(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 173 367 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
31.05.2017 Bulletin 2017/22

(51) Int Cl.:
B66B 9/16 *(2006.01)* ***B66B 5/00*** *(2006.01)*

(21) Application number: **16200919.5**

(22) Date of filing: **28.11.2016**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **27.11.2015 NL 2015870**

(71) Applicant: **RECO Liftbeheer B.V.**
2742 RA Waddinxveen (NL)

(72) Inventor: **Reigwein, Robin**
2742 RA Waddinxveen (NL)

(74) Representative: **V.O.**
P.O. Box 87930
Carnegieplein 5
2508 DH Den Haag (NL)

(54) **MOVABLE LIFT APPARATUS**

(57) The invention relates to a movable lift apparatus, comprising a structure in which a lift shaft with guiding means is arranged. Further, the apparatus comprises a lift cage which is movable in the lift shaft via the guiding means. The lift cage is provided with blocking means for, in a blocked position, blockingly engaging the guiding means to block movement of the lift cage along the guiding means.

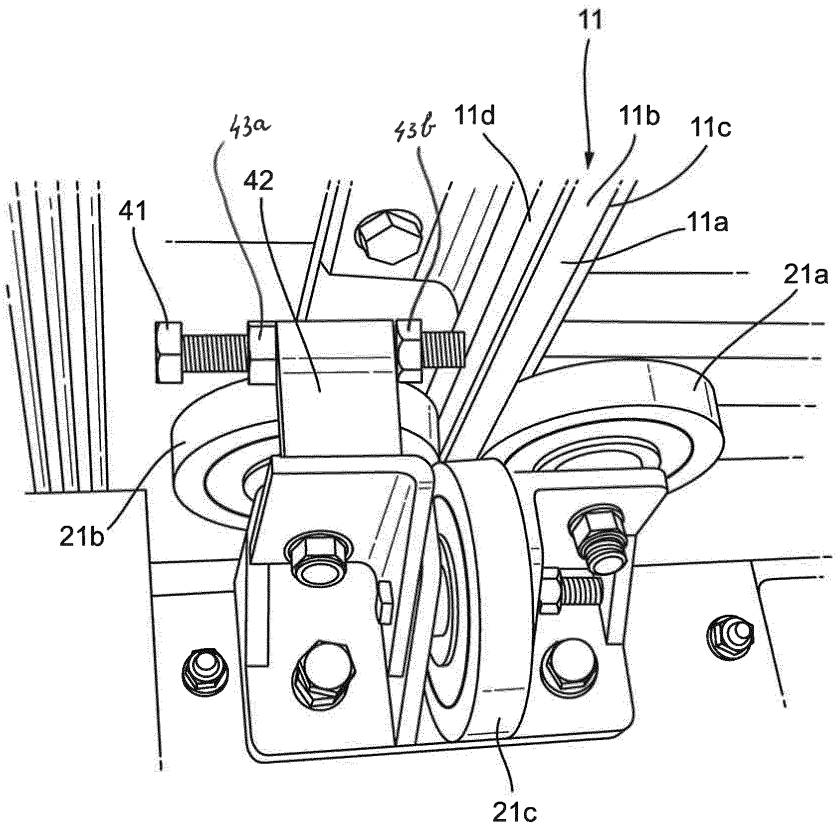

Fig. 3

EP 3 173 367 A2

Description

[0001] The invention relates to a movable lift apparatus, comprising a structure in which a lift shaft with guiding means is arranged, further comprising a lift cage which is movable in the lift shaft via the guiding means.

[0002] Such a movable lift is known from, for instance, Dutch patent specification NL 2 005 305, and is particularly suitable for use as a temporary lift provision for, for instance, events or temporary operations at infrastructural constructions such as railroads. The movable lift can be transported as an integral unit to a location, be put into use and, after use, be transported as a whole again.

[0003] Although in practice such movable lifts function satisfactorily, there is a need for improvement, for instance for reducing the risk of damage to the lift cage and guiding means and for improving safety in use.

[0004] The object of the invention is to obtain an improved lift system according to the opening paragraph. To that end, the movable lift apparatus according to the invention further comprises blocking means for, in a blocked position, blockingly engaging the guiding means to block movement of the lift cage along the guiding means.

[0005] By using blocking means which, in a blocked position, blockingly engage the guiding means, the lift cage can be locked at a position in the shaft, so that undesired shifting of the lift cage and hence damage during transport of the lift apparatus is counteracted. Thus, an improved movable lift apparatus is obtained having a further increased robustness in use.

[0006] Also, the invention relates to a method for making a lift apparatus ready for use and to a method for making a lift apparatus ready for transport.

[0007] Further advantageous embodiments of the invention are represented in the subclaims.

[0008] The invention will be further elucidated on the basis of exemplary embodiments which are represented in the drawing. In the drawing:

Figure 1 shows a schematic perspective view of a movable lift apparatus according to the invention;
Figure 2 shows a schematic perspective view of the lift cage, movable via guiding means, in the lift shaft of the movable lift apparatus of Fig. 1, and
Figure 3 shows a schematic perspective detailed view of blocking means of the lift cage of Fig. 2.

[0009] The figures are only a schematic representation of the preferred embodiment of the invention. In the figures, identical or corresponding parts are indicated with the same reference numerals.

[0010] Figure 1 shows a schematic perspective view of a movable lift apparatus 1 according to the invention. The apparatus 1 has a structure 100 in which a lift shaft 2 with guiding means (not shown) is arranged. Further, the apparatus 1 has a lift cage 3 which is movable in the lift shaft 2 via the guiding means. The structure 100 is provided with drive means (not shown) for driving the lift cage 3. Additionally, the structure 100 is formed as a movable, integral unit. By accommodating the lift cage 3 and preferably also the drive means in the movable, integral unit 100, various assembly operations during placement of the lift apparatus can be omitted. Similarly, the dismantling procedure is thereby simplified. In principle, the lift apparatus can be handled as a singular unit.

[0011] The integral structure 100 shown has an outside contour which is substantially block-shaped. Thus, the outside contour has a bottom surface 4, a top surface 5, and four side surfaces 6-8, all defined in an operative position of the lift apparatus 1, with the integral structure 100 resting on an end face of the outside contour. The side surfaces 6-8 are surrounded by two longitudinal ribs L and two other ribs, that is, two width ribs B or two height ribs H. The bottom surface 4 and the top surface 6 are surrounded by two width ribs B and two height ribs H, respectively extending widthwise in the direction x and heightwise in the direction z. Here, the dimensions of the outside contour of the integral structure 100 substantially coincide with the dimensions of a standard container, in the embodiment shown a 40-foot container. The integral unit is further provided with corner castings designed to be fastened on a transport means with the aid of twist locks and the like. Thus, the movable lift apparatus 1 can be relatively simply transported as a standard container.

[0012] A standard container is to be understood to mean at least, though not exclusively, a container that is used in the transport of goods and that is designed with specific standard dimensions so that it can easily be conveyed on a truck, ship, train and/or with other forms of transport. Such standard containers are also known as ISO containers or standard sea containers. The dimensions of such containers are for instance given in, inter alia, recommendation R-668 published by the ISO (International Organization for Standardization). The dimensions that are indicated in this recommendation for such a container are: a width of 8 feet (approximately 2.4 m), a height of 8 feet 6 inches (approximately 2.6 m) and a length of 10, 20 or 40 feet (approximately 6 m, 9 m, 12 m).

[0013] Here, the dimensions are determined such that geometrical axes (x, y, z) correspond to the width, length, height of the container.

[0014] A rib is understood to mean at least, though not exclusively, a corner edge of a container where two side surfaces intersect. Thus, a height rib H is defined as a rib that extends substantially in a direction parallel to the height direction z. The joint ribs can thus define, for instance, the outside contour of the container.

[0015] An end side of a container is understood to mean at least, though not exclusively, the side that is formed by the surface that is surrounded by two height ribs (z) and two width ribs (x).

[0016] A position of use is understood to mean at least, though not exclusively, a position of a lift module or of

the lift, where it is placed on an end side and where for instance the guiding means and the lift shaft are in a standing orientation.

[0017] It is noted that, preferably, a side 6 that is upright during use of the lift apparatus, a side surface of the integral unit, has dimensions that substantially coincide with the dimensions of the bottom surface of a standard container. In this context, the bottom surface of a standard container means an outside surface of the container that is surrounded by length ribs and width ribs, that is, the surface that is normally at the bottom side during transport. By implementing the above-mentioned upright side 6 with dimensions of a container, this side 6 can function as a bottom surface during transport, while other dimensions, such as the height thereof, may deviate. If the entire outside contour of the integral structure 100 is dimensioned as a container, this has as an additional advantage that because of the absence of deviating outside dimensions, the unit can be wholly handled as a container, for instance also where storage is concerned.

[0018] Through the use of corner castings the structure 100 can be readily coupled to standard containers or to a means of transport.

[0019] The drive means for driving the lift cage preferably comprise an electric motor, and a traction sheave driven by the motor for driving one or a plurality of traction cables, so that a hoisting installation is obtained. Further, the drive means preferably include a control mechanism to enable adequate operation of the drive of the lift cage. The lift apparatus 1 further comprises an electrical connection 16 for external supply of electric power to the drive means.

[0020] It is noted that instead of a traction drive, a different type of drive may be used, for instance a hydraulic drive, a pneumatic drive, a mechanism with a gear rack and a pinion, a chain mechanism, a linkage mechanism, a drum mechanism, a screw spindle, etc. As is known to the skilled person, drive means can also comprise elements of a different kind, such as a counterweight.

[0021] The lift apparatus 1 further comprises a plurality of access doors 10 which are arranged in one or a plurality of the sides 6-9 of the integral structure 100 that are upright during use of the lift apparatus. The access doors can serve as entrance and exit of the lift. In the embodiment shown, the access doors 10 are situated at the front side 7 and the rear side 9 of the integral structure 100. The front and rear sides 7, 9 are two opposite upright sides, the side surfaces of the integral structure 100.

[0022] It is most preferred that the integral unit comprise a stiffening frame for, whilst stably positioned on an end side of the unit, the bottom surface 4, absorbing deforming forces. The frame may for instance comprise an assembly of tubes. Also, the integral structure 100 may be clad with stiff elements, such as steel plates, so that the stiffening frame is integrated in the outer wall of the integral structure 100. Through the use of a stiffening frame the construction can, in principle, be placed solitarily on a base, with the bottom surface being optionally anchored. In principle, a further fixation, for instance by securing the integral unit at different heights to an external construction, is superfluous then. Consequently, the lift apparatus 1 is flexibly deployable, at various locations, and to a large extent independently of existing infrastructure. Moreover, the apparatus is very promptly deployable after placement of the structure 100 because external coupling to the site can, in principle, be omitted.

[0023] The movable lift apparatus 1 can be transported via a transport means such as a truck for container transport, a flatbed trailer, a train or a ship.

[0024] It is further noted that the integral structure 100 may be designed not only to be substantially block-shaped, but also otherwise, for instance with inwardly curved surfaces between the ribs of the unit.

[0025] Figure 2 shows a schematic perspective view of the lift cage 3, movable via guiding means, in the lift shaft of the movable lift apparatus 1 of Fig. 1. The lift cage 3 has a substantially block-shaped exterior with a top 31, a bottom 32 and four vertical side walls 33-36 interconnected via lying and upright side edges 37-40. The lift cage is further provided with runners 21-27 which, during use, roll over the guiding means to allow the cage to be moved in a controlled manner. In the embodiment shown, the runners 21-27 are clustered on the corners of the lift cage 3. The guiding means comprise four guiding profiles 11-14 adjacent the upright side edges 37-40 of the lift cage 3, such that runners 21-27 at corners of an upright side edge 37-40 roll over a corresponding guiding profile 11-14. Each guiding profile 11-14 thus forms roller paths for runners disposed at a corresponding side edge 37-40 of the lift cage 3. Also, the lift cage 3 is provided with blocking means 41 for, in a blocked position, blockingly engaging the guiding means to block movement of the lift cage 3 along the guiding means. The blocking means thus function as locking means for locking the position of the lift cage in a direction along the guiding means 11, for instance during transport of the movable lift apparatus 1.

[0026] Figure 3 shows a schematic perspective detailed view of blocking means 41 of the lift cage 3 of Fig. 2. A guiding profile 11 cooperates with a cluster of runners 21a,b,c at a top corner of the lift cage 3. The runners 21a, b,c form a set of closely placed runners 21a,b,c with partly different orientation, which roll over different roller paths 11b,c,d on the guiding profile 11. In the embodiment shown, a leg 11a of the guiding profile 11 is clamped between treads of a first and second runner 21a,b, while a third runner 21c rolls against an end face of the guiding profile leg 11a.

[0027] In the embodiment shown, the blocking means for, in a blocked position, blockingly engaging the guiding means 11-14 comprise a pin mechanism 41, 42 whereby the pin 41 is adjustable between a retracted position in which the pin 41 lies clear of the guiding means 11 and a projecting position in which the pin 41 clampingly engages the guiding means 11. In the embodiment shown, the pin 41 is configured as a bolt extending through a

sleeve of a frame element 42 and is provided with nuts 43a,b to fix the pin 41 in a desired axial position with respect to the frame element 42. The frame element 42 is rigidly fastened to the lift cage 3. In the projecting position, the end of the pin 41 abuts against the guiding profile 11 and thereby blocks a movement of the lift cage 3 along the guiding profile 11, in other words, locks a position of the lift cage 3 along the guiding profile 11. Generally, the frame element may carry not only the pin element 41 but also one or a plurality of runners 21 of a cluster of runners. In the embodiment shown, the frame element 42, at least, carries one of the runners 21b and the pin 41. Further, the pin 41 and the runner 21b are disposed next to each other such that in the projecting position the pin 41 engages the same roller path 11d of the guiding profile as that on which the runner 21b rolls during regular use.

[0028] In the embodiment shown, the pin is steplessly adjustable between the retracted position and the projecting position. In principle, the pin can be fixed in any intermediate position between the retracted and the projecting position. Alternatively, the pin can only be secured in the retracted and the projecting position. Further, the pin mechanism may be configured in yet another manner, for instance by providing the sleeve of the frame element 42 with internal thread for cooperation with the thread of the bolt.

[0029] When the pin 41 is in the projecting position, against the guiding profile 11, the runner 21b, which abuts against the guiding profile 11 on the same side and during regular use rolls on the roller path 11d on that same profile side, is relieved. This is because at least a part of the forces exerted from the lift cage 3 on the respective runner 21b is then transmitted via the frame element 42 and the pin 41 to the guiding profile 11. The pin mechanism 41, 42 then forms a support, parallel to the respective runner 21b. In this manner, at least a part of the gravity exerted on the lift cage 3 during transport can be advantageously transmitted to the guiding profile 11, and the respective runner 21b is spared. Thus, one-sided wear on the tread and/or bearing of the respective runner 21b can be counteracted.

[0030] During operational use of the movable lift 1, the runners 21-27 experience hardly any gravity of the lift cage 3, if at all. This is because the lift cage 3 is then mainly or wholly carried by traction cables or other hoisting means. However, during transport of the movable lift 1, the integral structure may be in a tilted position, a transport position, whereby one of the sides, viz., one of the side surfaces 6-8, forms the bottom surface of the lift 1. In this tilted position, a relatively small number of runners carry the weight of the lift cage 3, and may thus be subject to undue wear. Bringing the lift cage 3 in a blocked, locked position by having the blocking means 41, 42 engage the guiding means 11 prevents the lift cage 3 undesirably moving along the guiding means 11 at any time, and the weight-bearing runners can be advantageously relieved at the same time. Preferably, the blocking means are located near the runner 21b which, in the transport position of the lift apparatus 1, bears at least a part of the weight of the lift cage 3. Thus, the blocking means blockingly engage the guiding means on a side that, in the transport position, is remote from the bottom side of the lift apparatus 1, in other words, on a side of the guiding profile on which is the roller path 11d of the, in transport position, upper runner 21b.

[0031] It is most preferred that the blocking means be brought into the blockade position before the movable lift apparatus 1 is tilted to a transport position. Conversely, it is most preferred that the blocking means be brought out of the blockade position after the lift apparatus 1 is brought from a tilted orientation, in which the lift is in the transport position, to the operative position.

[0032] It is noted that the blocking means can comprise a plurality of pin mechanisms as described above, for instance one pin mechanism per cluster of rollers on the corners of the lift cage 3.

[0033] The lift cage 3 as shown in Fig. 2 is furthermore provided with a riser-like safety board 51 disposed near the threshold (not shown) of an access opening (not shown) in the lift cage, which safety board is hingeable about an axis running substantially parallel to the threshold. To this end, the safety board has a hinge 52 which is mounted to the lift cage 3 adjacent the threshold. The safety board 51 is hingeable between a folded-in position S1 in which the safety board 51 substantially abuts against the bottom 32 or floor of the lift cage 3, and a folded-out position S2 in which the safety board 51 extends downward from the threshold.

[0034] The safety board 51, also called folding board, serves to make it possible to step out of the lift cage 3 safely. In the event of a malfunction, the lift cage 3 can be manually brought near the access door 10. Upon opening of the access door 10, it may be found that the level of the lift cage 3 does not fully coincide with the position of the access door 10 of the integral structure 100. If the floor of the lift cage 3 is higher than the threshold of the access door 10 in the integral structure, users of the lift cage 3 can still step out or climb out provided the height difference is not too great. In order to prevent the users, upon leaving the lift cage 3, ending up at the bottom of the integral structure 100, underneath the lift cage 3, which is obviously unwanted, the safety board 51 wholly or partly screens off the opening that may arise in the above-outlined situation between the threshold or floor 32 of the lift cage 3 on one side and the threshold of the access door 10 of the integral structure 100 on the other side.

[0035] During normal use of the lift apparatus, the safety board 51 has no function, since in that case, upon stepping into and out of the lift cage 3, the lift cage 3 is at the same level as the access door 10 of the integral structure 100. Practically speaking, there is no risk of users ending up under the lift cage 3 then.

[0036] By arranging the safety board 51 in a hinged manner, the safety board 51, during normal use of the

lift apparatus, can be in a folded-away position, then occupying only a small space. When the above described malfunction occurs, the safety board can be brought into a position in which the opening between the thresholds of lift cage 3 and integral structure 100 is at least partly screened off. Thus, during normal use, the lift cage 3 can descend practically to ground level. Digging operations for creating a trench, gulley or hole, under the integral structure 100, in which a fixed safety board of the lift cage 3 can be accommodated when the lift cage 3 is in the lowermost position, are therefore superfluous. Thus, a very small overall depth can be provided, so that placing the movable lift and making it ready for operation costs relatively little time.

[0037] It is noted that the safety board 51 is preferably hingeable between a horizontal position, under the lift cage 3, and a vertical position, hanging down. In principle, the angular position of the safety board may deviate from this in practice, for instance by use of other parts in, on or at the integral structure 100 of the movable lift unit.

[0038] The safety board 51 shown is telescopically adjustable between a slid-in position and a slid-out position. Thus, the height h of the safety board 51 may be adjusted as desired through mutual shifting of telescoping parts of the safety board, depending on the size of the opening between the thresholds mentioned. Naturally, the height of the safety board may also be adjustable otherwise, for instance, by use of mutually hinged parts. Also, the safety board 51 can have a fixed height.

[0039] It is noted that the safety board can be implemented not only in combination with the movable lift apparatus according to claim 1, but also, more generally, with a movable lift apparatus comprising a structure in which a lift shaft with guiding means is arranged, further comprising a lift cage which is movable in the lift shaft via the guiding means.

[0040] According to an aspect of the invention, a method is provided for making a movable lift apparatus according to claim 1 ready for transport, comprising, by means of the blocking means, blockingly engaging the guiding means to block movement of the lift cage along the guiding means.

[0041] According to another aspect of the invention, a method is provided for making a movable lift apparatus according to claim 1 ready for use, comprising the step of removing the blocking engagement of the guiding means by the blocking means to release movement of the lift cage along the guiding means.

[0042] The invention is not limited to the exemplary embodiments described here. Many variants are possible.

[0043] For instance, the runners can in principle be completely or partly replaced by a single or plurality of guiding elements, such as a guiding shoe, cooperating with the guiding means of the movable lift apparatus.

[0044] Such variants will be clear to the skilled person and are understood to fall within the scope of the invention as set forth in the following claims. Features are described as part of the same or separate embodiments. It is noted that the scope of protection of the invention can include embodiments with combinations of any or all of the described features.

Claims

1. A movable lift apparatus, comprising a structure in which a lift shaft with guiding means is arranged, further comprising a lift cage which is movable in the lift shaft via the guiding means, wherein the lift cage is provided with blocking means for, in a blocked position, blockingly engaging the guiding means to block movement of the lift cage along the guiding means.

2. The movable lift apparatus according to claim 1, wherein the blocking means comprise a pin mechanism, wherein the pin is adjustable between a retracted position in which the pin lies clear of the guiding means and a projecting position in which the pin clampingly engages the guiding means.

3. The movable lift apparatus according to claim 1 or 2, wherein the lift cage is provided with runners which roll over the guiding means during use.

4. The movable lift apparatus according to any one of the preceding claims, wherein the pin in the projecting position relieves at least one runner.

5. The movable lift apparatus according to any one of the preceding claims, wherein the guiding means comprise a plurality of guiding profiles which each cooperate with a set of mutually closely placed runners of the lift cage.

6. The movable lift apparatus according to claim 5, wherein the blocking means comprise a plurality of pin mechanisms which each engage a guiding profile near the set of mutually closely placed runners.

7. The movable lift apparatus according to any one of the preceding claims, wherein the dimensions of the outside contour of the integral unit substantially coincide with the dimensions of a standard container.

8. The movable lift apparatus according to any one of the preceding claims, wherein the blocking means are arranged to blockingly engage the guiding means on a side which, in a transport position of the lift apparatus, is remote from the bottom side of the lift apparatus.

9. The movable lift apparatus according to any one of the preceding claims, with a substantially block-shaped outside contour which, in an operative posi-

tion, has a bottom surface, a top surface and four side surfaces, and wherein the lift apparatus in a transport position is tilted such that one of the four side surfaces forms the bottom surface.

10. The movable lift apparatus according to any one of the preceding claims, wherein the blocking means when engaging the guiding means form a support parallel with respect to a runner.

11. The movable lift apparatus according to any one of the preceding claims, wherein the lift cage is provided with a safety board arranged near the threshold of an access opening in the lift cage, wherein the safety board is hingeable about an axis which runs substantially parallel to said threshold.

12. The movable lift apparatus according to claim 11, wherein the safety board is hingeable between a folded-in position in which the safety board substantially abuts against the floor of the lift cage, and a folded-out position in which the safety board extends downwards from the threshold.

13. The movable lift apparatus according to claim 11 or 12, wherein the safety board is telescopically adjustable between a slid-in position and a slid-out position.

14. A method for making a movable lift apparatus according to claim 1 ready for use, comprising removing the blocking engagement of the guiding means by the blocking means to release movement of the lift cage along the guiding means.

15. A method for making a movable lift apparatus according to claim 1 ready for transport, comprising, by means of the blocking means, blockingly engaging the guiding means to block movement of the lift cage along the guiding means.

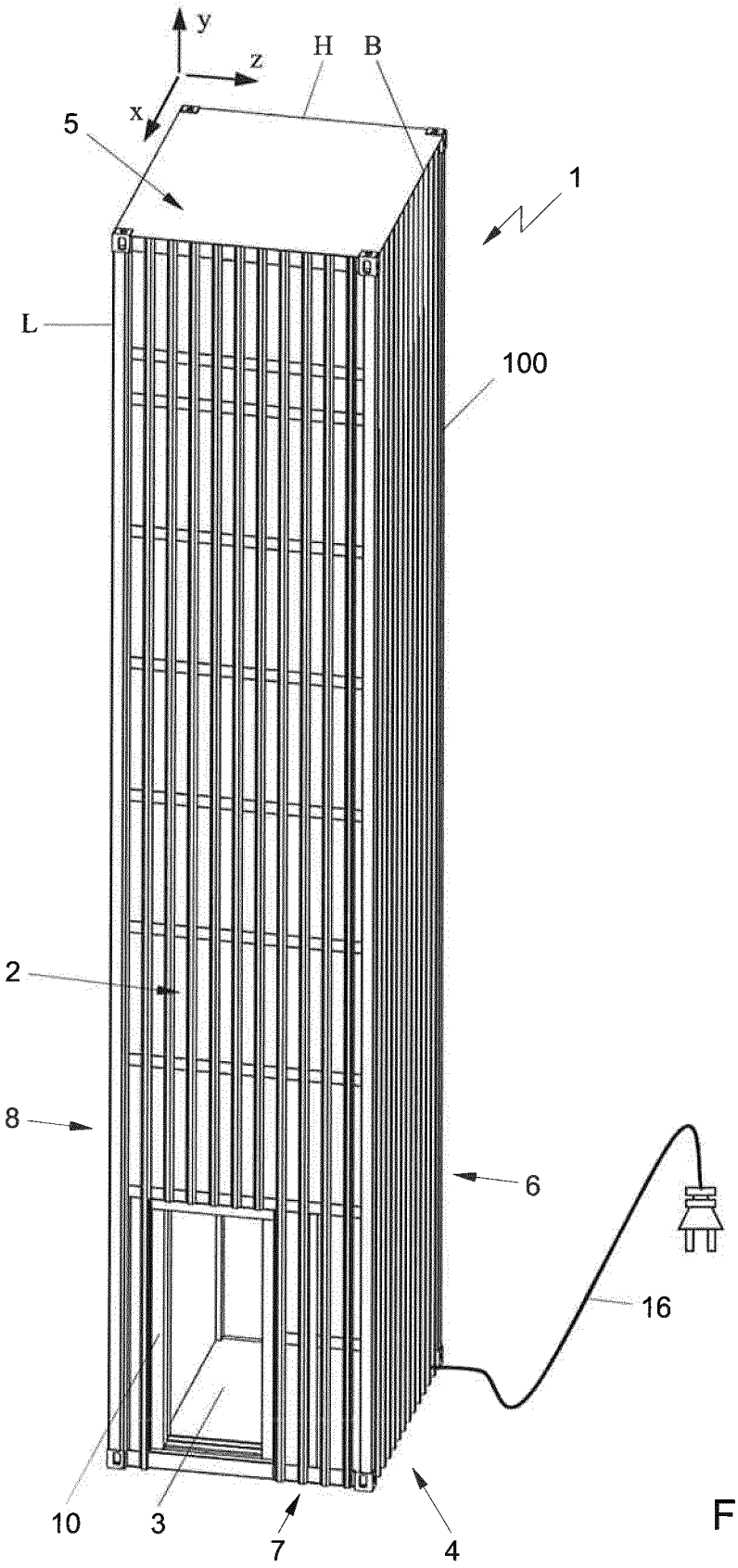

Fig. 1

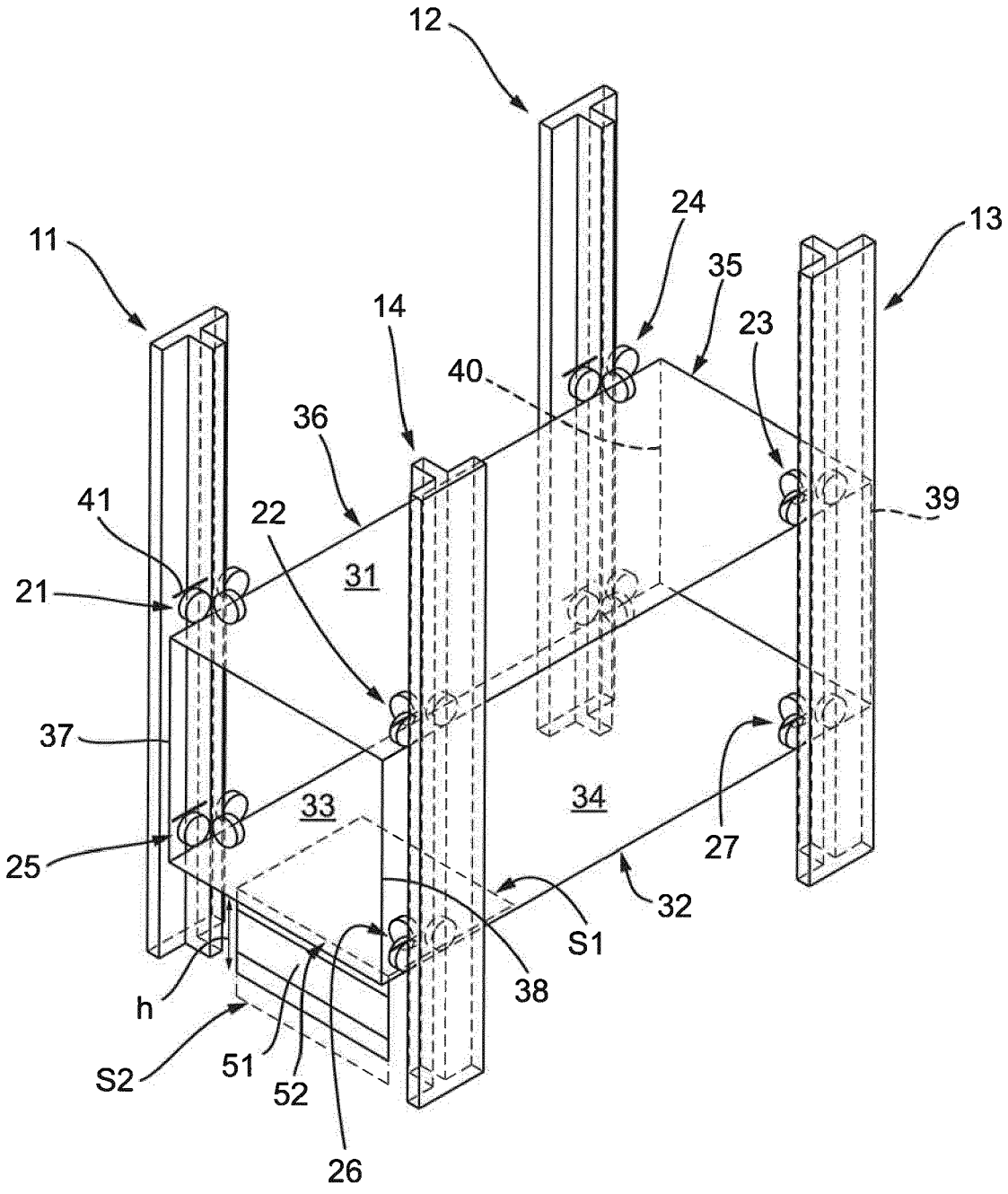
12
11
24
13
35
14
23
40
36
41
22
39
21
31
37
33
34
27
25
32
S1
38
h
S2
51
52
26

Fig. 2

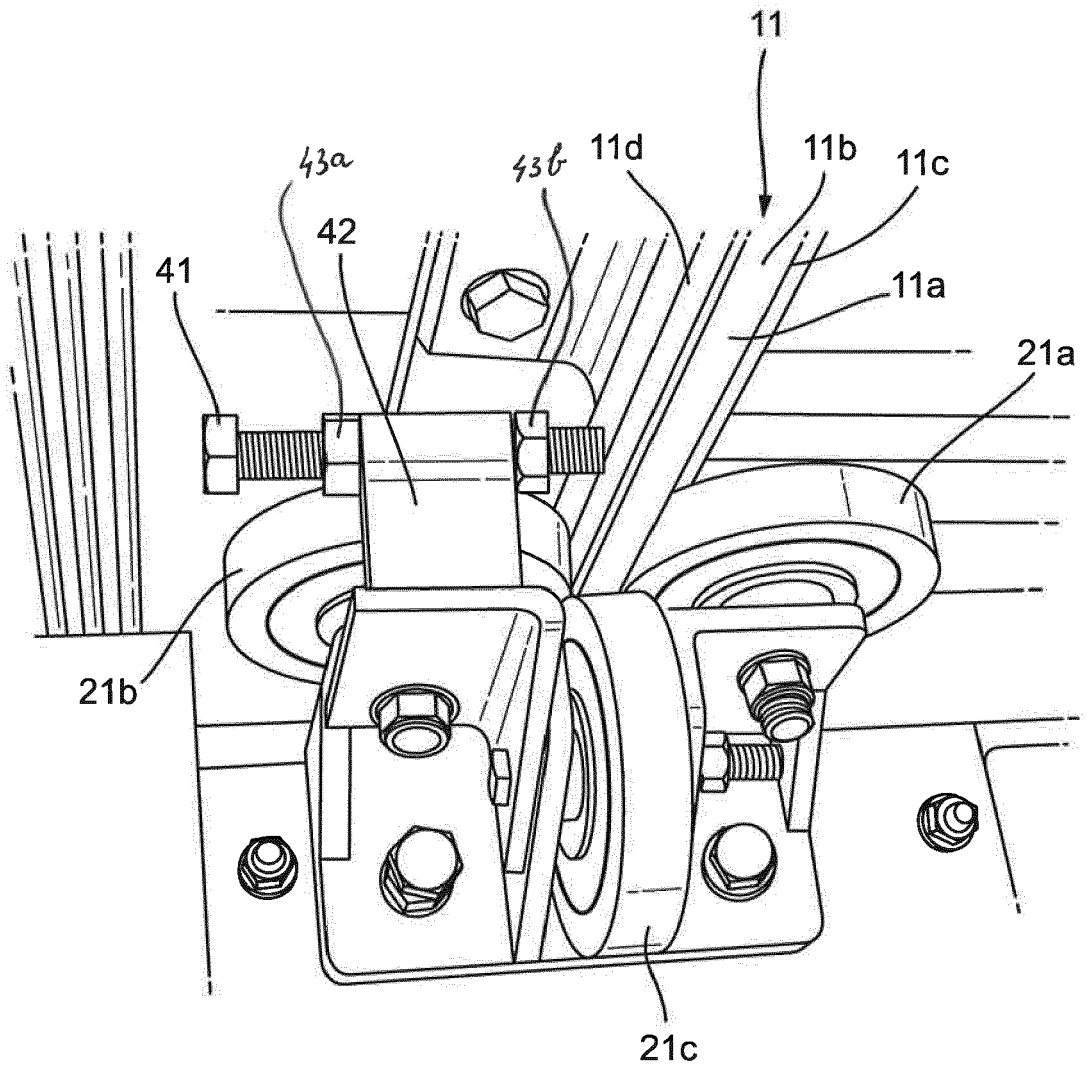

Fig. 3

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

- NL 2005305 **[0002]**