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(54) A lift assembly

(57) A lift assembly comprising a rail system and a lift (18,19,20) being capable of movement along said rail system, for example a chair lift (18,19,20) for a disabled person. The rail system comprising with two guides (12,13), one being provided substantially above the other. The guides (12,13) having a substantially round cross-section, whereby a rack (38) is positioned near the lower guide (12), which rack (38) can mesh with a driven gear (37) of the lift (18,19,20). The lift is provided with a guide unit (22) for engaging said lower guide (12).

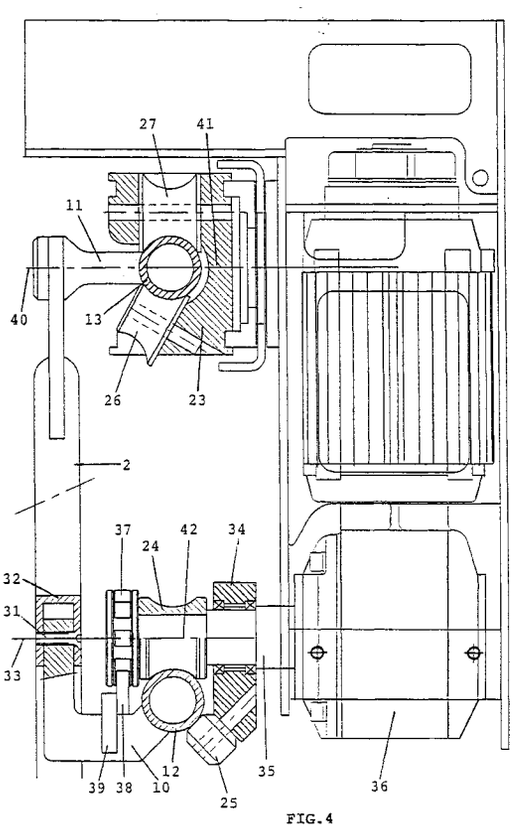

FIG.4

EP 0 884 266 A1

Description

The invention relates to a lift assembly comprising a rail system and a lift being capable of movement along said rail system, for example a chair lift for a disabled person, whereby said lift can move upwards at an angle, at least along part of its path, said rail system comprising two guides, one being provided substantially above the other, whereby the spacing between said guides depends on the angle of inclination of said guides and whereby supporting elements interconnect said two guides.

This type of lift may be used to convey a disabled person, who is unable to use the staircase, upwards or downwards along said staircase. The rail system is thereby mounted along the staircase in such a manner that a lift can move along the staircase, said lift being positioned above said staircase during said movement. The rail along which the lift moves may for example be secured to a wall along the staircase, but it may also be mounted on supports which are secured to the steps on one side of the staircase. The lift may be in the form of a chair, in which a person may be seated, or consist of a platform onto which a wheelchair can be moved. Also other lift forms are possible.

In case of a straight staircase the rail system may consist of a straight assembly of sections, which is mounted at the same angle as the staircase. The lift is connected to the rail system in that it engages the upper and lower guides of the rail system via guide units mounted on the lift, whereby the lift takes up a substantially straight position at all times, that is, at an angle with respect to the rail system. The rail system may furthermore be provided with a rack, which is capable of cooperating with a gear connected to the lift, so that when the gear is driven by means of an electromotor provided in the lift, the lift is moved along the rail system.

Usually a staircase does not consist of a single straight part, by it may comprise different angles of inclination at different places, it may comprise a horizontal part and it may make one or more bends. In all these cases the rail system must be provided along the staircase in such a manner that the lift will take up a straight position at all times during its movement along the rail system. The position of the lift with respect to the rail system is determined by the spacing between the guides. Consequently said spacing must vary such that the lift will remain in a straight position at all times, irrespective of the angle of inclination of the rail system. That is, the two guides will be spaced less far apart when the staircase, and thus the rail system, is inclined at a steeper angle.

In most cases a lift is not provided with two guide units positioned directly above each other, because this will present problems when the rail system comprises a horizontal part. In order to make the lift sufficiently stable at such a horizontal part two guide units are secured to the lift, one guide unit being positioned obliquely above the other.

When a lift assembly is to be installed along a certain staircase, said staircase must be measured very precisely beforehand, after which the shape and the construction of the rail system can be computed on the basis of said measurement. Generally the shape and the dimensions of the rail system will thereby vary along its length. In fact the rail system is assembled and made to size as a whole at the factory, or in parts if it should become too voluminous to transport, transported to the staircase in question and installed along the staircase there. In practice the rail system is always assembled at the factory by means of welded joints, partly because it is thus ensured that all dimensions of the rail system remain unchanged at all times.

Drawbacks of known lift assemblies are the fact that they must be made precisely to size on the basis of complicated calculations, requiring error-free measuring of the staircase, and that reuse of the system for another lift assembly is hardly possible, if at all, in the event that a rail system has to be removed from a house.

The object of the invention is to provide a lift assembly enabling reuse of the rail system, at least to a large extent. Particularly because of the fact that in some cases a lift assembly will be present in a house for a short time only, after which it must be removed again, the possibility of reusing a considerable part of such a lift assembly offers major advantages.

According to one aspect of the invention the rail system of the lift assembly is provided with two guides, which are each detachably connected to the supporting elements of said guides. Said guides preferably consist of a number of tube sections, for example having a round cross-section, which are detachably interconnected. Such a detachable interconnection may be effected by interposing a coupling element, which is slid into one end of each tube section, after which a fixation may take place in that screws are passed through the tube sections into the coupling element. The coupling elements may also be secured in the tube sections by means of a clamped fit.

The tube sections may consist of straight tube sections and bent tube sections, which are detachably interconnected by said coupling elements and which are likewise detachably connected to the supporting elements. Because straight and bent tube sections are utilized, each tube section may be used to form another rail system after the rail system has been dismantled, possibly in combination with tube sections from other rail systems that have been used before. Furthermore all components of the lift assembly can be made to size in situ, using simple hand-operated tools.

According to a further aspect of the invention a supporting element for attaching each of the two guides at a fixed location may be provided with a securing element, by means of which the guide can be connected to the supporting element at a desired angle, and that in such a manner that with every desired angle a prede-

termined spacing between the guides is adjusted automatically. Such an automatic adjustment of the spacing between the guides may for example be achieved in that each of the two securing elements can rotate about a substantially horizontal axis of rotation with respect to the supporting element, whereby the guide can be fixed to the supporting element in a random angular position. The axes of rotation of two securing elements of a supporting element may thereby lie in different, spaced-apart vertical planes, and at least one of said securing elements may be designed such that its axis of rotation crosses the central axis of the guide fastened therewith at some distance therefrom. When the axes of rotation of the securing elements lie in different, spaced-apart vertical planes, this means that one is not positioned directly above the other, which makes it possible to vary the relation between the spacing between the guides and the angle of inclination. Such a variation may also be effected in that the axis of rotation of a securing element does not intersect the central axis of the guide fastened therewith, but crosses it at some distance therefrom. All this will be explained in more detail by means of an embodiment.

According to another aspect of the invention the supporting element may be provided with two downwardly extending legs, which may each be secured to the floor and/or a staircase, for example each leg to a different step of the staircase. Preferably the length of each leg can be adjusted independently of the other leg.

According to another aspect of the invention a rack may be detachably secured to the supporting elements, and that near the lower guide. The rack and/or gear meshing therewith referred to herein may comprise teeth of any desired shape. In particular a gear is meant comprising teeth in the shape of axial pins, which mesh with correspondingly shaped teeth of the rack.

Preferably the location of the axes of rotation of the securing elements on the supporting element is such that it corresponds with the location of guide units mounted on the lift, which are likewise capable of rotating movement about a horizontal axis of rotation. This means that when the lift occupies a certain position on the rail system, the axes of rotation of the securing elements will coincide with the axes of rotation of guide units, which are provided with guide wheels engaging the two guides. This will be explained in more detail in the description of the embodiment.

Furthermore a third guide unit may be present, which engages one of the guides, for example the upper guide. This guide assists in providing a stable support of the lift. According to the invention said third guide unit may be secured to the lift in such a manner that a substantially vertical movement with respect to the lift is possible.

When the two guide units are not positioned directly above each other, the lift will not remain in a straight position when the rail system makes a lateral bend. That is why the rail system is preferably constructed such that, seen in vertical projection, the upper guide makes a larger (wider) curve in a bend than does the lower guide. When the dimensions are correct the lift will maintain its straight position at all times thereby.

The invention furthermore relates to a method for installing a rail system as defined in the claims.

Further aspects of the invention, which may be used separately as well as in combination with each other, will be described by means of an embodiment and are referred to in the claims.

Hereafter an embodiment of a lift assembly according to the invention will be described by way of illustration with reference to the schematic drawing.

Figure 1 is a perspective view of a rail system of a lift assembly, and also an exploded view thereof;
Figure 2 is a view of a lift assembly;
Figure 3 is a view of an alternative embodiment of the lift;
Figure 4 is a partial cross-section of a rail system and a lift;
Figure 5 is a partial cross-section of a supporting element and rails; and
Figure 6 is a view, corresponding with Figure 3, of another embodiment.

The Figures are only diagrammatic view of the embodiment, wherein like parts are numbered alike in the various Figures.

Figure 1 is a perspective and schematic view of a rail system and also an exploded view showing the parts of said rail system. A number of supporting elements 2 are mounted on a staircase 1. Each of said supporting elements 2 comprises two legs 3, 4, said legs at their downwardly extending ends being provided with bases 5, which may be secured to the steps of a staircase, for example by means of screws. The legs 3, 4 may thereby be provided with an additional tube section 46 for adjusting the length of the leg. This will be explained in more detail with reference to Figure 5.

Each supporting element 2 is secured to two successive steps, whereby a plate-shaped intermediate piece 6 is placed under the base 5 of the shorter leg 4, said intermediate piece 6 engaging around the longer leg 3 with one end. In this manner the attachment of the supporting element 2 is strengthened. A supporting element 2 is placed on the horizontal floor 7 as well, whereby the two legs of said element have the same length.

Each supporting element 2 is provided with two securing points 8, 9, to which the lower guide 12 and the upper guide 13 can be secured by means of securing elements 10, 11. The position of the securing points 8 and 9 is the same for all supporting elements 2. It will be apparent that this location and also the shape of the securing elements 10 and 11 determine the relation between the spacing between the guides 12, 13 and the angle of inclination of said guides. This spacing between

the guides 12, 13 must be attuned to the construction of the lift to be moved along the rail system, such that said lift will remain in a straight position while moving along its path. At the bottom side of the staircase the rail system according to Figure 1 is connected to the floor 15. At the upper side of the staircase 1 the rail system extends beyond the floor 7.

In the exploded view of the rail system shown in Figure 1 a number of parts thereof are illustrated in detached relationship. Each guide 12, 13 is thereby shown to be assembled from a number of straight tube sections and a number of bent tube sections. Said tube sections are interconnected by coupling elements 16, which may be slid into the ends of two tube sections connecting to each other. The interconnection of the tube sections may be strong enough per se, because the coupling elements are provided with a clamped fit, it is also possible, however, to secure the ends of the tube sections to the coupling elements by means of screws.

Figure 2 is a view of a lift assembly provided on a staircase 1, whereby the rail system of said assembly corresponds with the rail system described with reference to Figure 1. As already described before, the supporting elements 2 are secured to successive steps of the staircase 1. Furthermore a supporting element 2 is provided on the horizontal part 17. Also Figure 2 shows how the spacing between the guides 12, 13 changes in dependence on the inclination of said guides. This dependence is determined by the position of the securing points 8 and 9 of the supporting elements 2 and by the shape of the securing elements, of which only securing element 10 is shown in Figure 2.

Upper guide 13 is secured to supporting element 2 in such a manner, that the central axis of guide 13 intersects the central axis of securing point 9. To this end the securing element 11, which is not shown in Figure 2, is capable of rotating movement about a horizontal axis of rotation through securing point 9, to which securing element 11 the upper guide 13 can be secured.

The lower securing element 10, which is capable of rotating movement about a horizontal axis of rotation through securing point 8, is shown in Figure 2. The lower guide 12 is secured to said securing element 10 in such a manner, that the central axis of said lower guide 12 crosses the horizontal axis of rotation through securing point 8 at some distance therefrom. It will be apparent that the position of securing points 8, 9 and the shape of the securing elements 10, 11 effect a certain relation between the spacing between the two guides 12, 13 on the one hand and the angle of inclination of said guides on the other hand.

Figure 2 shows a lift, on which a chair is placed in order to be able to move a handicapped person along the staircase in seated position. The lift, which is shown in rear view, is provided with a back support 18, two arm supports 19 and a seat 20.

The lift is provided with a frame 21, to which two guide units are secured, which are capable of rotating movement about a horizontal axis with respect to frame 21.

The lower guide unit 22 is provided with a guide wheel 24, which can roll on guide 12 with a concave running surface. The lower guide unit 22 is furthermore provided with a second guide wheel 25, which can likewise roll on guide 12. The guide wheels 24, 25 are interconnected in such a manner that they can jointly rotate about the central axis of guide wheel 24.

The lift drive is not shown in Figure 2. Said drive may consist of a rack, which may be secured to the securing elements 10 in front of the lower guide 12, seen in Figure 2, and which may have upwardly directed teeth. Said teeth can mesh with a gear positioned in front of guide wheel 24, seen in Figure 2, which is driven via a shaft, about which the lower guide unit 22 can rotate. The drive just described is shown in Figure 4 and will be explained in more detail with reference to said Figure.

According to Figure 2 frame 21 is provided with an upper guide unit 23 comprising guide wheels 26 and 27, which both have a concave running surface and which can roll on upper guide 13. Guide unit 23 is capable of rotating movement with respect to frame 21 about a substantially horizontal axis, which lies in the same plane as the axes of guide wheels 26 and 27, said axis of rotation also intersecting the central axis of upper guide 13.

In order to keep the lift in its straight position in a stable manner the upper guide unit 23 is furthermore provided with two guide wheels 48, 49, which are positioned at some distance from the guide wheels 26 and 27. As a result of this the lift engages the rail system in three points, which results in an adequate stability.

As is apparent from Figure 2, the position of the axes of rotation of guide units 22 and 23 on frame 21 is such that when the lift is positioned at a certain location near the supporting element, said axes of rotation coincide with securing points 8 and 9 of a supporting element. The consequence of this is that with every angle of inclination of the guides 12, 13 the spacing between said guides is such that the lift will remain in the same straight position at all times.

Figure 3 shows an alternative embodiment of the lift, wherein a lower guide unit 22 being identical to the one shown in Figure 2 is secured to frame 21. The upper guide unit 23 is different from the one shown in Figure 2, however, because the guide unit 23 of Figure 3 only comprises two guide wheels 26, 27. A third guide unit 28 is provided in order to obtain a stable connection between the lift and the rail system, which third guide unit engages the upper guide 13. Said third guide unit 28 is capable of rotating movement with respect to frame 21 about a horizontal axis, which intersects the central axis of upper guide 13, but in addition to that said third guide is capable of moving in vertical direction along frame 21, for which purpose guide unit 28 is mounted in vertical guide means, for example consisting of a vertical bar 29, along which the guide unit 28 can move.

The advantage of the construction according to Figure 3 is that the horizontal spacing between guide units 23 and 28 (seen in plan view, therefore) will remain the same at all times. This results in a stabler connection between the lift and the rail system.

Figure 4 shows a detail wherein guide units 22, 23 are illustrated in partial sectional view, as is part of the rail system.

As part of the rail system a supporting element 2 is shown, with a lower securing element 10 and an upper securing element 11 secured thereto. The Figure shows in sectional view how lower securing element 10 is connected to a section 32 of supporting element 2 by means of a screw 31. Securing element 10 can be fixed in various angular positions with respect to axis of rotation 33 thereby. Axis of rotation 33 coincides with securing point 8 according to Figure 2.

Attached to securing element 10 is lower guide rail 12, on which a guide wheel 24 and a guide wheel 25 can roll. Guide wheel 25 is capable of rotating movement in a support 34, which support 34 is capable of rotating movement about shaft 35 of electromotor 36, which forms the lift drive. Guide wheel 24 is likewise capable of rotating movement about shaft 35. Gear 37, in this embodiment consisting of two parallel discs, between which pins forming the teeth are provided, is fixedly mounted on shaft 35, so that said gear 37 can be driven by electromotor 36. Gear 37 thereby engages in a teeth rack 38, which is connected to securing portion 39 of securing element 10 by means of screws.

In this embodiment gear 37 is mounted directly on the shaft of electromotor 36, but it is also possible for the gear 37 to be driven by an electromotor via a reduction gear.

Guide 13 is connected to the upper securing element 11, and that in such a manner that the axis of rotation 40, about which securing element 11 can rotate before being fixed to supporting element 2, intersects the central axis of guide 13.

Guide 13 is engaged by two guide wheels 26, 27, which are both rotatably journalled in guide unit 23, which is freely rotatable about axis of rotation 41.

Figure 4 shows the situation wherein the position of the lift on the rail system is such that the axis of rotation 33 of securing element 10 coincides with the axis of rotation 42 of the lower guide unit, and whereby the axis of rotation 40 of the upper securing element 11 coincides with the axis of rotation of the upper guide unit 23.

Figure 5 is a more detailed view of the rail system in assembled condition. The lower guide 12 is thereby fixed to securing element 10 by means of a bolt 43, because securing element 10 is provided with a hole, through which bolt 43 may extend, and guide 12 is provided with a threaded hole, into which bolt 43 can be screwed. By securing the guides 12, 13 to securing elements 10, 11 in this manner the tubes forming the guides 12, 13 can be reused without the threaded holes being objectionable thereby. Said holes may thereby be covered up by threading a screw therein.

Figure 6 substantially corresponds with Figure 3, but in this embodiment the third guide unit 52, which is capable of movement in vertical direction along guide 53, is positioned in such manner as to engage lower guide 12. An important advantage of this is that the path of movement of guide unit 52 in Figure 6 is shorter than the path of movement 28 in Figure 3.

Supporting element 2 is provided with a section 32, in which the securing element 10 is fixed by means of bolt 31, and that in the desired angular position with respect to the central axis of bolt 31. Of course said securing may take place in several other ways in order to achieve the same effect. In a corresponding manner upper guide 13 is secured to supporting element 2. A bolt 44 is screwed into guide 13 thereby, thus fixing guide 13 to securing element 11 as well as fixing securing element 11 to supporting element 2.

Figure 5 moreover shows the manner in which the length of leg 3, 4 can be adjusted. To that end tube end 45 of supporting element 2 is slid into a tube section 46, which tube section 46 is slid over an upwardly directed stub of base 5. The tube ends 45 of the supporting elements may all have a standard length thereby, whilst the height of supporting element 2 is determined by the length of tube section 46, which can readily be cut to the required length. The interconnection between tube end 45 and tube section 46 may be effected in various ways, for example by passing a bolt through both sections.

When the rail system as described above is used it becomes possible to install the rail system in a relatively fast and simple manner, even without measuring the staircase precisely beforehand. All tubular elements can be shortened by means of hand-operated tools and made to size therewith. Any bends in the tubes may be formed at the factory beforehand, but it is also possible to obtain bends by shortening a circular tube section to a length such that the required bend is obtained.

After the supporting elements 2 have been mounted in suitable places on a staircase, the tube sections may be cut to the required length by means of simple techniques, which can be carried out with hand-operated tools. Then the tube sections are linked together by means of coupling elements, which are slid into two abutting tube sections. When the guides thus formed are then fixed in the correct position with respect to the supporting elements, the threaded holes for securing the guides may be provided therein by means of tools, which may be specially adapted to that end, which tools are supported on the securing elements occupying the correct position. Thus it has become relatively simple to provide a lift system.

Also the dismantling of the rail system can take place in a simple manner, such that the parts can be reused after being disassembled. The used parts may thereby be sorted and stored until certain parts can be reused. It is also possible, however, to form another lift assembly based on an existing lift assembly, and that to

size for another staircase. By measuring both the old staircase and the new one and by making a relatively simple computation it will then be possible to determine what parts of the old lift assembly may remain unchanged, what parts need to be shortened or what parts need to be added.

The embodiment described above is to be considered as such and a great many variations are possible within the scope of the invention.

The following embodiments are preferred embodiments.

A lift assembly comprising a rail system and a lift being capable of movement along said rail system, for example a chair lift for a disabled person, whereby said lift can move upwards at an angle, at least along part of its path, said rail system comprising with two guides, one being provided substantially above the other, whereby the spacing between said guides depends on the angle of inclination of said guides and whereby supporting elements interconnect said two guides, whereby said two guides are each detachably connected to said supporting elements.

A lift assembly whereby each guide consists of a number of tube sections, which are detachably interconnected.

A lift assembly whereby a supporting element for each guide is provided with a securing element at a fixed location, by means of which securing element the guide can be connected to the supporting element at a desired angle, and that in such a manner that with every desired angle a predetermined spacing between the guides is adjusted automatically.

A lift assembly whereby each of the two securing elements can rotate about a substantially horizontal axis of rotation with respect to the supporting element, and is capable of connecting the guide to the supporting element in number of angular positions.

A lift assembly whereby the axes of rotation of the securing elements of a supporting element lie in different, spaced-apart vertical planes.

A lift assembly whereby at least one of said securing elements may be designed such that its axis of rotation crosses the central axis of the guide fastened therewith at some distance therefrom.

A lift assembly whereby said supporting element is provided with two downwardly extending legs, which can each be secured to the floor and/or a staircase, for example each leg to a different step of the staircase.

A lift assembly whereby each leg is provided with a telescopic part, which can be fixed in a plurality of positions, so that the length of each leg is adjustable.

A lift assembly whereby a rack is detachably secured to the supporting elements of the lower guide, which can mesh with a driven gear of the lift.

A lift assembly whereby said lift is connected to each of said guides by means of a pair of guide wheels engaging the respective guide, whereby each pair of guide wheels is provided on a guide unit, which is capable of rotating movement about a horizontal axis of rotation, whereby said axes of rotation coincide with the axes of rotation of said securing elements when the lift is positioned near a supporting element.

A lift assembly whereby said lift is connected to each of said guides by means of a pair of guide wheels engaging the respective guide, whereby each pair of guide wheels is provided on a guide unit, which is capable of rotating movement about a horizontal axis of rotation, and that a third guide unit engages each of said guides with guide wheels, said guide unit being capable of rotating movement about a horizontal axis, in such a manner that said guide unit can move in a substantially vertical path with respect to said lift.

A lift assembly whereby said third guide unit engages said lower guide.

A lift assembly whereby said lift is provided with an electric drive unit, whose outgoing shaft coincides with the axis of rotation of one of said guide units, whereby one guide wheel is provided in such manner as to be rotatable about the connecting shaft between the drive unit and a gear engaging a rack connected to said supporting elements, whilst a second guide wheel is journalled in an element which is likewise provided in such manner as to be rotatable about said connecting shaft.

A lift assembly whereby said rail system makes a bend to another substantially vertical plane, and that, seen in vertical projection, said upper guide makes a larger (wider) curve in a bend than does said lower guide.

A method for installing a rail system along a staircase, wherein a number of supporting elements are secured to the steps and/or to the floor, after which a number of tube sections, which may or may not be provided with bends, are interconnected and detachably secured to the supporting elements at fixed locations with the interposition of securing elements, which may be connected to a supporting element in various angular positions, all this in such a manner that two guides are formed, one guide being positioned above the other, the spacing between said guides depending on the angle of inclination and being determined by the shape of the supporting elements.

A method whereby an existing lift assembly present on a staircase, which is to be removed, is converted into a lift system which can be installed on another staircase, whereby it is computed on the basis of the dimensions of both staircases by how much the parts of the existing lift assembly must be shortened or lengthened and/or what new parts must be added.

A method whereby straight tube sections are utilized in assembling said rail system, which tube sections can be shortened to the desired size, as well as tube sections which are bent in the shape of a part of a circle, which tube sections can be shortened to form a desired angle.

Claims

1. A lift assembly comprising a rail system and a lift (18,19,20) being capable of movement along said rail system, for example a chair lift (18,19,20) for a disabled person, whereby said lift (18,19,20) can move upwards at an angle at least along part of its path, said rail system comprising an upper guide (13) and a lower guide (12), being provided substantially above each other, whereby the perpendicular spacing between said guides (12,13) depends on the angle of inclination of said guides (12,13), whereby said lift (18,19,20) is provided with an upper guide unit (23) and a lower guide unit (22), each being rotatable with respect to the lift (18,19,20) about a substantially horizontal axis of rotation (41,42) and each engaging a guide (12,13), whereby a guide unit (22) is provided with a driven gear (37) meshing with a rack (38) which is positioned near one of the guides (12).

2. A lift assembly according to claim 1, characterized in that the lower guide unit (22) is provided with the driven gear (37).

3. A lift assembly according to any one of the preceding claims, characterized in that the guides (12,13) have a substantially round cross-section and preferable comprise a tube sections.

4. A lift assembly according to any one of the preceding claims, characterized in that the rack (38) is secured to supporting elements (2) to which the lower guide (12) is secured.

5. A lift assembly according to any one of the preceding claims, characterized in that the axes of rotation of the guide units (22,23) lie in different, spaced-apart vertical planes.

6. A lift assembly according to claim 5, characterized in that the upper guide unit (23) is designed such that its axis of rotation (41) crosses the central axis of the upper guide (13).

7. A lift assembly according to any one of the preceding claims, characterized in that said upper guide unit (23) comprises a guide wheel (27) engaging the upper side of the upper guide (13).

8. A lift assembly according to any one of the preceding claims, characterized in that said lower guide unit (22) comprises a guide wheel (24) engaging the upper side of the lower guide (12).

9. A lift assembly according to claim 8, characterized in that said guide wheel (24) and said driven gear (37) and the lower guide unit (22) can rotate about the same horizontal axis of rotation (42).

10. A lift assembly according to any one of the preceding claims, characterized in that the lower guide unit (22) comprises a support (34) carrying a guide wheel (25) engaging the lower guide (12), which support (34) is rotatable about the horizontal axis of rotation (42) of the lower guide unit (22).

11. A lift assembly according to any one of the preceding claims, characterized in that said lift (18,19,20) is provided with an electric drive unit (36), whose outgoing shaft (35) coincides with the axis of rotation (42) of said lower guide unit (22), whereby a guide wheel (24) engaging the upper side of the lower guide (12) is provided in such manner as to be rotatable about the connecting shaft (42) between the drive unit (36) and a gear (37) engaging the rack (38).

12. A lift assembly according to claim 11, characterized in that the electric drive unit comprise an electromotor (36) and a reduction gear.

13. A lift being capable of movement along a rail system, for example a chair lift (18,19,20) for a disabled person, whereby said lift (18,19,20) can move upwards at an angle at least along part of its path, said rail system comprising an upper guide (13) and a lower guide (12), being provided substantially above each other, whereby the perpendicular spacing between said guides (12,13) depends on the angle of inclination of said guides (12,13), whereby said lift (18,19,20) is provided with an upper guide unit (23) and a lower guide unit (22), each being rotatable with respect to the lift (18,19,20) about a substantially horizontal axis of rotation (41,42) and each engaging a guide (12,13), whereby a guide unit (22) is provided with a driven gear (37) which can mesh with a rack (38) positioned near one of the guides (12).

14. Method for moving a lift (18,19,20) along a rail system, for example a chair lift (18,19,20) for a disabled person, whereby said lift (18,19,20) is moved upwards at an angle, at least along part of its path, said rail system comprising an upper guide (13) and a lower guide (12), being provided substantially above each other, whereby the perpendicular spacing between said guides (12,13) depends on the angle of inclination of said guides (12,13), whereby said lift (18,19,20) is provided with an upper guide unit (23) and a lower guide unit (22), each being rotatable with respect to the lift (18,19,20) about a substantially horizontal axis of rotation (41,42) with respect to the lift (18,19,20) and each engaging a guide (12,13), whereby the lift is moved by a driven gear (37) provided on a guide unit (22) engaging a

rack (38) which is positioned near one of the guides (12).

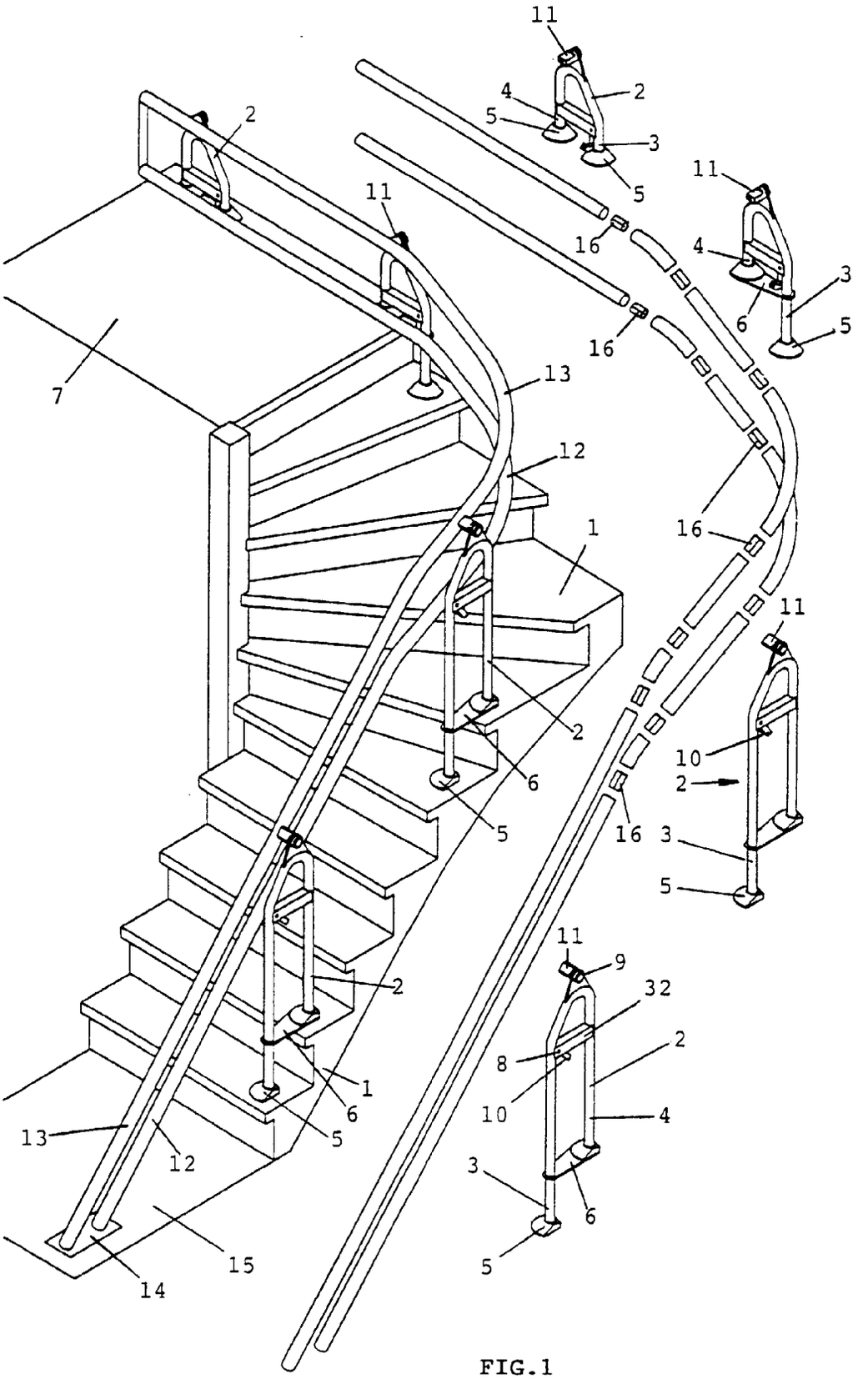
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FIG.1

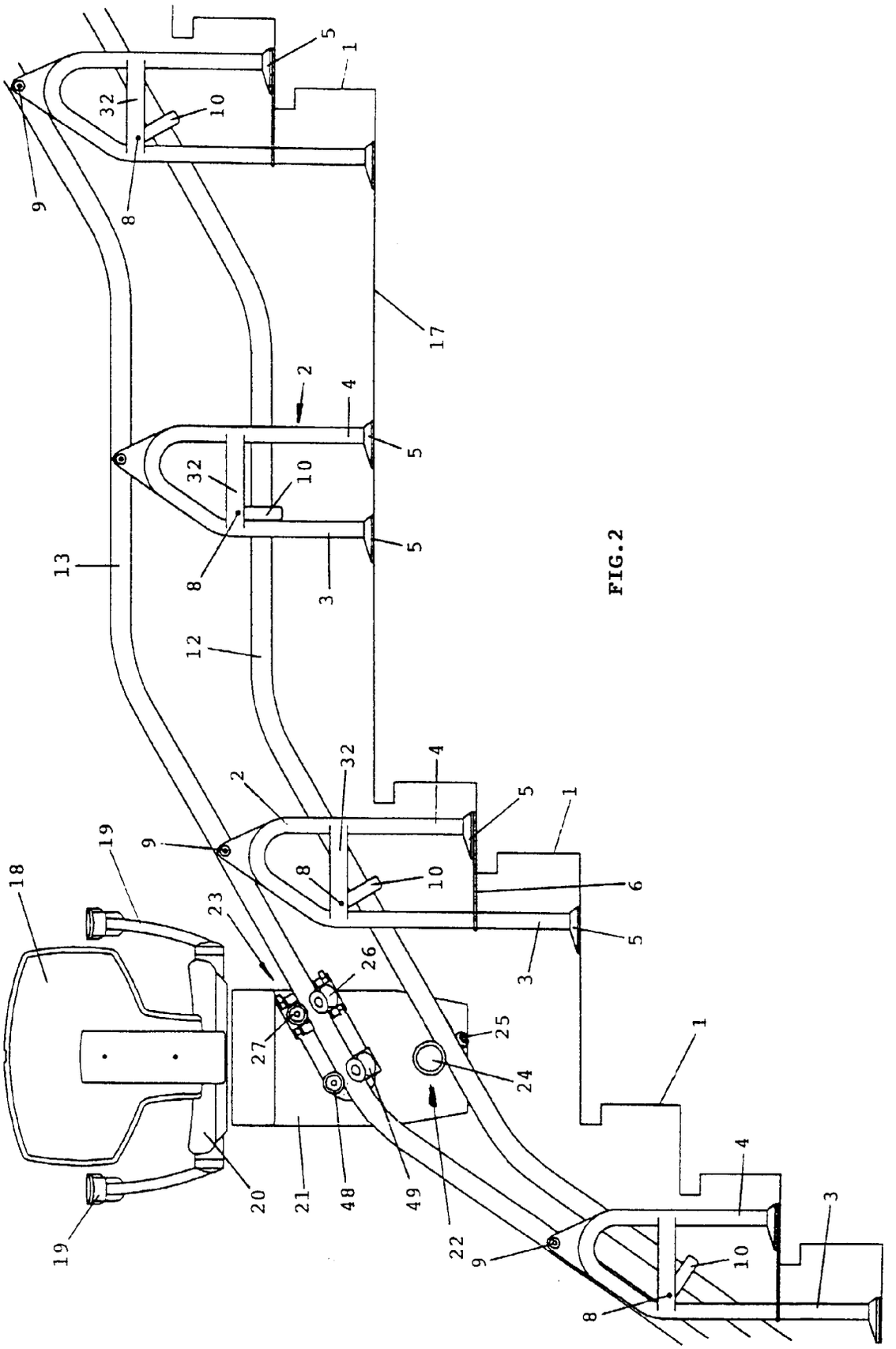

FIG.2

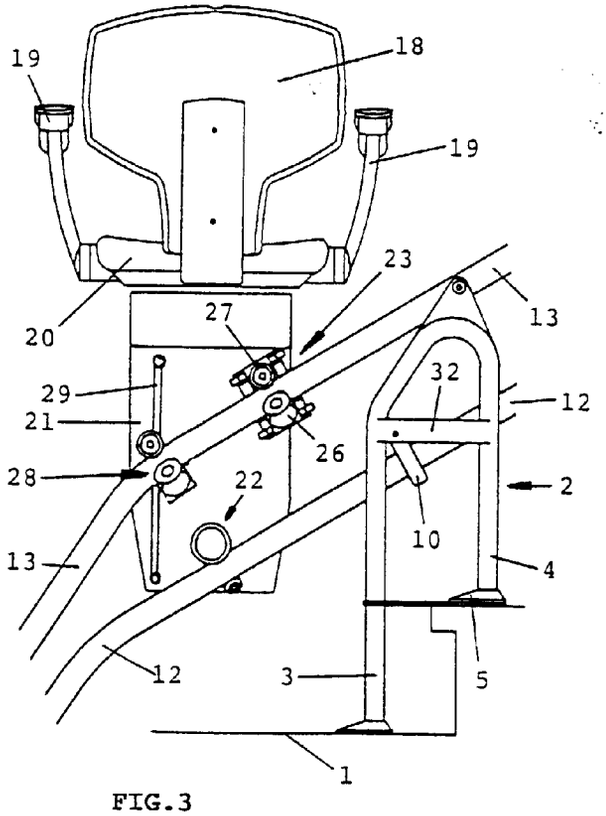

FIG.3

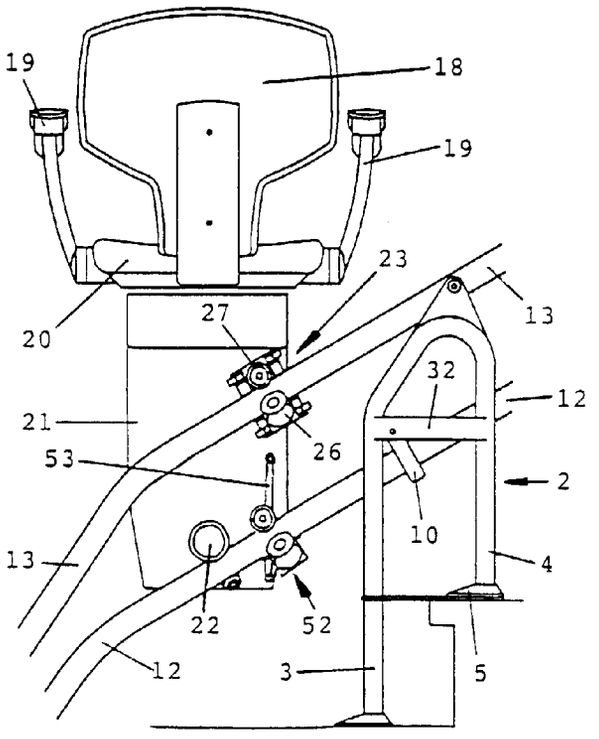

FIG.6

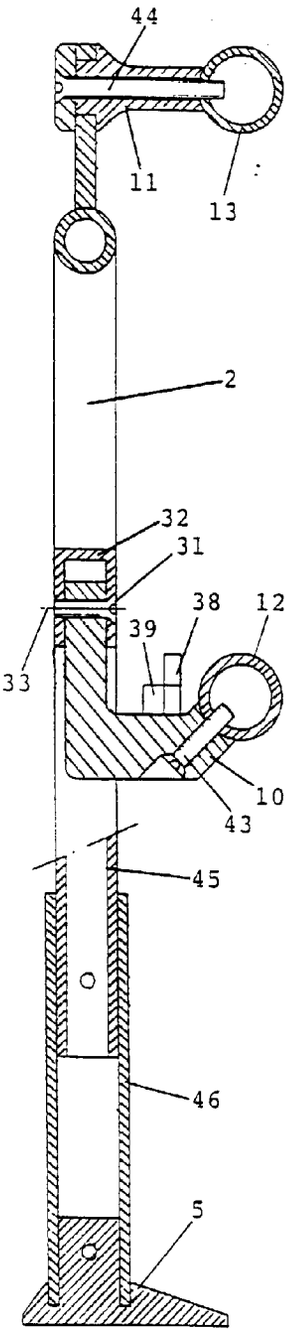

FIG.5

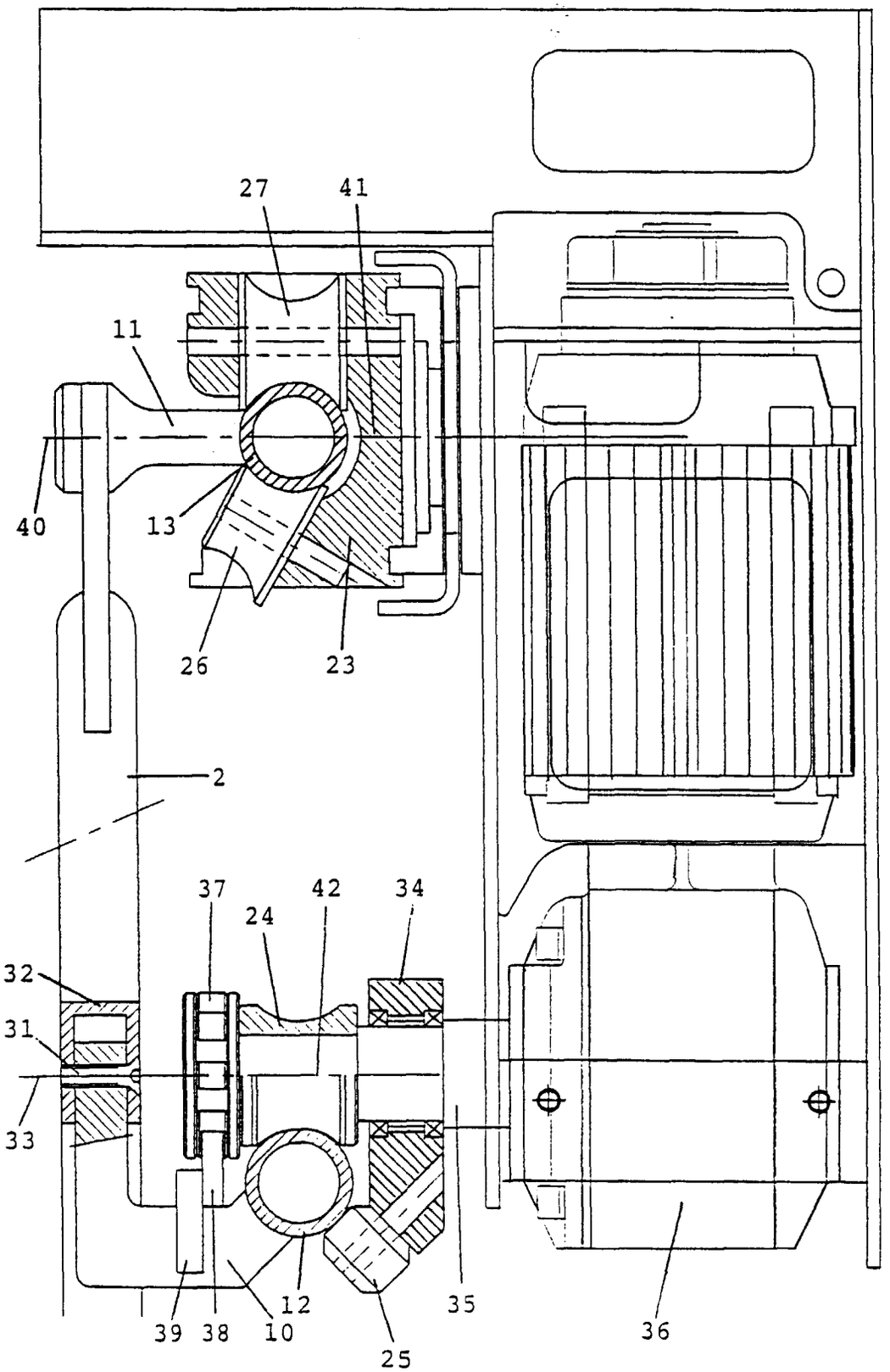

FIG.4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 20 2906

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.6)
X	DE 38 19 522 A (KLEINDIENST GMBH) 14 December 1989 * column 2, line 56 - column 4, line 31; figures 1-3 *	1-14	B66B9/08
X	NL 7 212 744 A (VAN MAASTRICHT) 22 March 1974 * page 2, line 33 - page 5, line 3; figure 3 *	1,4	
X	FR 2 668 439 A (FINANC MAGNYTOISE SOC) 30 April 1992 * page 3, line 30 - page 5, line 34 *	1	
X	EP 0 394 201 A (VIMEC SRL) 24 October 1990 * column 3, line 7 - line 16; figures 1,2 *	1	
A	WO 92 14673 A (HILLENKOETTER & RONSIECK) 3 September 1992 * abstract; figures 1-6 *	1,6	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B66B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19 October 1998	Sozzi, R

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