



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 418 987 A1

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: **90202522.0**

(51) Int. Cl.⁵: **A61G 3/02**

(22) Date of filing: **24.09.90**

(30) Priority: **22.09.89 NL 8902375**

(43) Date of publication of application:
27.03.91 Bulletin 91/13

(84) Designated Contracting States:
AT BE CH DE ES FR GB IT LI NL

(71) Applicant: **THYSSEN DE REUS B.V.**
IJsseldijk 361
NL-2922 BN Krimpen a/d IJssel(NL)

(72) Inventor: **van der Heiden, Arnoldus**
Theodorus
Rupsklaver 12
NL-3069 DC Rotterdam(NL)

(74) Representative: **Smulders, Theodorus A.H.J.,**
Ir. et al
Vereenigde Octrooibureaux Nieuwe Parklaan
107
NL-2587 BP 's-Gravenhage(NL)

(54) **A lift installation for moving a means of conveyance, such as a wheel chair, through a doorway into and out of a motor vehicle, such as a train.**

(57) A lift installation for moving a means of conveyance through a doorway into and out of a motor vehicle (1), which installation comprises a lift frame (6-10) coupled to a platform (14, 15) by means of a vertical pivot shaft, on the one hand, and to a support frame, on the other, said support frame comprising a central post (5) disposed within the motor vehicle (1) with a vertical axis, said lift frame (6-10)

being slidable along, and rotatable about, said post (5), and in a position pivoted partly outside said motor vehicle (1) being movable along said central post (5) by a foot (12) adapted to find support on the ground (23), and linking up with a guiding rod member (11) whose axis coincides with that of the vertical pivot shaft of the platform (14-15).

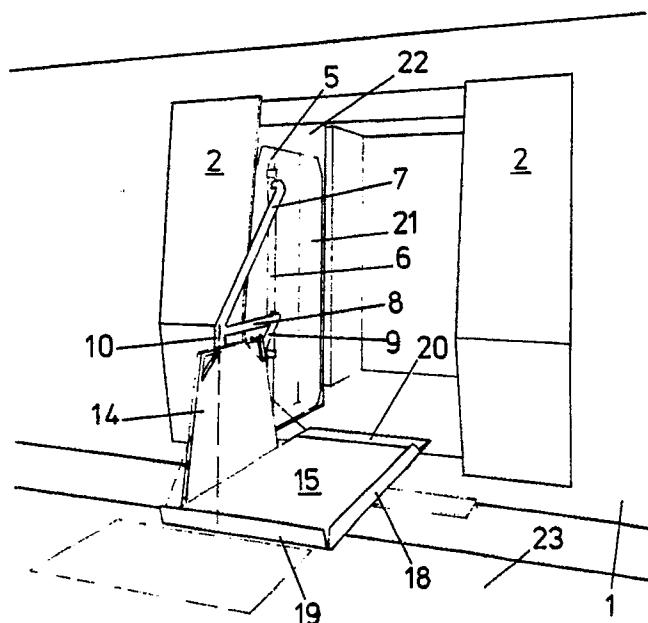


FIG.6

EP 0 418 987 A1

A LIFT INSTALLATION FOR MOVING A MEANS OF CONVEYANCE, SUCH AS A WHEEL CHAIR, THROUGH A DOORWAY INTO AND OUT OF A MOTOR VEHICLE, SUCH AS A TRAIN

This invention relates to a lift installation for moving a means of conveyance, such as a wheel chair, through a doorway into and out of a motor vehicle, such as a train, said installation comprising a lift frame coupled to a platform, on the one hand, and to a support frame, on the other, a drive for moving said platform and said lift frame relative to said support frame, said support frame comprising a central post disposed within the motor vehicle with an axis extending virtually vertically, and said lift frame being rotatable about said axis of the central post between a position in which said lift frame is located substantially within the motor vehicle and a position in which at least a portion of the lift frame is outside the motor vehicle, said last-mentioned part of the lift frame accommodating drive means belonging to said drive.

For moving, for example, a wheel chair into and out of a motor vehicle, use can be made of portable lift installations. When the motor vehicle is a train, this means either a considerable loss of time, because, in particular when the wheel chair must be removed from the train, it is necessary first to pick up the lift installation, or considerable cost, because at least one lift installation should be provided on each platform, and often cannot be left unattended. A considerable time loss is intolerable for the railway company for organizational reasons. A large number of lift installations with the required attendant personnel is unattractive for reasons of cost.

A lift installation of the type defined in the preamble is known from US-A-4 664 584, which publication shows as the motor vehicle, instead of a train, a motor car. Such a lift installation built-in into a train can be operated by the guard. In the case of a train, just as with a motor car, the unloading height, in the case of a train the distance between the floor in the train and the railway platform, will vary greatly for each station, not only as a result of a different level of the various platforms, but also as a result of spring suspension, degree of occupation of the train, wear and tear of the wheels etc. Variations of up to 40 cm must be taken into account. This difference in unloading height is taken up by moving the platform downwards a greater or smaller distance, which involves no problems as a result: of the support of the lift installation being mounted in the motor vehicle. For safety reasons, however, a lift load of 4000 N should be reckoned with. When, in this connection, it is taken into consideration that such load must be absorbed within the train in a cantilever condition fully outside the train, this means a very considerable and

drastic beefing-up of the train's frame.

From DE-U-85 32 380, a lift installation is known which does not require a heavier vehicle frame because during loading and unloading the lifting forces are taken up by a foot supported on the ground, which can move the platform vertically upwards and downwards with the aid of drive means provided in the lift frame. During loading and unloading, the platform remains at all times fully outside the vehicle, which renders the provision of a pivoting bridging flap necessary. When out of operation, the platform and the lift frame are arcuately pivoted through 90° about a horizontal axis extending lengthwise of the doorway by means of a linkage. In this folded-up position, the platform closes the doorway "doorwise", and thus renders the entrance way to the motor-vehicle unusable, which makes this construction unsuitable for use in doorways where the lift installation will not usually be used, such as in doorways of a train.

It is an object of the present invention to provide a lift installation which is so constructed that moving, for example, a wheel chair into and out of the motor vehicle, can be effected in a relatively short period of time, and the lift installation can be built-in into the motor vehicle without drastic alterations of the motor vehicle proper and without the doorway being barred in the inoperative position.

It is a further object of the invention to give the lift installation such a construction that, in the inoperative position it can be stored out of the way within the motor vehicle in a position in which it occupies little space.

For this purpose, according to this invention, there is provided a lift installation of the kind defined in the preamble, which is characterized in that said lift frame is slidable on said central post, and is movable in that direction by said drive means, which drive means comprise a foot adapted to find support on the ground and to be displaced relative to the lift frame in a direction parallel to the axis of the central post by means of a bar-shaped guide member, said platform being connected to the lift frame for pivoting movement about a substantially vertical shaft whose axis coincides with the axis of said bar-shaped guide member.

By virtue of these features, a construction is obtained which, in principle, is mounted within the motor vehicle, but in the operative position passes the forces to be absorbed direct to the ground by virtue of the foot being caused to bear on the ground, so that the frame of the motor vehicle is hardly, if at all, loaded with such forces, in other words, the frame of the motor vehicle does not

require any adaptation. Moreover, by pivoting the lift frame outwardly, an operator in principle already brings the lift installation into its operative position. Moving the platform from within the motor vehicle to the outside, and the other way round, can be accomplished by just pivoting the platform relative to the lifting frame, while the difference in height between inside and outside can be overcome by raising and lowering the latter. In other words, the operation of the lift installation is based on simple and rapidly performed operations. Varying differences in height between inside and outside are taken care of in a simple manner by causing the foot to move the lifting the frame relative to the post. By virtue of the fact that the axes of the vertical pivot shaft of the platform and the guiding bar member coincide, a construction is realized which offers advantages as regards the force pattern, makes it possible for the platform to perform a simple pivoting movement about a vertical axis, and renders a pivotable bridging flap unnecessary.

Owing to the possible pivoting movements about the post and about the vertical platform shaft, the construction can be pivoted entirely into the vehicle and out of the doorway, so that the latter is not barred in the inoperative position of the installation.

The absorption of forces and the necessary space and doorway width for the pivoting movement of the platform can be favourably affected, in accordance with a further embodiment of the invention, when the platform is provided with a substantially rectangular carrying surface, and the vertical pivot shaft of the platform is provided adjacent to, and substantially halfway of, a long side of said carrying surface.

In connection with the required space, it is further preferable for the lifting frame to be a substantially flat, planar construction which from a position at right angles to the doorway of the motor vehicle, in which a portion of the lift frame is located outside the vehicle, can be pivoted about the axis of the central post through at least 180°. If, in that construction, at least the carrying surface of the platform can be pivoted relative to said lift frame about a substantially horizontal shaft, this can be folded up when not in use, so that floor space of the motor vehicle is not occupied unnecessarily.

When the motor vehicle is a train, a folded-up platform is apt to bar an inner door between a get-in platform and a compartment. In that case, it is preferable, and in accordance with a further embodiment of the invention, for the platform of the lift installation, with the carrying surface pivoted into the vertical position to be pivotable about at least a shaft perpendicular to the plane of the folded-up carrying surface.

Within the train, too, it is preferable that the lift installation should not be left unattended for everybody to have access to it. In this connection it is proposed, according to a further embodiment of the invention, that the central post is placed within a casing that can be closed with a door formed by the carrying surface of the platform. In this way, the lift installation can be stored, in a particularly compact form, under lock and key, which in addition can be done in a fast and simple way, for example, by the guard. In order that the necessary work in this connection may be done with a minimum of effort, it is further preferable for the various parts to be balanced in the various positions by means of springs, such as the weight of the platform for folding up and pivoting, and the weight of the lift frame and the platform at the central post for the lift frame and platform to be manually moved in the vertical direction relative to the central post.

The lift installation according to the invention, applied to a train, will now be described and elucidated in more detail with reference to an exemplary embodiment illustrated in the accompanying drawings. In said drawings,

Fig. 1 shows the lift installation in the folded-out and lowered position;

Fig. 2 shows a top plan view of the showing of Fig. 1;

Fig. 3 shows the lift installation in the stow-away position;

Fig. 4 shows a top plan view of the showing of Fig. 3; Fig. 5 illustrates the pivoting movement of the platform with the carrying surface in the folded-up position; and

Fig. 6 is a perspective view showing the lift installation built-in into a train.

The figures illustrate a train 1 provided with doors which by means of pivoting arms 3 connected to rotary shafts 4 can be moved into an open and a closed position. The open position is shown in Figs. 1, 2 and 6; the closed position in Figs. 3 and 4.

In order to enable, for example, a wheel chair to be moved into and out of train 1, there is provided, in accordance with this invention, a lift installation which includes a vertically extending central post 5 fixedly mounted in train 1. Slidable on and along the central post 5 is a tube member 6 which forms part of a lift frame further comprising tube members 7-10, with tube members 6 10 forming a rigid construction. Tube member 10 extends parallel to tube member 6 and contains a hydraulic lift cylinder including a rod member 11 terminating in a foot 12. Pivotally connected, for movement about the axis of rod member 11, to tube member 10, by means of bearings 13, is a platform provided with a sidewall 14 and a carrying surface 15. A pivot shaft 16 makes it possible for

carrying surface 15 to be folded up relative to the sidewall 14, and a stop 17 provides for carrying surface 15 to be pivoted further downwards than the position shown in Fig. 1. To prevent a wheel chair to roll off carrying surface 15 inadvertently, raised longitudinal edges 18, 19 and 20 are provided, with edges 19 and 20 folding down to enable a wheel chair to roll off and on.

Figs. 3 and 4 illustrate the lift installation in its stow-away position, from which it is clearly seen that the carrying surface 15 with the folded-down longitudinal edges 19 and 20 forms the closing door of a casing 21 which accommodates the entire lift installation. Within casing 21 there is also a compartment 22 in which means for controlling the lift installation and a power unit may be accommodated.

The use and storage of the lift installation will now be described in more detail with reference to Figs. 5 and 6, and starting from the stow-away position illustrated in Figs. 3 and 4.

As stated before, the lift installation may be stored in a locked-away position in which it is not accessible to third parties by forming carrying surface 15 as a closable door for casing 21. When the lift installation is to be moved onto a platform 23 in a position in which it is ready for use, this can be done by unlocking the carrying surface 15 relative to casing 21, whereafter, by pivoting the lift frame with platform around the central post 5 and simultaneously pivoting the platform relative to the lift frame, the platform can be moved outside the train 1 into a position in which it extends parallel to the side of the train 1. A number of the angular positions to be traversed are shown in ghost outline in Fig. 4. In the position parallel to train 1, the lift frame with platform has also been lowered until foot 12 bears on platform 23. Subsequently, platform 15 is pivoted from its on-end position shown in Fig. 3 into the sideways-up position shown in Fig. 5. This has been rendered possible by sidewall 14 being coupled by means of two pivot rods 24 and 25 with a subframe 26 connected to tube member 10, with pivots 27 and 28 being fixed to subframe 26 and pivots 29 and 30 to sidewall 14. The positions traversed during the pivoting movement are shown in Fig. 5 in ten steps. When the platform has thus been moved into a sideways-up position, carrying surface 15 is folded down into a horizontal position along with one or both folding side edges 19 and 20 to reach the position shown in Fig. 1.

It is observed that the pivoting and folding movements are effected manually. To facilitate this, various parts are balanced in various positions by means of springs, such as the platform's weight for pivoting and folding, and the weight of the lifting frame and the platform at the central post 5 for the lifting frame and the platform to be manually pivot-

ed and moved vertically relative to the central post 5.

When a wheel chair has been placed on carrying surface 15 and the side edges 19 and 20 set up into their vertical position, the lift frame and hence the platform with the wheel chair carried by it are raised by means of the hydraulic lift construction within tube member 10, with the foot 12 continuing to bear on platform 23, and hence ensuring that the majority of the forces to be absorbed are directly passed to platform 23, so that central post 5 is loaded to a slight extent only. When the lift frame is at the desired level, as indicated in a dotted line in Fig. 1, the platform is pivoted through 90° relative to the lift frame, to reach the position indicated with a dotted line in Fig. 2. When the side edge 20 has been folded down, the wheel chair can roll off carrying surface 15 and has thus boarded the train. The situation then reached is shown in Fig. 6.

The lift installation is subsequently stored again as follows. The platform is turned outwardly and lowered. Subsequently the carrying surface is folded up and the platform moved into its vertical on-end position. It is noted that Fig. 5 shows that the latter movement requires the carrying surface to be first turned clockwise and then anti-clockwise to reach its on-end position. The required movements are "felt" automatically as a result of the construction of the twin-rod system which enables and controls the pivoting movement. When the platform has reached its on-end position, it is raised and pivoted back into train 1 and into casing 21. Carrying surface 15 is then locked and the starting position shown in Fig. 3 is again reached.

When the wheel chair has to be unloaded from the train, the casing is unlocked, the lift frame with the platform are pivoted outwards and lowered until foot 12 rest on platform 23. The platform is rotated sideways up and carrying surface is folded down to reach the position shown in Fig. 1 and discussed hereinbefore. The lift frame and the platform are raised, and the latter is pivoted inwards to reach the position shown in Fig. 6. The lift installation is then ready to receive a wheel chair. By rotating the platform and subsequently lowering the lift frame and the platform, a wheel chair placed on the carrying surface can be moved outside the train and onto the railway platform, whereafter it can roll off carrying surface 15. The lift installation is then stored again by folding up the carrying surface, rotating the platform into its on-end position, raising and pivoting the lift frame and the platform into the casing, and re-locking the carrying surface.

It goes without saying that many modifications and variants are possible without departing from the scope of the invention. Thus, for example, no reference has been made to various locking means

which permit certain movements only in pre-determined positions. Thus, for example, means may be provided to ensure that the lift frame can only be pivoted relative to the central post 5 if the lift frame is in a raised position. Furthermore, for example, locking means may be provided at bearings 13 or subframe 26 which lock the platform automatically in the two angular positions shown in Fig. 6, which locking means should be released manually if it is desired to rotate the platform. Fig. 6 also indicates schematically that the side edges 19 and 20 can be moved into their folded-up or folded-down positions by pulling means, with the actuators for such pulling means being disposed in sidewall 14. Further locking means may be provided between subframe 26 and sidewall 14 to prevent undesirable rotation of the platform. Also, means may be provided, for example, an electrical control of the position of subframe 26 to ensure that the platform can only be raised and lowered when it is over the railway platform. Furthermore, emergency manual operating means may be provided in case the hydraulic lift apparatus should fail. It is observed that the invention has been described mainly with reference to a train; however, the motor vehicle may alternatively be a motor lorry, a bus, or the like. Similarly, the wheel chair may be any other object to be moved into and out of the motor vehicle, such as commodities whether or not on a waggon.

Claims

1. A lift installation for moving a means of conveyance, such as a wheel chair, through a doorway into and out of a motor vehicle (1), such as a train, said installation comprising a lift frame (6-10) coupled to a platform (14, 15), on the one hand, and to a support frame (5), on the other, a drive for moving said platform and said lift frame relative to said support frame, said support frame comprising a central post (5) disposed within the motor vehicle with an axis extending virtually vertically, and said lift frame being rotatable about said axis of the central post between a position in which said lift frame is located substantially within the motor vehicle and a position in which at least a portion of the lift frame is outside the motor vehicle, said last-mentioned part of the lift frame accommodating drive means (11, 12) belonging to said drive, characterized in that said lift frame is slidable on said central post, and is movable in that direction by drive means, which drive means comprise a foot (12) adapted to find support on the ground (23) and to be displaced relative to the lift frame in a direction parallel to the axis of the central post by means of a bar-shaped guide member (11), said

platform being connected to the lift frame for pivoting movement about a substantially vertical shaft whose axis coincides with the axis of said bar-shaped guide member.

2. A lift installation as claimed in claim 1, in which said platform (14, 15) has a substantially rectangular carrying surface (15), characterized in that the vertical pivot shaft of the platform is provided adjacent to, and substantially halfway of, a long side of said carrying surface

3. A lift installation as claimed in claim 1 or 2, characterized in that said lift frame (6-10) is a substantially flat, planar construction which from a position at right angles to the doorway of the motor vehicle (1), in which a portion of the lift frame is located outside the vehicle, can be pivoted about the axis of the central post (5) through at least 180° C.

4. A lift installation as claimed in any one of the preceding claims, characterized in that at least the carrying surface (15) of the platform can be pivoted relative to said lift frame (6-15) about a substantially horizontal shaft (16).

5. A lift installation as claimed in claim 4, characterized in that said platform (14, 15) with said carrying surface pivoted into the vertical position can be pivoted about at least a shaft (27-30) perpendicular to the plane of the folded-up carrying surface.

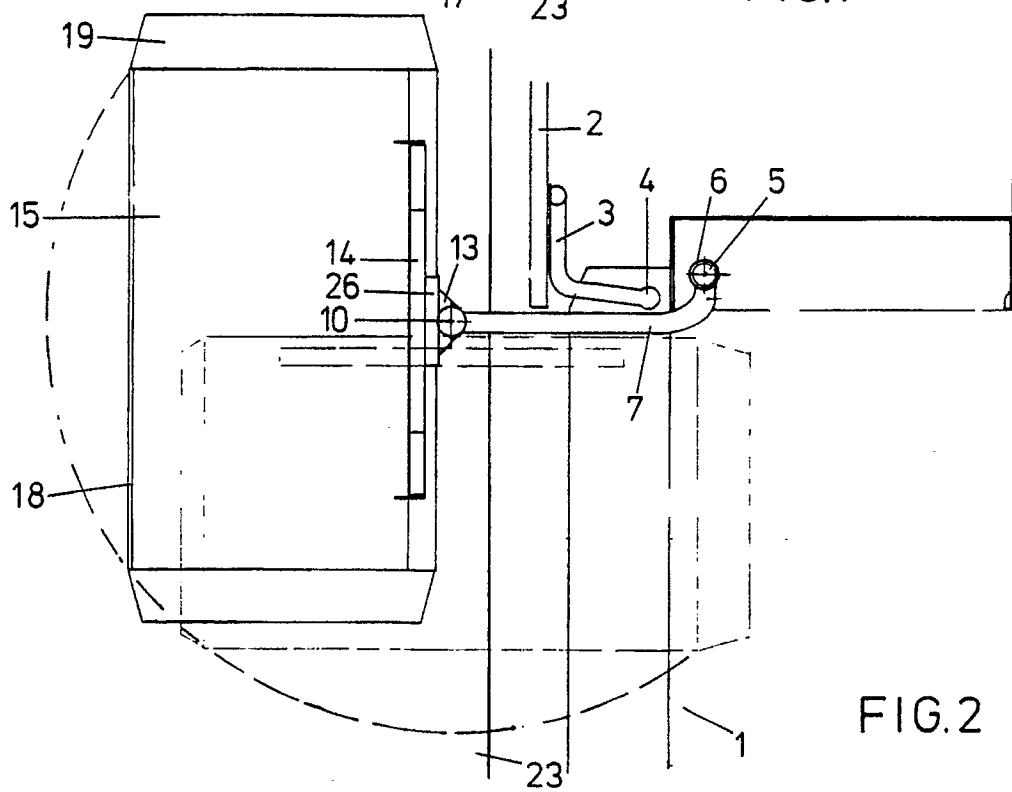
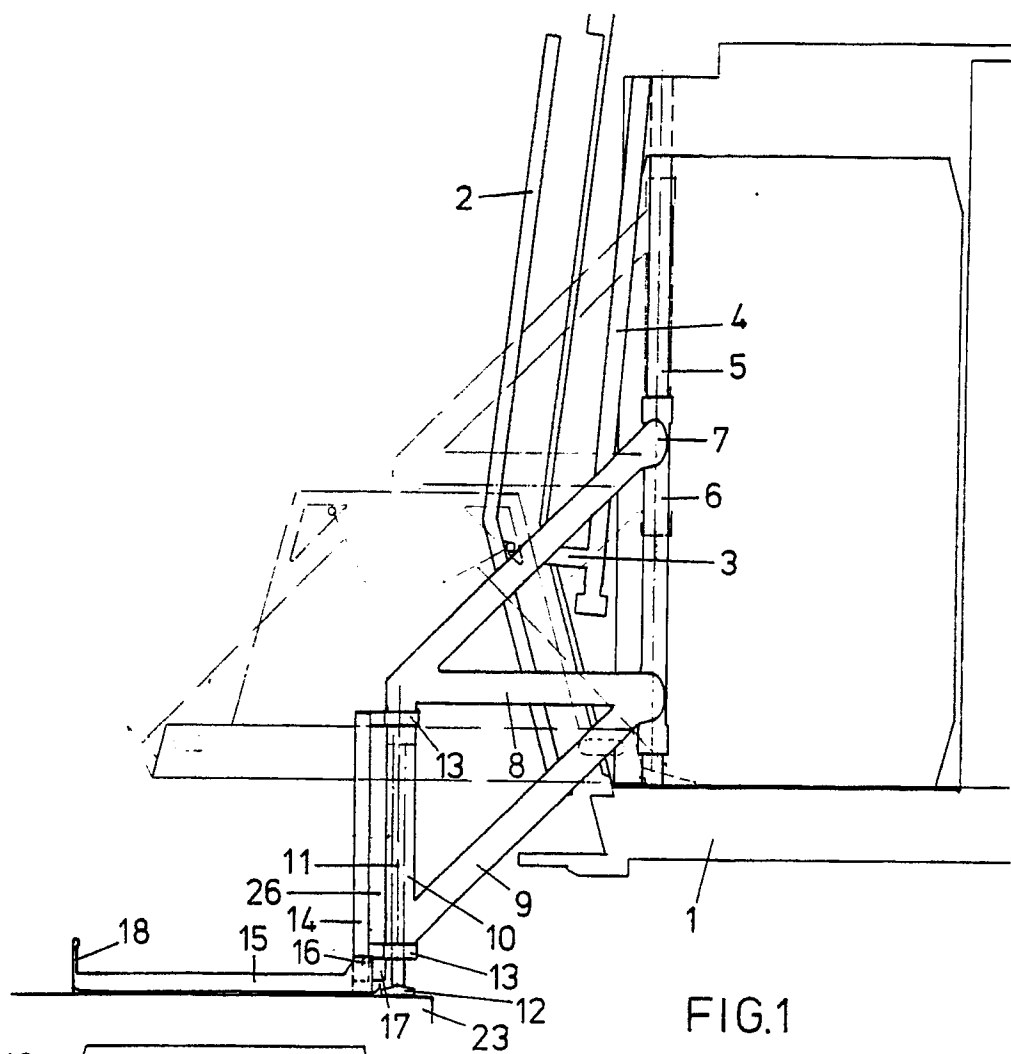
6. A lift installation as claimed in claim 5, characterized in that the central post (5) is placed within a casing (21) that can be closed with a door formed by the carrying surface (15) of the platform.

7. A lift installation as claimed in any of the preceding claims, characterized in that the weight of the lift frame (6-10) and the platform (14, 15) is balanced at the central post (5) for said lift frame and platform to be manually moved in the vertical direction relative to said central post.

8. A lift installation as claimed in any of claims 4-7, characterized in that the weight of the carrying surface (15) of the platform (14, 15) is balanced for folding up about its horizontal pivot shaft (16).

9. A lift installation as claimed in any one of claims 5-8, characterized in that the weight of the platform (14, 15) is balanced for pivoting movement with the carrying surface (15) in the folded-up position.

10. A lift installation as claimed in any of claims 7-9, characterized in that the balancing is effected through spring action.



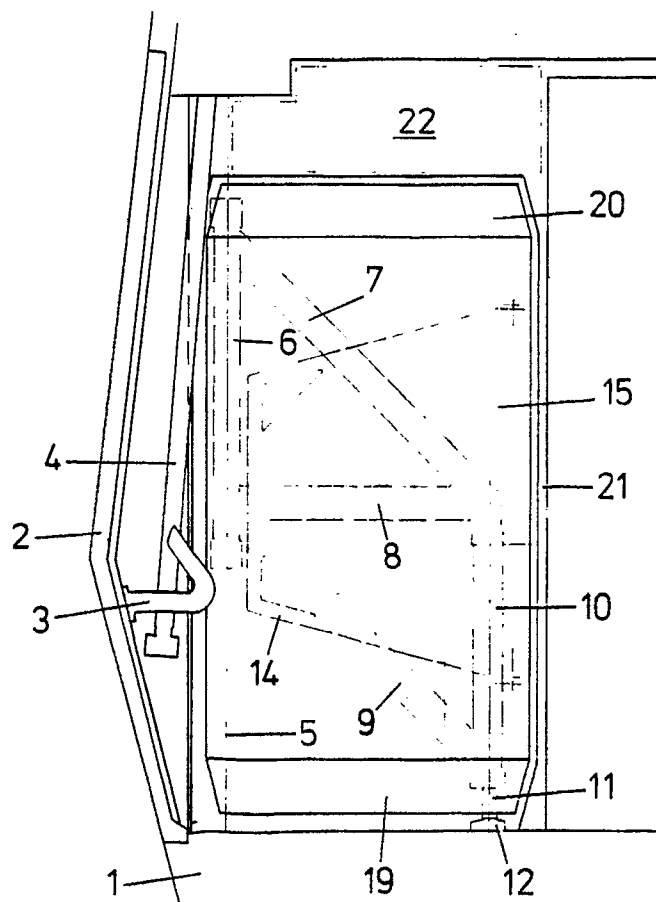


FIG. 3

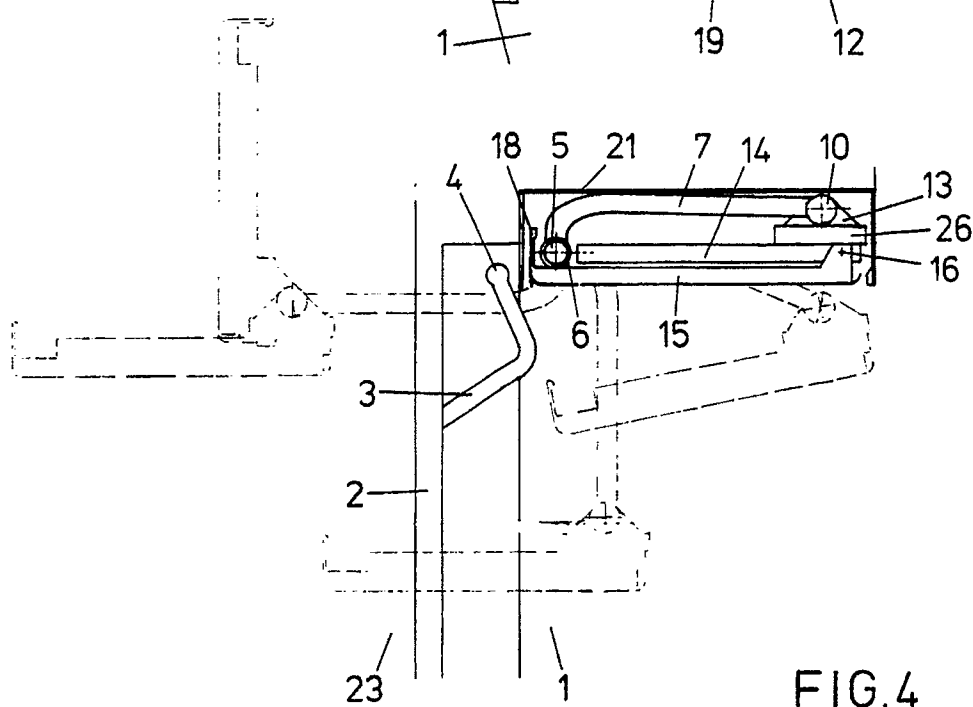


FIG. 4

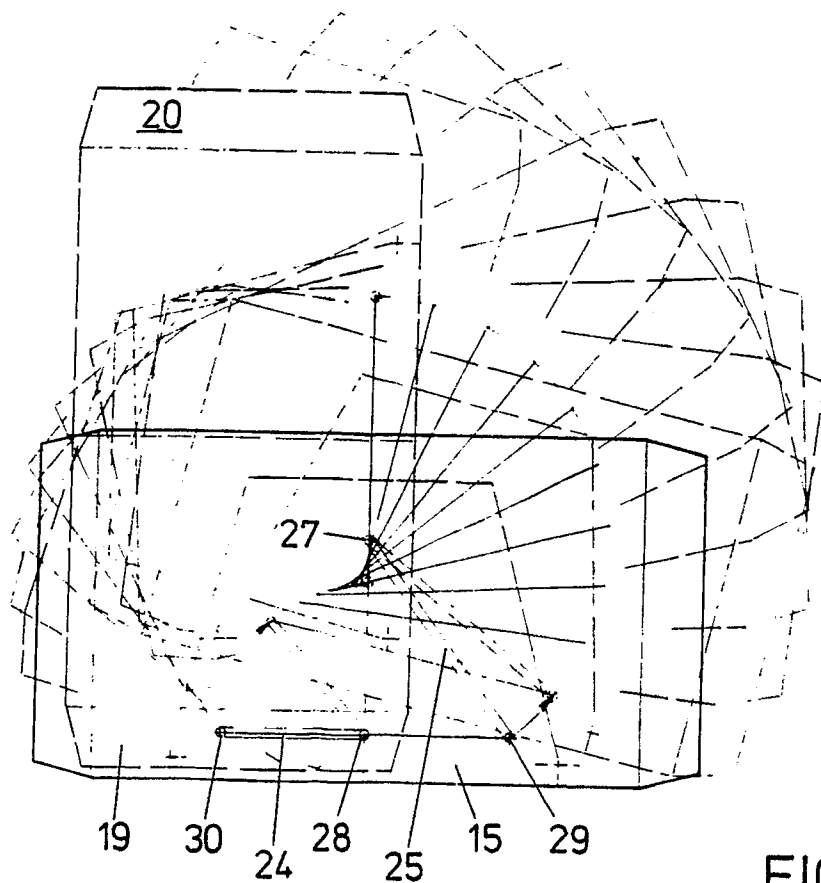


FIG. 5

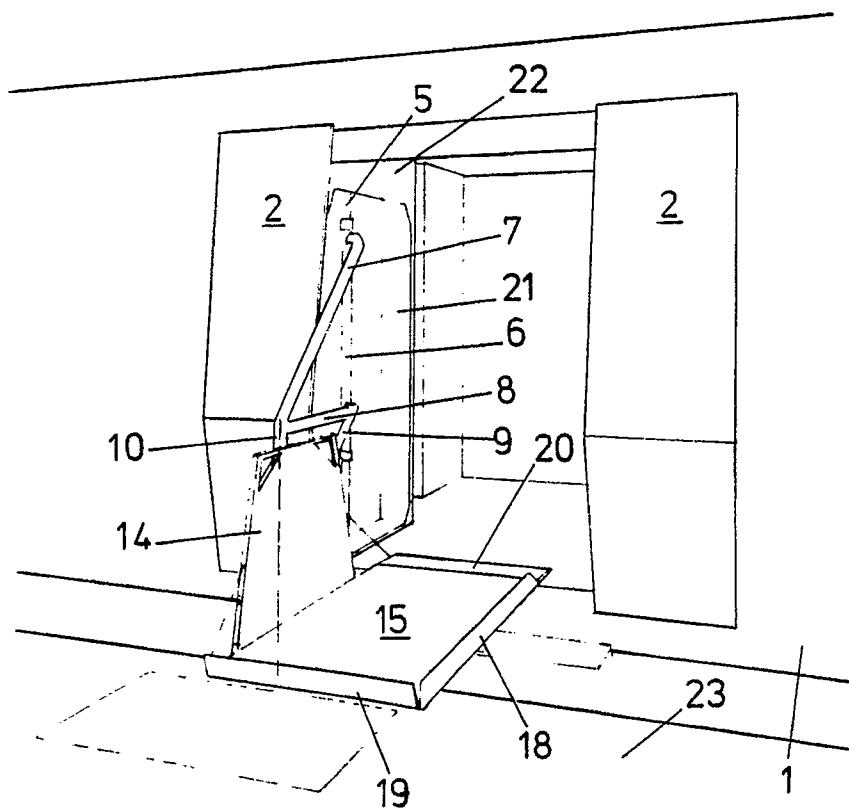


FIG. 6



European
Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 20 2522

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A,D	US-A-4 664 584 (BRAUN) * Abstract; figures 1,2,4 * - - -	1	A 61 G 3/02
A,D	DE-U-8 532 380 (FFG FAHRZEUGWERKSTATTEN FALKENRIED) * Page 9, lines 15-20; figures 1-3 * - - -	1	
A	NL-A-7 907 237 (AB HYDRO-LIFT) * Page 4, line 1 - page 5, line 13; figures 1-3 * - - -	1	
A	US-A-3 847 292 (WILLIAMS) * Abstract; figures 5,6,7 * - - -	1	
A	DE-U-7 810 043 (BRUNS) * Page 4, line 13 - page 5, line 9; figure * - - - - -	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A 61 G B 60 P
Place of search		Date of completion of search	Examiner
The Hague		29 November 90	BAERT F.G.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone		E : earlier patent document, but published on, or after the filing date	
Y : particularly relevant if combined with another document of the same category		D : document cited in the application	
A : technological background		L : document cited for other reasons	
O : non-written disclosure		& : member of the same patent family, corresponding document	
P : intermediate document			
T : theory or principle underlying the invention			