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- **König, Kathrin**  
**88316, Isny (DE)**
- **Klockow, Anne-Kristin**  
**88316, Isny (DE)**

(71) Applicant: **Invacare International Sàrl**  
**1196 Gland (CH)**

(74) Representative: **Ganguillet, Cyril**  
**ABREMA**  
**Agence Brevets & Marques Ganguillet**  
**Avenue du Théâtre 16**  
**P.O. Box 5027**  
**1002 Lausanne (CH)**

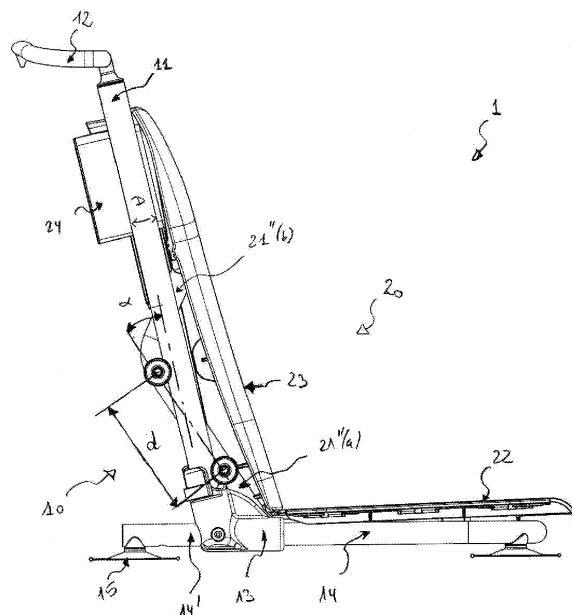
(72) Inventors:  
• **Kimmerle, Michael**  
**88299, Leutkirch (DE)**

(54) **Bath lift device**

(57) The invention concerns a bath lift device (1) for raising and lowering persons into or out of a bathtub comprising two independent parts that can be easily separated:

- a fixed part (10) including a chassis (11-14) adapted to rest, in use, on a floor of the bathtub, said chassis (11-14) comprising two tubular upright elements (11) parallel to each other, extending, in use, in a close to vertical direction,
- a movable part (20) including a seat frame (21) supporting a seat plate (22) and a backrest (23), said seat frame (21) being moveable upward and downward relative to the chassis (11-14) via a lifting means (24) and being slideably mounted onto said two upright elements (11),

characterized in that said moveable part (20) comprises two pairs of guiding rollers (25) rotatably connected to said seat frame (21), each pair being slideably mounted onto one upright element (11) and the guiding rollers (25) of each pair being disposed, in use, on opposite sides of said one upright element (11).



**FIG. 1**

## Description

### FIELD OF THE INVENTION

**[0001]** The present invention relates to a bath lift device for raising and lowering persons into or out of a bathtub, said device including a chassis adapted to rest, in use, on a floor of the bathtub and a slideably supported seat adapted to be movable between a raised position, in which the seat is correctly positioned to permit a person standing outside the bathtub to sit inside said seat, and a lowered position, in which said seat is positioned at the bottom of the bathtub.

### BACKGROUND OF THE INVENTION

**[0002]** Bath lift devices have been widely used for aged or disabled people as a convenient means for entering or leaving a bathtub. Generally, a conventional bath lift device comprises two main parts, a fixed part resting, in use, on a floor of the bathtub and a movable part including the seat.

**[0003]** However, in these conventional bath lift devices, these two parts are not independent. Thus, it is not possible to separate the movable part from the fixed part without doing some dismantling operations. Therefore, when one wants to clean the floor of the bathtub, one needs to take the bath lift device as a whole out of the bathtub. Considering that the conventional bath lift devices are often made in heavy material, this operation can only be done by a strong person.

**[0004]** One solution to this problem consists in rendering independent the movable part from the fixed part. Thus, in this solution, one needs only to take the movable part out of the bathtub if one wants to have easily access to the floor. Such a solution can be found for instance in the international patent application WO 2005/065621. The bath lift device, revealed by this prior art, uses a pair of guide pillars extending from the chassis onto which is slideably mountable a seat having a backrest from the rear of which extend a pair of guide collars dimensioned to be received on the guide pillars. Thus, the seat can be raised relative to the chassis till the guide collars are disconnected from the guide pillars. However, in this solution, the friction between the guide pillars and the guide collars interferes with the raising or lowering movement of the seat. Moreover, this two-points connection between the seat and the chassis is insufficient to provide a stable position of the seat. Indeed, this connection allows the seat to slightly tilt backwards and forwards or slightly pivot on the left and on the right with regard to its initial position. This results in an uncomfortable sitting position for the user. Finally, with this two-points connection, there is a higher risk that a breaking of the guide pillars or of the guide collars occurs when an heavy person sits inside the seat.

**[0005]** The aim of the present invention is therefore to provide a bath lift device in which the fixed part and the

movable part can be easily separated, in which the movable part can be easily raised or lowered relative to the fixed part, in which the sitting position of the user is stable and in which the probability of a break of the elements constituting the bath lift device is low.

**[0006]** A further aim of the present invention is also to provide a bath lift device easy and cheap to manufacture and lightweight.

### SUMMARY OF THE INVENTION

**[0007]** In this view the present invention is concerned with a bath lift device as claimed in claim 1.

**[0008]** Important features of the device are defined in the dependent claims.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0009]** Other features and advantages of the present invention will appear more clearly from the detailed description of embodiments of the invention which are presented solely by way of a non-restricted example and illustrated by the attached drawings in which:

Figure 1 is a side view of a first embodiment of a bath lift device according to the invention;

Figure 2 is a perspective view of the fixed part of the bath lift device of Figure 1;

Figure 3 is a perspective view of the movable part of the bath lift device of Figure 1, in which the seat plate is disconnected from the seat frame;

Figure 4 is a perspective view of the lateral element used in the bath lift device of Figure 1;

Figure 5 is a perspective view in detail of a suction cup used in the bath lift device of Figure 1.

Figure 6 is a perspective bottom view of a clamping ring used in the bath lift device of Figure 1.

### DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

**[0010]** In reference to Figures 1 to 3, a bath lift device according the present invention is shown.

**[0011]** The bath lift device 1 of the present invention mainly includes a fixed part 10 including a chassis 11-14 adapted to rest, in use, on a floor of the bathtub and a moveable part 20 including a seat frame 21 supporting a seat plate 22 and a backrest 23, said seat frame 21 being moveable upward and downward relative to the chassis 11-14 via a lifting means 24.

**[0012]** In reference to Figure 2, one can see that the chassis 11-14 comprises two tubular upright elements 11 parallel to each other and extending, in use, in an approximately vertical direction. Said upright elements 11 are connected to their lower ends to a U-shaped element 14 via two connecting elements 13, said U-shaped element 14 extending, in use, in an approximately horizontal direction. To prevent a tilt back of the chassis

11-14, each connecting element 13 is advantageously connected to said U-shaped element 14 so as to be positioned between an end section 14' of said U-shaped element 14 and the rest of said U-shaped element 14. Of course, in an alternative embodiment of the present invention, each connecting element 13 could be connected at one end of said U-shaped element 14, an additional tubular element being connected to said connecting element 13 so as to form the end section 14' of Figure 2. To improve the stability of the chassis 11-14, said connecting elements 13 are joined by a lateral rod 13' extending between the two lateral flanges of the U-shaped element 14. To improve the stability of the chassis 11-14, said upright elements 11 are also joined at their upper ends by a lateral element 12. As shown in Figure 4, said lateral element 12 consists in a curved tubular element 31 connected at its ends 32 to the two upper ends of the upright elements 11. Said curved element 31 is shaped so as to define an upper open area 33, delimited by the internal borders 34 of the curved element 31 and by the segment 35 joining said ends 32 in the plane defined the curved element 31. Said open area 33 is configured so that the movable part 20 can be slid upward through said open area 33 when the user wants to separate the movable part 20 from the fixed part 10. In addition, to temporarily connect the fixed part 10 to the floor of the bathtub, suction cup 15 are disposed underneath the chassis 11-14. As shown in Figure 5, each suction cup 15 comprises a central section 16 fixedly connected to the U-shaped element 14 at its upper face, said section 16 having on its underface a concavity which acts as a sucker for temporarily connect said cup 15 to the floor of the bathtub. Each suction foot 15 comprises also at least one, but preferably two, peelable release tab 17 externally extending from the periphery of the central section 16, said tab 17 releasing the suction between the suction cup 15 and the floor of the bathtub when its free end 18 is raised. In the embodiment illustrated in Figure 5, said tab 17 is equipped with a tubular section 18 at its free end. This tubular section 18 is configured so as to be entirely introduced inside a hole 19 formed in the underneath face of the U-shaped element 14 when the tab 17 is elastically twisted so as to align the longitudinal axis of said tubular section 18 with the longitudinal axis of the upright elements 11. Said tubular section 18 is also configured so as to be temporarily connected to said U-shaped element 14 when its longitudinal axis is perpendicular to the longitudinal axis of the upright elements 11. To get this result, one solution consists in configuring said tubular section 18 so that its length is greater than the diameter of said hole 19. Thus, when the user wants to disconnect the chassis 11-14 from the floor of the bathtub, he needs beforehand to release the suction between suction feet 15 and the floor of the bathtub. Accordingly, he has to manually raise the free end of the tabs 17 of two suction feet 15 positioned at one extremity of U-shaped element 14 so as to release the suction between said suction feet 15 and the floor of the bathtub and,

afterwards, if the tabs 17 of the suction feet 15 positioned at the other extremity are correctly connected to said U-shaped element 14, he only needs to lift up the U-shaped element 14 from the side which is already disconnected from the floor of the bathtub so that said tab 17 is raised and the suction between said corresponding feet 15 and the floor of the bathtub is released.

**[0013]** In reference to Figure 3, one can see that the moveable part 20 comprises a seat frame 21 formed by a first part 21', extending, in use, in an approximately horizontal direction, and by a second part 21'', extending, in use, in an approximately vertical direction, said first part 21' supporting the seat plate 22 and said second part 21'' supporting the backrest 23. Said first part 21' is configured as a U-shaped element and said second part 21'' is configured as a pair of parallel upright elements fixedly connected at their lower ends to the U-shaped element. As best seen in Figure 1, each upright element 21'' is advantageously formed by a lower longitudinal section 21''(a) and an upper longitudinal section 21''(b), said sections 21''(a) and 21''(b) defining an approximately triangular form with the backrest 23. Said seat frame 21 is movable upward and downward relative to the chassis 11-14 via a lifting means 24 arranged on the rear of the backrest 23. To control the sliding displacement of said seat frame 21 relative to the chassis 11-14, the moveable part 20 comprises also two pairs of guiding rollers 25 rotatably connected to the upright elements 21'' of said seat frame 21, each pair being slideably mounted onto one upright element 11 of the chassis 11-14 and the guiding rollers 25 of each pair being disposed, in use, on opposite sides of said one upright element 11. In the preferred embodiment illustrated in Figure 1, the guiding rollers 25 of each pair are advantageously positioned on the external lateral side of the lower section 21''(a) of one upright element 21'' such that the axes of rotation of said guiding rollers 25 are separated by a distance  $d$ , said distance  $d$  being greater than the diameter of the upright element 11, on which they are slideably mounted. Indeed, in this configuration, the angle  $\alpha$  between the plane containing said axes and the longitudinal axis defined by the upright element 11, on which they are slideably mounted, is, in use, different from  $90^\circ$ . Accordingly, this configuration defines a four-points connection between the moveable part 20 and the fixed part 10 which confers a more stable sitting position for the user compared to the two-points connection when  $\alpha$  is equal to  $90^\circ$ . Furthermore, the distance  $d$  will be advantageously chosen such that said angle  $\alpha$  is, in use, less than 45 degrees, and preferably less than 25 degrees. Indeed, by diminishing the angle  $\alpha$ , which corresponds to an increased distance  $d$ , it is easier for the user to install the moveable part 20 on the fixed part 10 when said moveable part 20 is initially separated from said fixed part 10. Accordingly, in a first step, the user positions the moveable part 20 relative to the fixed part 10 so that the angle  $\alpha$  is greater than its value when the bath lift device 1 is in use and, in a second step, he lowers the moveable part 20 so that

said moveable part 20 reaches a position limit and so that both upright elements 11 are continuously surrounded at two opposite sides by the guiding rollers 25 of each pair and, in a final step, he turns the moveable part 20 round so that the angle  $\alpha$  reaches its value when the bath lift device 1 is in use. Finally, to improve the sliding displacement of the seat frame 21, the upper rollers 25 of each pair, and respectively the lower rollers 25 of each pair, are advantageously joined by an axle 26 extending, in use, in an approximately horizontal direction.

**[0014]** In an alternative embodiment of the present invention, not illustrated on the drawings, it is also possible to use a seat frame 21 comprising upright elements 21" that are completely straight. In this case, one guiding roller 25 of each pair will be connected to one upright element 21" by a lateral connecting rod extending in a close to perpendicular direction with regard to said upright element 21".

**[0015]** The lifting means 24 used in the present invention will be configured so as to be lightweight and space-saving. Without to be bound by this specific solution, it will be advantageous to use a lifting means as described in the Canadian patent application CA 2 397 503. In particular, such a lifting means prevents that a body part of a bathing person is trapped when the seat plate is moving downward. Accordingly, the lifting means 24 includes an outer spindle 24' within which is received a linearly extendable inner spindle tube (not shown), said outer spindle tube 24' being fixedly connected to the seat frame 21 and said inner spindle tube being supported at its lower end 24" by the chassis 11-14. In particular, said lower end 24" can be shaped as a fork adapted to be connected to the lateral rod 13' of the chassis 11-14. Said inner spindle is linearly extendable via an actuating means (not shown) contained within a housing 29, said housing 29 being fixedly connected to the rear of the backrest 23. In the embodiment illustrated in Figure 3, the outer spindle tube 24' is connected to the axle 26 joining the lower rollers 25 of each pair. This connection is advantageously done by a clamping ring 27. In reference to Figure 6, said clamping ring 27 comprises a tubular section 40 inside which is received the outer spindle tube 24', said tubular section 40 comprising a radial aperture 41. At both sides of said radial aperture 41, the tubular section 40 is extended by two longitudinal sections 42, each section 42 comprising a pair of threaded holes 43 configured to join both sections 42 by two bolts (not shown). Of course, in an alternative embodiment of the present invention, it is also possible to use less or more sections 42 so as to adapt the internal diameter of the tubular section 40 to the external diameter of the outer spindle tube 24'. On the radially opposite side of the tubular section 40 with regard to said sections 42 extend two parallel flanges 44 from the periphery of said tubular section 40. Each flange 44 comprises a hole 45 adapted to receive the axle 26. Of course, in an alternative embodiment of the present invention, it is also possible to use only one flange, said flange being wider than said two parallel flanges 44 of

Figure 6. To improve the connection between the outer spindle tube 24' and the tubular section 40, said section 40 is advantageously formed by a first tubular section 46 and a second tubular section 47, said first section 46 having an internal diameter less than the internal diameter of said section 47. Said first section 46 is configured so as to be received inside a corresponding groove (not shown) of said outer spindle tube 24'. In a preferred embodiment of the present invention, the depth of said groove will be advantageously greater than the difference between the internal diameters of said second section 47 and said first section 46. Indeed, this configuration permits to transfer the efforts of the outer spindle tube 24' onto the internal surface of the second section 47, and, accordingly, onto a larger surface of the clamping ring 27 when said second section 47 is higher than said first section 46.

**[0016]** In reference to Figure 3, one can see that two extension plates 28 can be pivotally connected on both lateral ends of the seat plate 22, said extension plates 28 being configured so as to rest on the rim of the bathtub when the movable part 20 is positioned in a raised position so that the user can easily sit inside the bath lift device 1. Therefore, when said movable part 20 is lowered, said extension plates 28 are folded up so as to be positioned inside the bathtub.

**[0017]** In reference to Figure 3, it is also shown that the backrest 23 comprises at least one rib 23', and preferably two ribs at both left and right sides of said backrest 23, said rib 23' extending in a perpendicular direction with regard to the rear of the backrest 23 and being approximately aligned, in use, with one upright element 11 of the chassis 11-14. Said rib 23 is adapted to contact said upright element 11 when the movable part 20 is tilting backwards with regard to the fixed part 10. Such a situation can occur when the lower end 24" of the inner spindle tube of the lifting means 24 is no more supported by the chassis 11-14. Therefore, such a configuration improves the safety of the bath lift device 1 as a whole.

## Claims

1. Bath lift device (1) for raising and lowering persons into or out of a bathtub comprising two independent parts that can be easily separated:
  - a fixed part (10) including a chassis (11-14) adapted to rest, in use, on a floor of the bathtub, said chassis (11-14) comprising two tubular upright elements (11) parallel to each other, extending, in use, in a close to vertical direction,
  - a movable part (20) including a seat frame (21) supporting a seat plate (22) and a backrest (23), said seat frame (21) being moveable upward and downward relative to the chassis (11-14) via a lifting means (24) and being slideably mounted onto said two upright elements (11),

- characterized in that** said moveable part (20) comprises two pairs of guiding rollers (25) rotatably connected to said seat frame (21), each pair being slideably mounted onto one upright element (11) and the guiding rollers (25) of each pair being disposed, in use, on opposite sides of said one upright element (11).
2. Bath lift device (1) according to claim 1, wherein the distance (d) separating the axes of the guiding rollers (25) of each pair is greater than the diameter of the upright element (11), on which they are slideably mounted.
  3. Bath lift device (1) according to any one of the preceding claims, wherein the distance (d) separating the axes of rotation of the guiding rollers (25) of each pair is chosen such that the angle ( $\alpha$ ) between the plane containing said axes and the longitudinal axis of the upright element (11), onto which they are slideably mounted, is, in use, less than 45 degrees, and preferably less than 25 degrees.
  4. Bath lift device (1) according to any one of the preceding claims, wherein the two upright elements (11) are joined by a lateral element (12).
  5. Bath lift device (1) according to claim 4, wherein the lateral element (12) is configured so as to permit the easy separation of the moveable part (20) from the fixed part (10) when the seat frame (21) is moved upward.
  6. Bath lift device (1) according to claim 5, wherein the lateral element (12) consists in a curved tubular element (31) connected at its ends (32) to the two upper ends of the upright elements (11), said tubular element (31) being shaped so as to define an upper open area (33) permitting the sliding upward displacement of the moveable part (20).
  7. Bath lift device (1) according to any one of the preceding claims, wherein the lifting means (24) includes an outer spindle tube (24') within which is received a linearly extendable inner spindle tube, said outer spindle tube (24') being fixedly connected to the seat frame (21) and said inner spindle tube being supported at its lower end (24'') by the chassis (13').
  8. Bath lift device (1) according to claim 7, wherein the inner spindle tube is linearly extendable via an actuating means contained within a housing (29), said housing (29) being fixedly connected to the rear of the backrest (23).
  9. Bath lift device (1) according to any one of the preceding claims, wherein suction cup (15) are disposed underneath the chassis (14) so as to temporarily connect the fixed part (10) to the floor of the bathtub.
  10. Bath lift device (1) according to claim 9, wherein each suction cup (15) comprises a central section (16) fixedly connected to the chassis (14) at its upper face, said section (16) having on its underface a concavity which acts as a sucker for temporarily connect said foot (15) to the floor of the bathtub.
  11. Bath lift device (1) according to claim 10, wherein each suction foot (15) comprises at least one peelable release tab (17) externally extending from the periphery of the central section (16), said tab (17) releasing the suction between the suction cup (15) and the floor of the bathtub when its free end (18) is raised.
  12. Bath lift device (1) according to claim 11, wherein said tab (17) includes a connecting means (18) at its free end, said connecting means (18) being configured so as to temporarily connect said tab (15) to the chassis (14).
  13. Bath lift device (1) according to claim 12, wherein at least one circular hole (19) is formed in the chassis (14), said hole (19) being configured to receive the connecting means (18) of said tab (15), said connecting means (18) consisting in a tubular section having a length greater than the diameter of said hole (19).
  14. Bath lift device (1) according to any one of the preceding claims, wherein the chassis (11-14) comprises a U-shaped element (14) extending, in use, in an approximately horizontal direction, said U-shaped element (14) being connected to the lower ends of the upright elements (11) via two connecting elements (13).

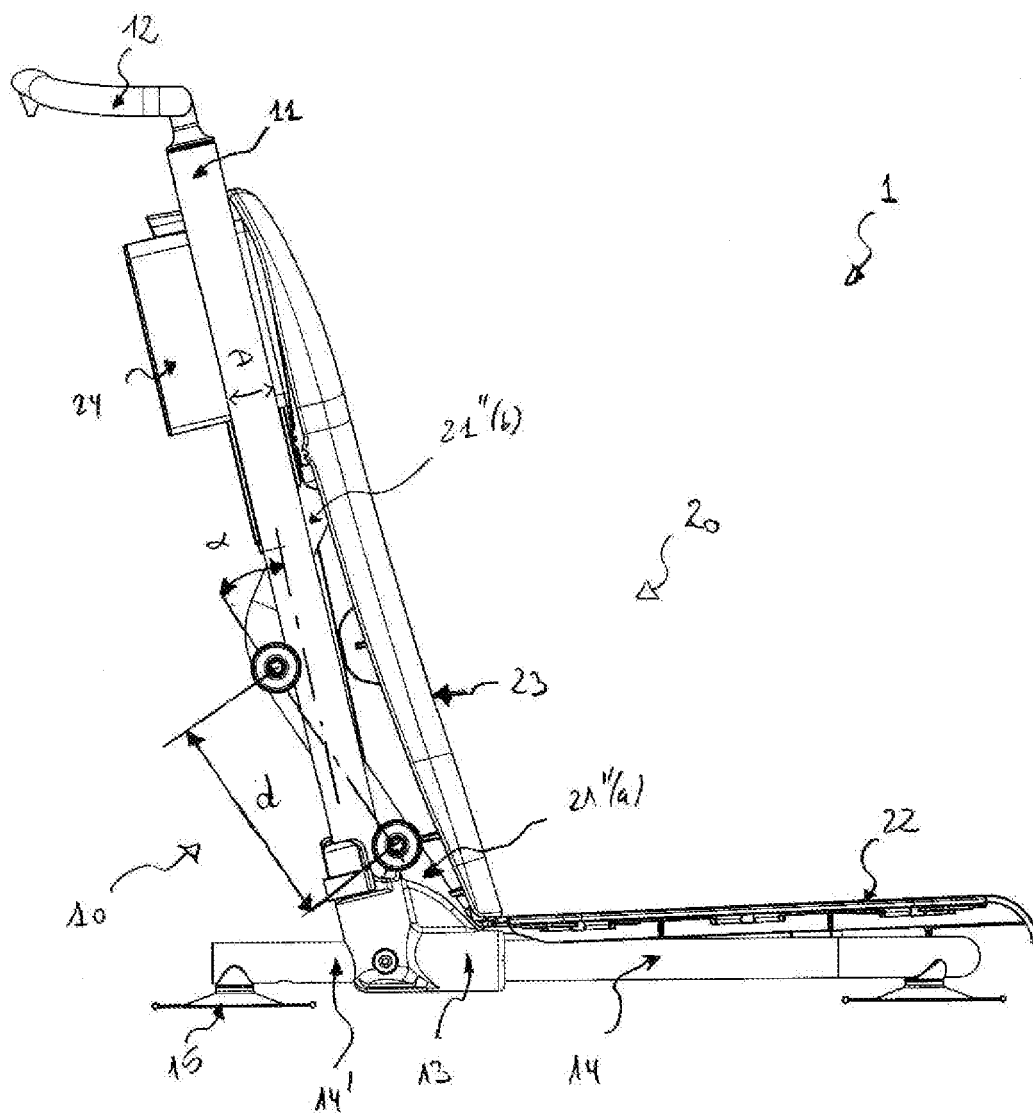


FIG. 1

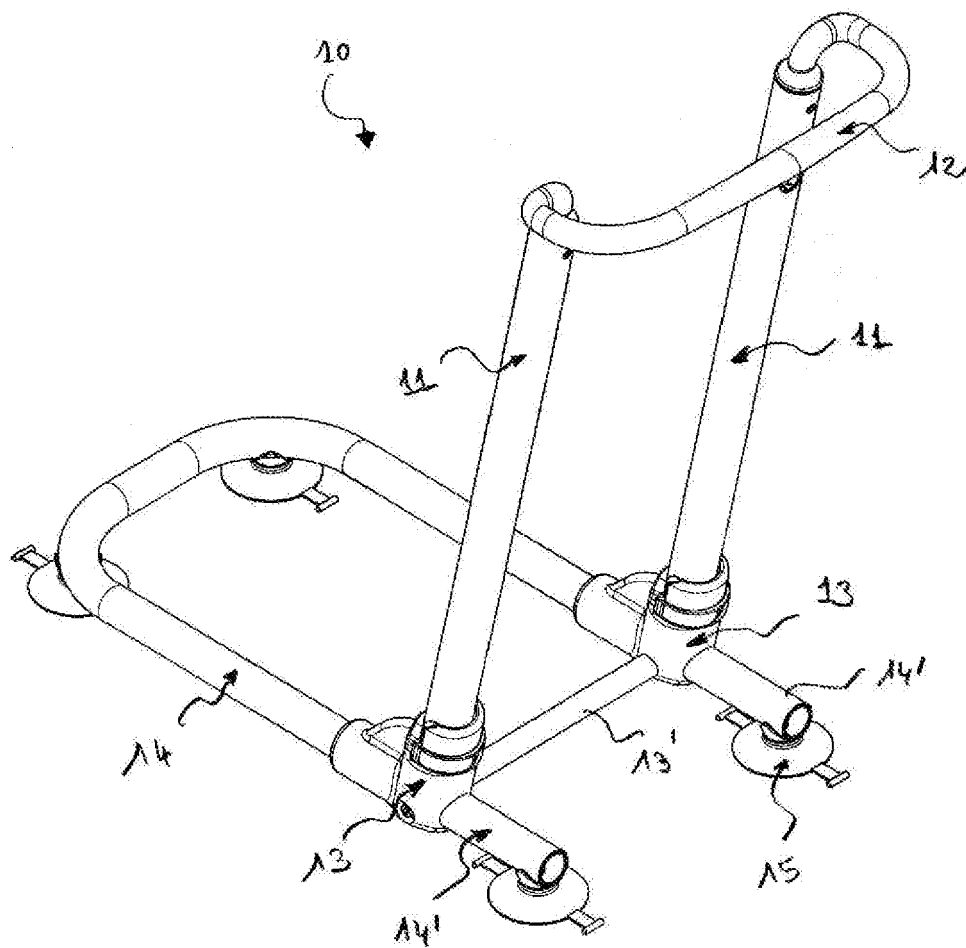


FIG. 2

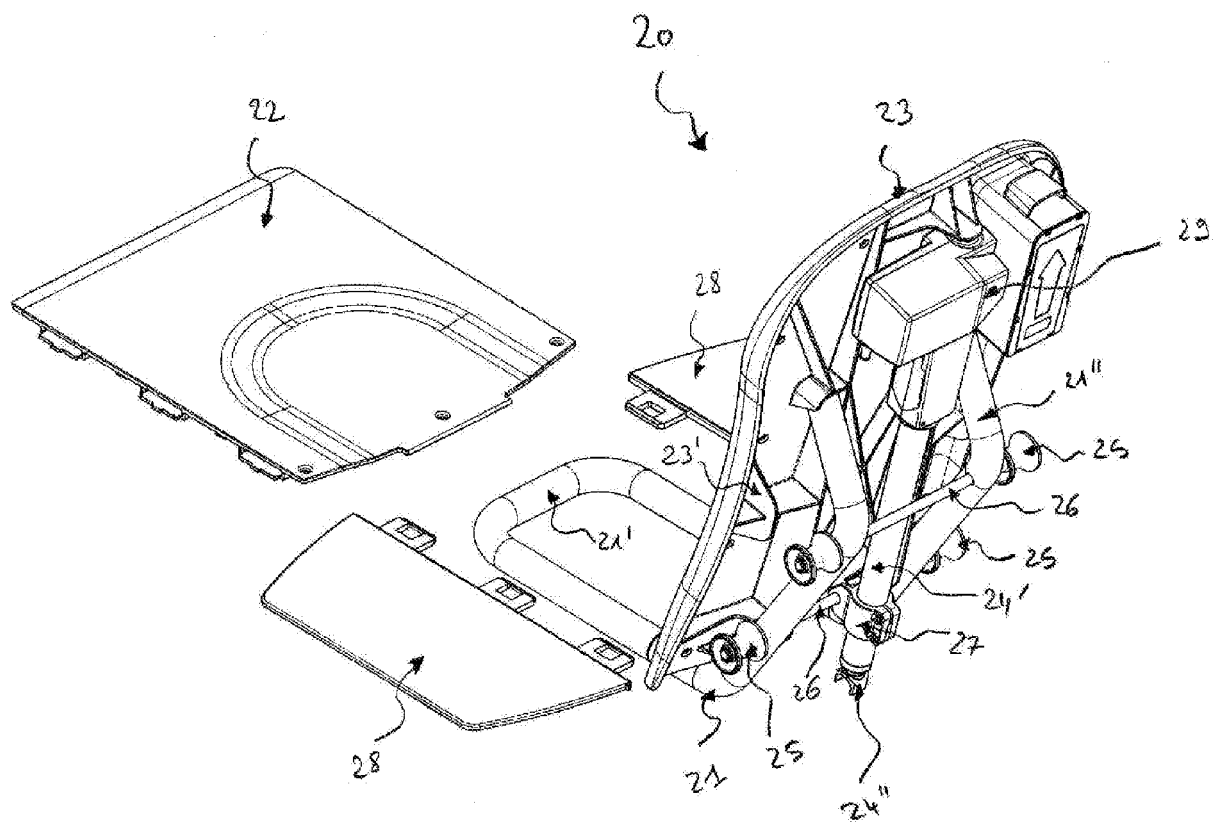


FIG. 3

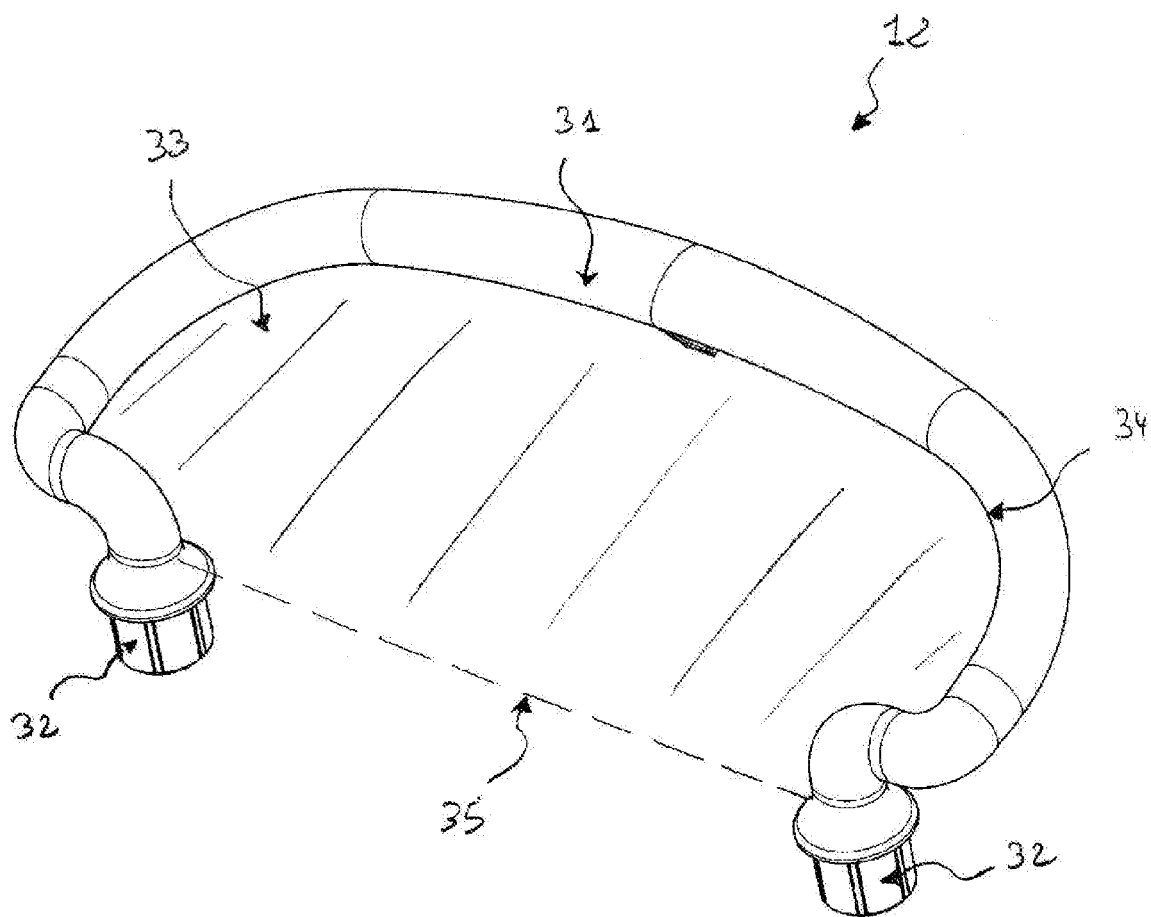


FIG. 4

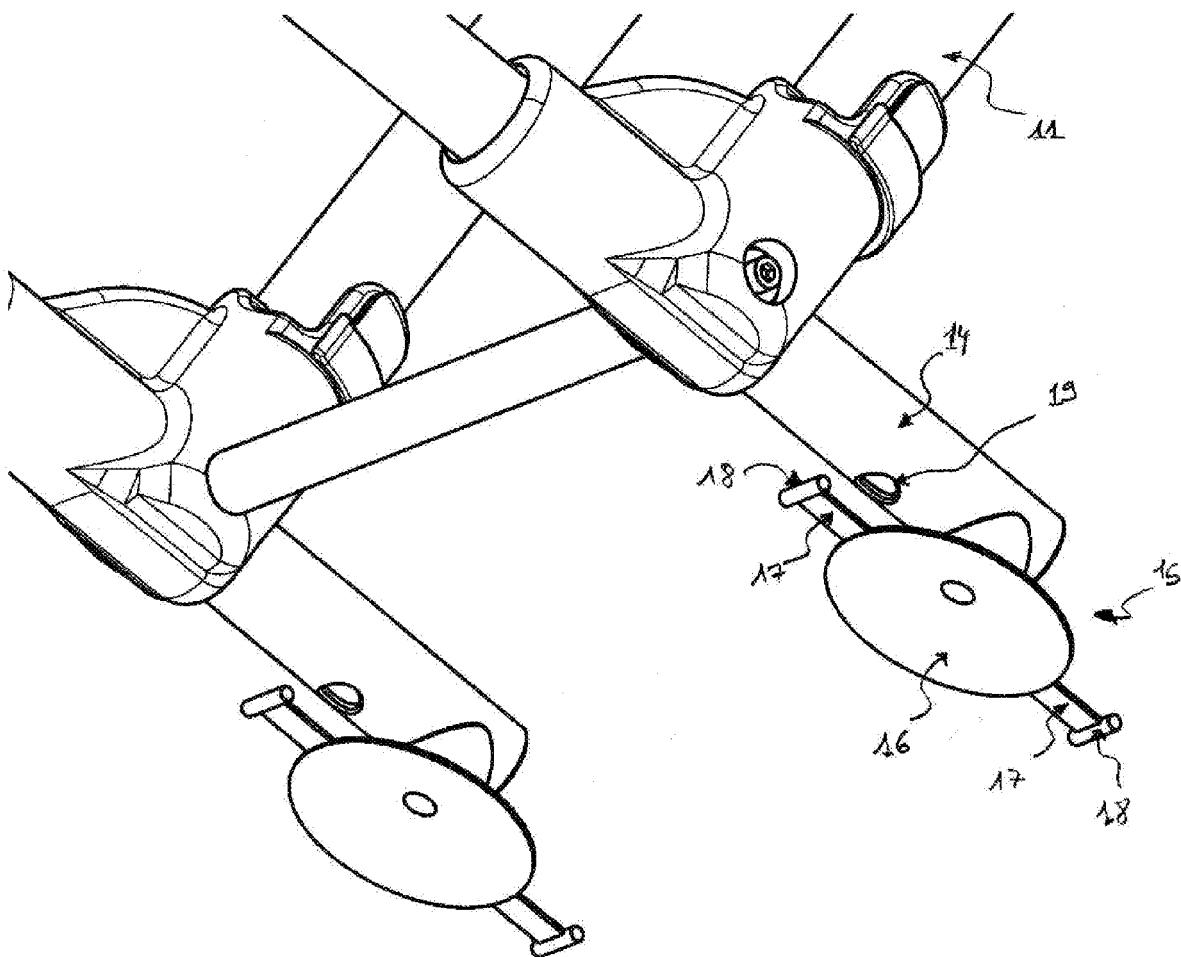


FIG. 5

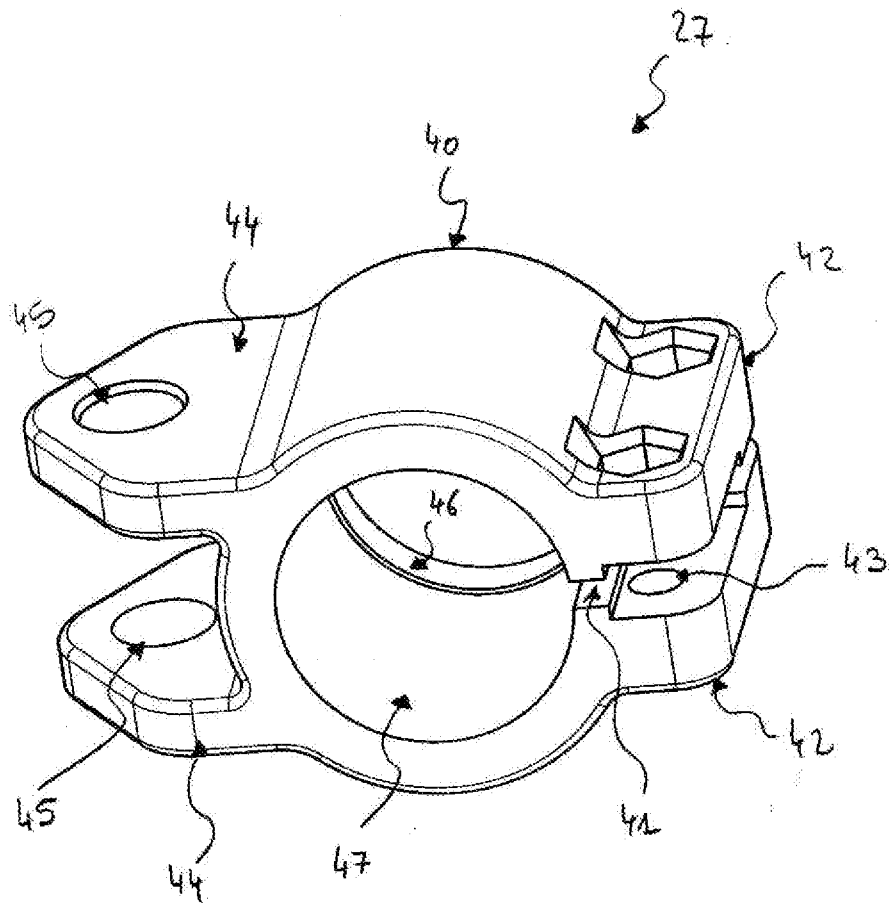


FIG. 6



## EUROPEAN SEARCH REPORT

Application Number  
EP 10 15 3361

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                            |                                  |                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Citation of document with indication, where appropriate, of relevant passages                                                                              | Relevant to claim                | CLASSIFICATION OF THE APPLICATION (IPC) |
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| <del>The present search report has been drawn up for all claims</del>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                            |                                  | TECHNICAL FIELDS SEARCHED (IPC)         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                            |                                  | A61G                                    |
| Place of search                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                            | Date of completion of the search | Examiner                                |
| The Hague                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                            | 19 July 2010                     | Birlanga Pérez, J                       |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons<br/>&amp; : member of the same patent family, corresponding document</p> |                                                                                                                                                            |                                  |                                         |

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EPO FORM 1503.03.82 (P04C01)



Application Number

EP 10 15 3361

**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

2-8, 14(completely); 1(partially)

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION  
SHEET B**

Application Number  
EP 10 15 3361

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 2-8, 14(completely); 1(partially)

Bath lift device including a fixed part with a chassis including two tubular upright elements and a movable part comprising two pair of guiding rollers, said upright elements joined by a lateral element.  
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2. claims: 9-13(completely); 1(partially)

Bath lift device including a fixed part with a chassis including two tubular upright elements and a movable part comprising two pair of guiding roller and suction cups underneath the chassis.  
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 15 3361

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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19-07-2010

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**REFERENCES CITED IN THE DESCRIPTION**

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