandem with the mains motor.

[0015] In one embodiment a vertically mounted safety ram is provided in or adjacent to each of the guide means.

[0016] Typically the sudden increase in load is caused by the failure of one or more of the movement means and/or the ram connected thereto.

[0017] In an alternative embodiment, each of the guide means incorporates a clamp arrangement, said clamp arrangement located with the platform but running along the said guide means. Each of the cable clamps is provided such that upon failure of the ram or failure of the elongate member connection between the platform and the ram, the clamp will move so as to lock the platform at that particular location on the guide means and therefore prevent the platform from falling along the guide means in an uncontrolled manner.

[0018] This provides important safety for users of the apparatus.

[0019] In one embodiment, when the platform is required to be used at a specific location height, such as for example, at the height of a loading dock, locking devices or the clamps mentioned above may be utilised to hold the platform fixed in that position until the position of the platform is required to be moved. This ensures that any elasticity in the elongate members can be taken into account and ensures that the platform is held at the required height.

[0020] As the length of the elongate members is im-

portant, each of the elongate members is preferably prestressed, prior to utilisation in the apparatus.

[0021] In one embodiment, the platform is provided with a bridging ramp which can be extended from the platform to form a bridge between the platform and an adjacent surface, such as the deck of a vehicle trailer or floor of a warehouse and thereby allow goods to be transferred to and from the same via the bridge. In one embodiment, the bridge is powered by hydraulic rams, which may be connected to the same power pack as provides power for the single ram which drives the movement of the platform.

[0022] In another embodiment a levelling plate can be utilised to allow a ramp to be created on the platform so as to allow connection between the different heights of floors of different vehicles. This movement may be powered from the ram power source.

[0023] By providing the movement of the platform by using a single ram, then the expense of the conventional multiple ram or scissor lift arrangements, and the difficulties in obtaining synchronisation of the same, can be avoided. Furthermore, the use of the arrangement as herein described, allows platforms of any practical size to be developed and moved, which is in contrast to the platform sizes which may be moved using the conventional scissor lift arrangement and which platform sizes are relatively restricted. This arrangement allows the base of the apparatus to be shallow hence requiring no excavation work. The width of the apparatus is also relatively slim.

[0024] Specific embodiments of the invention are now described with reference to the accompanying drawings, wherein:-

Figure 1 illustrates a perspective view of apparatus in accordance with one embodiment of the invention;

Figures 2 and 3 illustrate the side and front elevations of apparatus in accordance with the embodiment of Figure 1; and

Figure 4 illustrates a plan view of apparatus in accordance with the invention.

[0025] Referring now to all of the figures, there is provided apparatus 2 including a movable platform 4, which platform is movable along respective guide means 6, 8, 10, 12 provided as part of frame 14. As well as acting to guide the movement of the platform, along the vertical plane, the guide means also act as a route for elongate members, hereinafter referred to as cables 20, one of which is shown in Figure 3 and in practise one cable passes along each of the guide means 6, 8, 10, 12. The cable passes from a first end 24, in contact with the platform, up the guide means to a pulley 22 at the top of the guide means and which pulley may be pivotally movable or angularly offset so as to ensure that the cable is provided in the required position to allow vertical movement

of the platform. The cable then passes round the pulley and back down to connection 26 with a single hydraulic ram 28, which is mounted, in this embodiment, near the base of the apparatus and at one edge 30 which in use will be that which has access opening 32 to which the opening of a storage area in the form of a vehicle trailer (not shown) is moved.

[0026] It will therefore be appreciated that the distance from the end of the ram, to connection with the platform, for each of the cables, will be of a different length and therefore it is important that the appropriate length of cable is used for each connection so as to ensure that the platform suspended from the cables is maintained substantially horizontally or at another desired angle by the cables, regardless of the particular height of the platform at that time.

[0027] The provision of a single ram, is found to be efficient in that it allows the platform to be moved efficiently between locations in a vertical plane and for the same to be kept in a substantially horizontal plane.

[0028] Typically, the apparatus is provided in a fixed location during use. In one embodiment, the fixed location is with access opening 34 adjacent to an opening into a goods storage area in the form of a warehouse and at the opposing side of the apparatus, there is provided access opening 32 to a vehicle trailer. Typically, said further side at which access is provided is designed to receive the positioning of an opening of a further goods storage area, such as a vehicle trailer, which can be moved into position.

[0029] In one embodiment, the hydraulic ram is used to operate each of the movement means and the hydraulic ram itself is mounted to lie substantially flush with the side wall, roof or base of the frame of the apparatus.

[0030] In one embodiment, the ram lies substantially flush with the frame, thereby allowing the platform to be moved along substantially the entire length of each of the guide means thereby providing a significant range of movement for the same.

[0031] If required, a ramp 36 can be provided at one or both openings 32, 34 so that, if required, it can be extended to lie outside the frame 14 to bridge any gap between the apparatus 2 and the storage area. One such ramp is shown extended from opening 34 in the Figures.

[0032] The apparatus preferably includes safety means, one example of which is shown in Figure 2. The safety means are provided in the form of vertically mounted safety rams 38. Each of the rams, in this case are mounted adjacent a guide means 6,8,10,12. Each ram has a first end 40 which is fixed to the frame 14 and an opposing end 42 which is mounted to the underside of the platform 4 so as to follow the up and down movement of the same. The rams may be capable of supporting some weight in their normal usage but are not required to for the normal operation of the platform. Each ram is provided with a burst valve which controls the supply of fluid to the rams.

[0033] Upon failure of the platform movement means,

such as for example one of the flexible members breaking, the platform would be free to lurch downwardly which could be dangerous to goods thereon and more importantly to any personnel standing on the platform. However if this occurs in the apparatus as herein described, the sudden increase of load which this causes on the safety rams 38 is sufficient to cause the burst valve on the safety rams to burst which in turn prevents the rams from moving from the position at which they are at at that instant. This therefore means that the platform is then fully supported on the safety rams and cannot move in an uncontrolled downward direction. In turn this means that personnel and goods on the platform are maintained in a safe position until they can be safely taken off the platform.

[0034] The present invention therefore provides a synchronised movement of the platform in an effective manner by using a common movement means.

Claims

1. movement apparatus (2), said apparatus comprising a frame (14) having at least four spaced guide means (6,8,10,12), said guide means provided to guide movement of a platform (4) along a vertical axis, said guide means including movement means in the form of a plurality of flexible elongate members (20) which cause the platform to be moved, at least one of the said elongate members being of different length and the elongate members are each connected to a common hydraulic ram (28), the movement of which causes movement of the said elongate members, and hence platform, along the guide means, said hydraulic ram (28) mounted on the frame (14) and the guide means (6,8,10,12) are provided to act on at least two opposing sides of the platform (4) and **characterised in that** an end (24) of each of the elongate members (20) is connected to the platform (4) and at least one safety means is provided to act on and support the platform by reacting to failure of the movement means and prevent the platform from moving in an uncontrolled downward direction.
2. Apparatus according to claim 1 **characterised in that** each member passes round a pulley, said pulley mounted at the top of a respective guide means.
3. Apparatus according to claim 1 **characterised in that** each of the elongate members is of a different length.
4. Apparatus according to claim 3 **characterised in that** the said lengths are selected to ensure that when the elongate member arc connected to the platform and the ram via their respective ends, the platform is held in a substantially horizontal plane at all positions along the guide means.

5. Apparatus according to claim 1 **characterised in that** the ram is provided at the base of the frame and adjacent one side edge thereof.
6. Apparatus according to claim 1 **characterised in that** the ram is fitted at the edge of the frame which is to be positioned adjacent one of the goods storage areas. 5
7. Apparatus according to claim 1 **characterised in that** the elongate members are steel cables. 10
8. Apparatus according to claim 1 **characterised in that** the safety means comprise one or more safety rams mounted in a vertical plane, one end of the same following the movement of the underside of the platform and the other end secured at a fixed location to the apparatus. 15
9. Apparatus, according to claim 8 **characterised in that** each safety ram is provided with a burst valve such that upon a significant increase in load on the ram from the platform the valve operates to lock the ram in the position at that instant and hence prevent the platform from moving further downwardly. 20 25
10. Apparatus according to claim 8 **characterised in that** a safety ram is provided in or adjacent to each of the guide means. 30
11. Apparatus according to claim 1 **characterised in that** each of the guide means incorporates a clamp arrangement, said clamp arrangement located with the platform and running along the said guide means such that upon failure of the ram or failure of the elongate member connection between the platform and the ram, the clamp moves to lock the platform at that particular location on the guide means when failure occurs. 35 40
12. Apparatus according to claim 1 **characterised in that** the platform is provided with a bridging ramp which can be expended from the platform to form a bridge between the platform and an adjacent surface. 45
13. Apparatus according to claim 1 **characterised in that** a levelling plate is utilised to allow a ramp to be created on the platform so as to allow connection between the different heights of floors of different vehicles. 50

Patentansprüche

1. Bewegungsvorrichtung (2), wobei die genannte Vorrichtung einen Rahmen (14) aufweist, der wenigstens vier voneinander beabstandete Führungsmittel

(6, 8, 10, 12) hat, wobei die genannten Führungsmittel zum Führen der Bewegung einer Plattform (4) an einer vertikalen Achse entlang vorgesehen sind, wobei die genannten Führungsmittel Bewegungsmittel in der Form von mehreren flexiblen länglichen Elementen (20) beinhalten, die verursachen, dass die Plattform bewegt wird, wobei wenigstens eines der genannten länglichen Elemente eine andere Länge hat und die länglichen Elemente jeweils mit einem gemeinsamen Hydraulikzylinder (28) verbunden sind, dessen Bewegung die Bewegung der genannten länglichen Elemente und somit der Plattform entlang der Führungsmittel verursacht, wobei der genannte Hydraulikzylinder (28) an dem Rahmen (14) montiert ist und die Führungsmittel (6, 8, 10, 12) bereitgestellt sind, um auf wenigstens zwei entgegengesetzte Seiten der Plattform (4) zu wirken, und **dadurch gekennzeichnet, dass** ein Ende (24) von jedem der länglichen Elemente (20) mit der Plattform (4) verbunden ist, und wenigstens ein Sicherheitsmittel bereitgestellt ist, um (auf) die Plattform zu wirken und unterstützen, indem es auf den Ausfall der Bewegungsmittel reagiert und verhindert, dass die Plattform sich in einer unkontrollierten Abwärtsrichtung bewegt.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** jedes Element um eine Seilscheibe herumgeführt wird, wobei die genannte Seilscheibe oben an einem jeweiligen Führungsmittel montiert ist.
3. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** jedes der länglichen Elemente eine andere Länge hat.
4. Vorrichtung nach Anspruch 3, **dadurch gekennzeichnet, dass** die genannten Längen ausgewählt sind, um sicherzustellen, dass, wenn die länglichen Elemente über ihre jeweiligen Enden mit der Plattform und dem Zylinder verbunden sind, die Plattform an allen Positionen entlang der Führungsmittel in einer im Wesentlichen horizontalen Ebene gehalten wird.
5. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** der Zylinder an der Basis des Rahmens und an einen Seitenrand davon angrenzend bereitgestellt ist.
6. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** der Zylinder an dem Rand des Rahmens angebracht ist, der an einen der Warenlagerbereiche angrenzend zu positionieren ist.
7. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die länglichen Elemente Stahlseile sind.

8. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Sicherheitsmittel einen oder mehr Sicherheitszylinder aufweist, die in einer vertikalen Ebene montiert sind, wobei ein Ende derselben der Bewegung der Unterseite der Plattform folgt und das andere Ende an einer bleibenden Stelle an der Vorrichtung befestigt ist. 5
9. Vorrichtung nach Anspruch 8, **dadurch gekennzeichnet, dass** jeder Sicherheitszylinder mit einer Berstscheibe versehen ist, so dass die Scheibe bei einer bedeutenden Zunahme der Belastung des Zylinders durch die Plattform betätigt wird, um den Zylinder in diesem Augenblick auf der Position zu arretieren und so zu verhüten, dass sich die Plattform weiter nach unten bewegt. 10 15
10. Vorrichtung nach Anspruch 8, **dadurch gekennzeichnet, dass** ein Sicherheitszylinder in oder neben jedem der Führungsmittel bereitgestellt ist. 20
11. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** jedes der Führungsmittel eine Klemmenanordnung beinhaltet, wobei die genannte Klemmenanordnung an der Plattform positioniert ist und an den genannten Führungsmitteln entlang läuft, so dass die Klemme sich beim Ausfall des Zylinders oder beim Ausfall der Verbindung der länglichen Elemente zwischen der Plattform und dem Zylinder bewegt, um die Plattform auf dieser bestimmten Position an den Führungsmitteln zu arretieren, wenn ein Ausfall stattfindet. 25 30
12. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Plattform mit einer Übergangsrampe versehen ist, die von der Plattform ausgestreckt werden kann, um zwischen der Plattform und einer benachbarten Oberfläche eine Brücke zu bilden. 35 40
13. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** eine Höhenausgleichsplatte genutzt wird, damit an der Plattform eine Rampe gebildet werden kann, um die Verbindung zwischen den verschiedenen Bodenhöhen verschiedener Fahrzeuge zu ermöglichen. 45
- déplacement de la plate-forme, au moins l'un desdits éléments allongés ayant une longueur différente, et chacun des éléments allongés étant raccordé à un vérin hydraulique commun (28), dont le mouvement entraîne le mouvement desdits éléments allongés, et par conséquent de la plate-forme, le long des moyens de guidage, ledit vérin hydraulique (28) étant monté sur l'ossature (14) et les moyens de guidage (6, 8, 10, 12) étant prévus pour agir sur au moins deux côtés opposés de la plate-forme (4), et **caractérisé en ce qu'**une extrémité (24) de chacun des éléments allongés (20) est raccordée à la plate-forme (4), et au moins un moyen de sécurité est prévu pour agir sur la plate-forme, et pour soutenir cette dernière, du fait qu'il réagit à une défaillance des moyens de mouvement et empêche la plate-forme de se déplacer suivant un sens incontrôlé vers le bas.
2. Appareil selon la revendication 1, **caractérisé en ce que** chaque élément passe autour d'une poulie, ladite poulie étant montée au niveau de la partie supérieure d'un moyen de guidage respectif.
3. Appareil selon la revendication 1, **caractérisé en ce que** chacun des éléments allongés a une longueur différente.
4. Appareil selon la revendication 3, **caractérisé en ce que** lesdites longueurs sont sélectionnées de façon à s'assurer que, lorsque les éléments allongés sont raccordés à la plate-forme et au vérin par l'intermédiaire de leurs extrémités respectives, la plate-forme est maintenue dans un plan sensiblement horizontal à toutes les positions le long des moyens de guidage.
5. Appareil selon la revendication 1, **caractérisé en ce que** le vérin est prévu au niveau de la base de l'ossature et en position adjacente à un bord latéral de celle-ci.
6. Appareil selon la revendication 1, **caractérisé en ce que** le vérin est prévu au niveau du bord de l'ossature lequel est destiné à être positionné de façon adjacente à l'une des zones de stockage de marchandises.
7. Appareil selon la revendication 1, **caractérisé en ce que** les éléments allongés sont des câbles en acier.
8. Appareil selon la revendication 1, **caractérisé en ce que** les moyens de sécurité comprennent un ou plusieurs vérins de sécurité lesquels sont montés suivant un plan vertical, alors que l'une de leurs extrémités suit le mouvement de la face inférieure de la plate-forme et que l'autre extrémité est assujettie à l'appareil au niveau d'un emplacement fixe.
9. Appareil selon la revendication 8, **caractérisé en ce**

Revendications

1. Appareil de mouvement (2), ledit appareil comprenant une ossature (14) avec au moins quatre moyens de guidage espacés (6, 8, 10, 12), lesdits moyens de guidage étant prévus pour guider le mouvement d'une plate-forme (4) le long d'un axe vertical, lesdits moyens de guidage incluant des moyens de mouvement sous la forme d'une pluralité d'éléments allongés souples (20) lesquels provoquent le 50 55

que chaque vérin de sécurité est muni d'une soupape de rupture de telle sorte que, lors d'un accroissement significatif de la charge sur le vérin en provenance de la plate-forme, la soupape sera actionnée afin de bloquer le vérin sur la position occupée à ce moment-là, et par conséquent va empêcher la plate-forme de se déplacer plus avant vers le bas. 5

10. Appareil selon la revendication 8, **caractérisé en ce qu'un** vérin de sécurité est prévu dans chacun des moyens de guidage, ou en position adjacente à chacun des moyens de guidage. 10

11. Appareil selon la revendication 1, **caractérisé en ce que** chacun des moyens de guidage incorpore un agencement de serrage, ledit agencement de serrage étant positionné avec la plate-forme et se déplaçant le long desdits moyens de guidage de telle sorte que, lors d'une défaillance du vérin ou d'une défaillance du raccordement de l'élément allongé entre la plate-forme et le vérin, le dispositif de serrage va effectuer un mouvement afin de bloquer la plate-forme à cet emplacement particulier sur les moyens de guidage au moment où la défaillance survient. 15
20
25

12. Appareil selon la revendication 1, **caractérisé en ce que** la plate-forme est munie d'une rampe de pontage qui peut être prolongée à partir de la plate-forme pour former un pont entre la plate-forme et une surface adjacente. 30

13. Appareil selon la revendication 1, **caractérisé en ce qu'une** plaque de mise à niveau est utilisée pour permettre la création d'une rampe sur la plate-forme de sorte à procurer un raccordement entre les différentes hauteurs de plancher de différents véhicules. 35

40

45

50

55

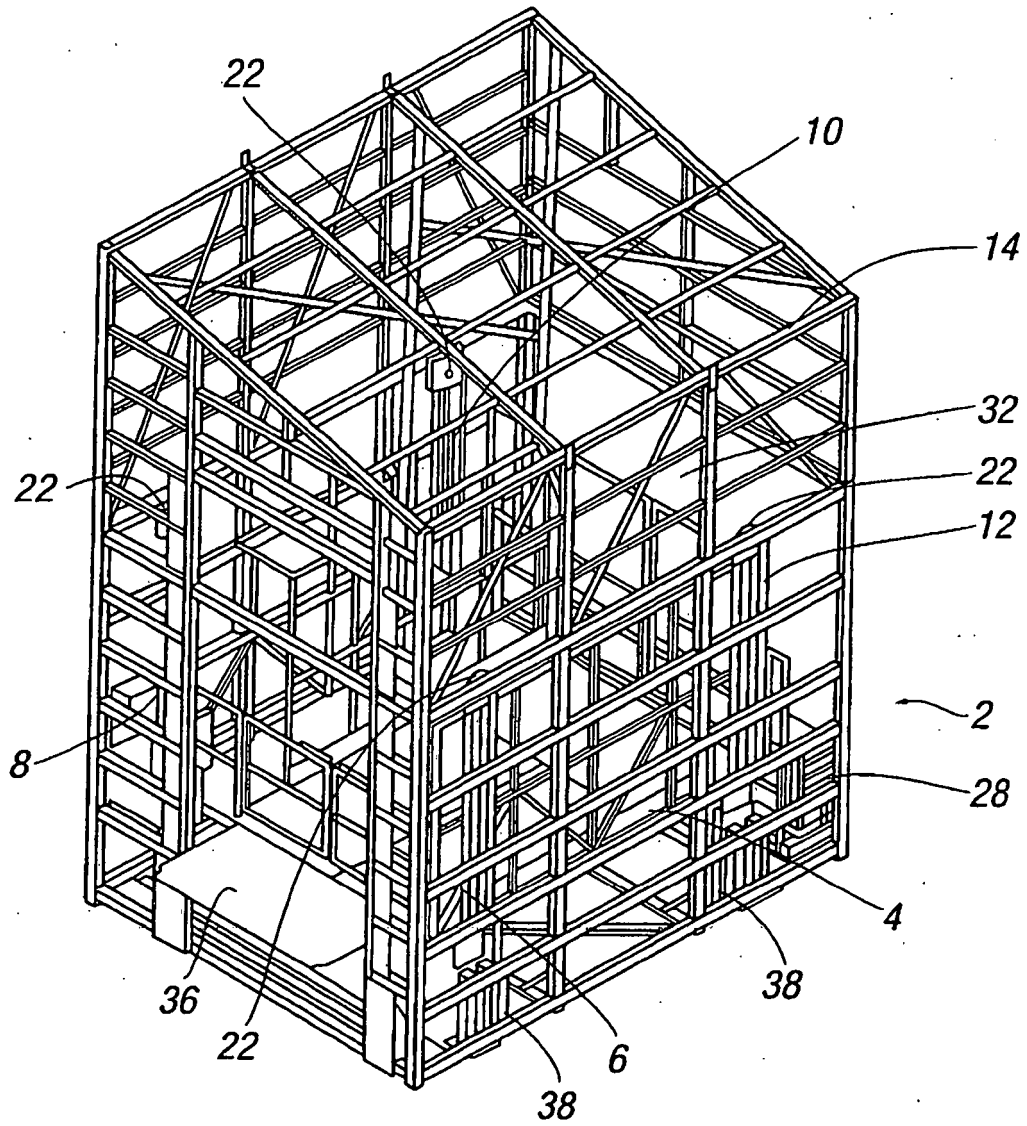


FIG. 1

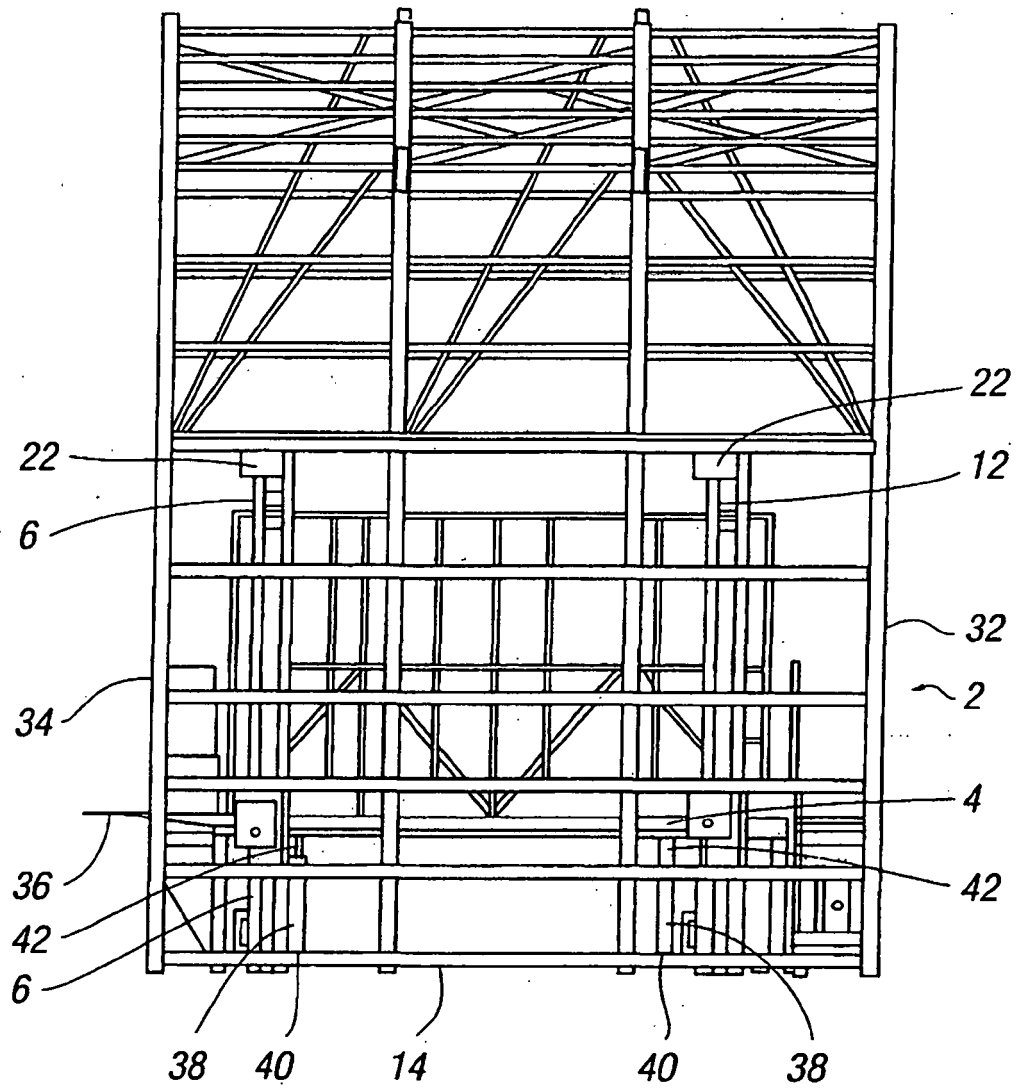


FIG. 2

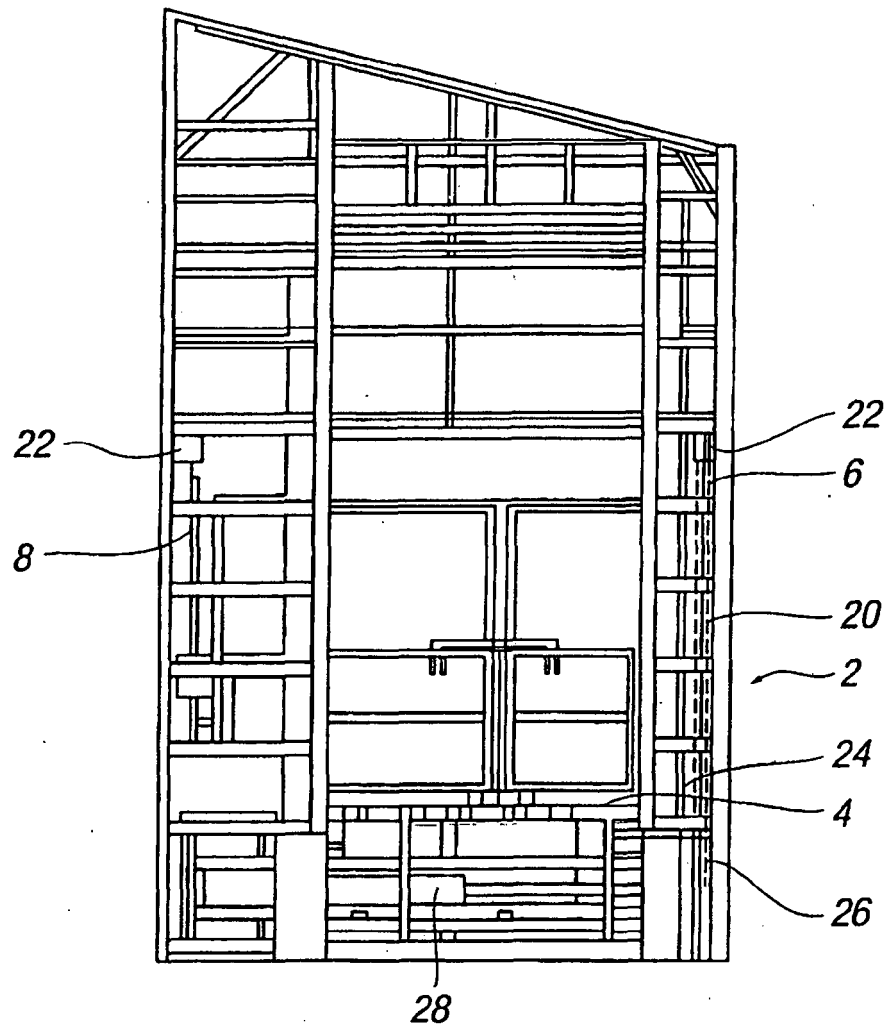


FIG. 3

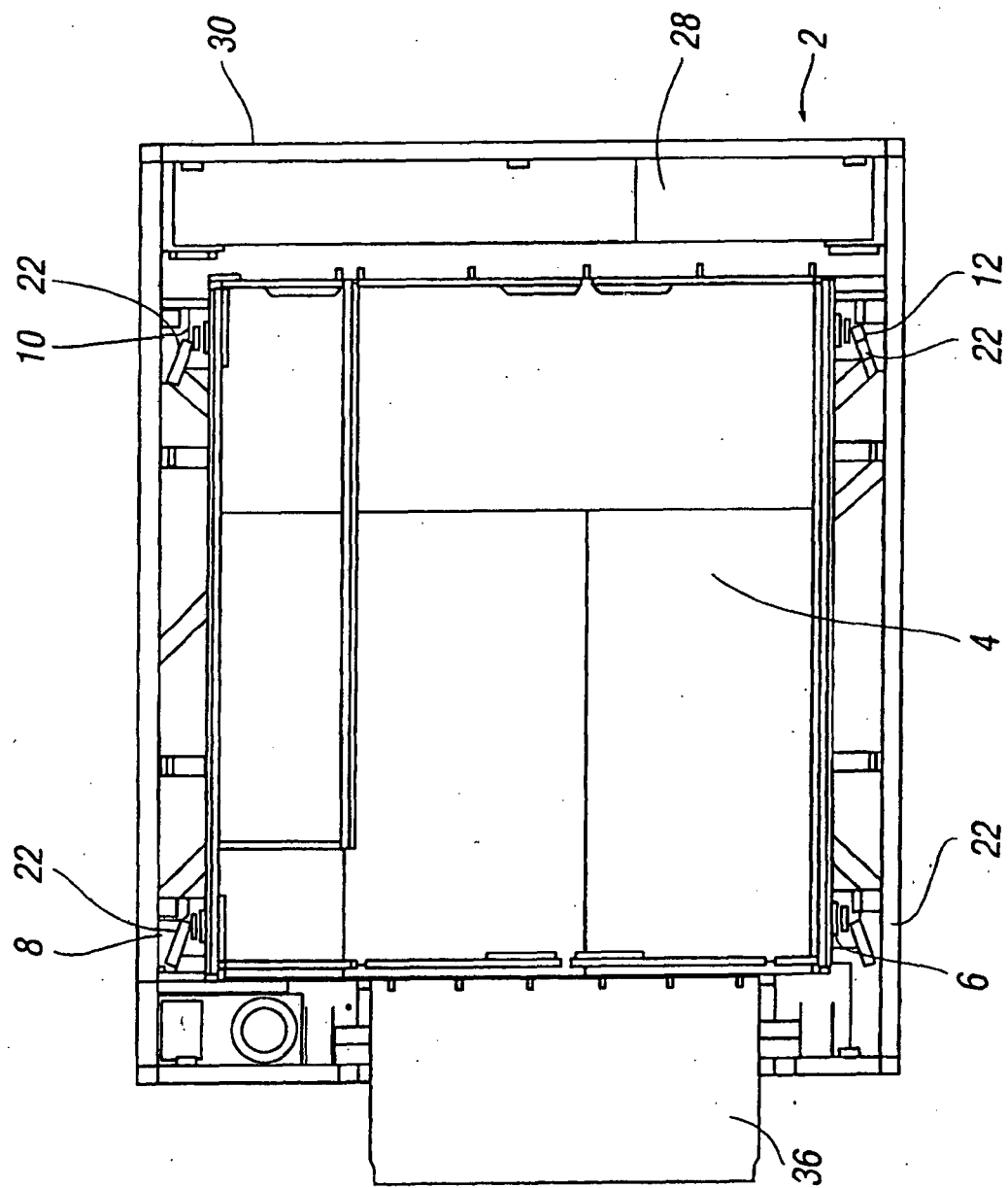


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- GB 1082925 A [0007]
- US 7143869 B [0007]
- US 531787 A [0007]
- US 20060249334 A [0007]