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(54) **Title:** HEIGHT-ADJUSTABLE TOILET SEAT

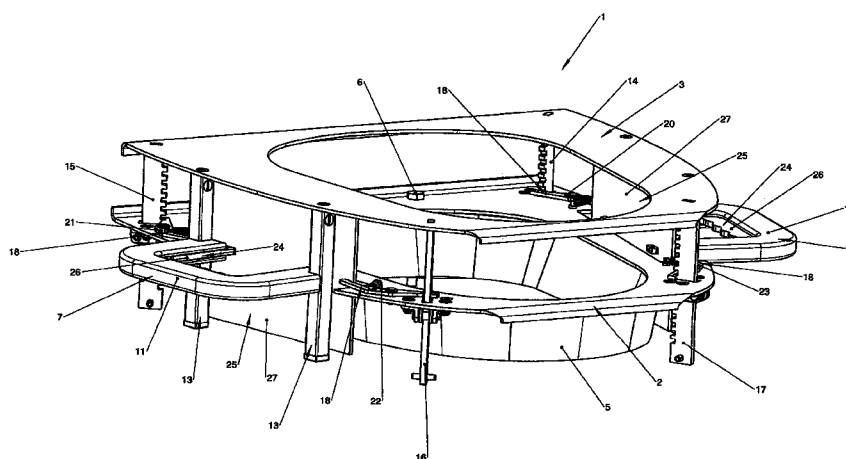


FIG. 3

(57) **Abstract:** Height-adjustable toilet seat (1), for attachment to a toilet bowl, comprised of at least one first part (2) and at least one second part (3), which are arranged to be adjustable in distance from each other via at least one height adjusting device (4), also including at least one operating device (7) that is comprised of at least one handle (11) to which at least one first control member (24) is arranged together with at least one second control member (25) and at least one handle bracket (13). The second control member (25) is comprised of at least one disc-shaped part (27) which in the first operating device (7) affects the first locking member (20) and the fourth locking member (23) and in the second operating device (7) affects the second locking member (21) and the third locking member (22), where each locking member (20-23) springs back to a locked position relative to the gear racks (14-17) when they are not affected by any of the disc-shaped parts (27).



Height-adjustable Toilet Seat

Field of the Invention

The present patent application concerns a height adjustable toilet seat in accordance with the claims.

5 Background of the Invention

The use of ordinary toilet seats gives rise to several problems. One of the problems with existing toilet seats is that their height may not be adjusted according to the user's body length and other physical conditions. Especially tall people may have problems using toilet seats whose seat height is for example adapted to the average height of the general population.

10 Even people with physical disabilities experience problems with seats on toilet bowls whose seat height is not adjustable. It may be difficult for example for certain disabled people to be able to sit down on the toilet seat of existing toilets that are not height-adjustable. It may also for example be difficult for certain disabled persons to get up (stand up) from the toilet seat of existing toilets that are not height-adjustable. A further problem with unintentional spillage on
15 the floor often occurs when a toilet is used as a urinal. A height-adjustable toilet seat that may be raised to a height that prevents spillage on the floor would in this situation be preferable.

In order to solve the above mentioned problems, height-adjustable toilets and toilet seats have been developed. The problem here is that most of these are electrically, pneumatically, or hydraulically operated/powered. The electrically, pneumatically or hydraulically operated
20 adjustment devices require that some sort of feed be drawn to the toilet, which in turn usually requires extensive installations. Electrical wiring in wet areas, for example, is most often associated with stringent safety requirements compared with wiring elsewhere.

One way to solve the problems of electrically, pneumatically or hydraulically powered height-adjusting devices is to make the seat manually adjustable. Even though manually operated
25 height-adjustable toilet seats and toilets have previously been developed, there still exists the problem that the adjustment of the height of the toilet seat is not quickly and easily performed. Existing designs of manually operated height-adjustable toilet seats have the problem that it takes a relatively long time to maneuver them between different seat heights. Furthermore these seats do not take into account that toilets are also used as urinals and
30 therefore they are not provided with the ability to reach such a height that they prevent

spillage in conjunction with standing urination. With manually operated designs, there also exists the problem of physically weak persons manually conveying power to a height-adjustable function. Many manually operated height-adjustable toilet seats may also be difficult or time consuming to install for the layman and even for professionals.

- 5 Recent medical research has shown that a forward leaning sitting position when urinating facilitates a complete or essentially a complete emptying of the bladder which has shown to be beneficial from a health standpoint. This is problematic because current toilet seats whether they are height-adjustable or not, are not designed to incline which would in turn allow a forward leaning sitting position.
- 10 In connection with the use of height-adjustable toilet seats, there exist problems with splatter (splashback) associated with urination and loose stools (diarrhea). Existing designs do not solve this problem fully and therefore have problems with hygiene. There is a need for a type of splashguard for height-adjustable toilet seats that is more suited to the raising and lowering function. There exists a need of a splashguard variant where it is possible to raise the seat to a
- 15 height that prevents spillage (splatter) of urine on the floor during standing urination. There also exists a need of improved height-adjustability for toilet seats.

Description of the Related Art

- Several variations of height-adjustable toilets and toilet seats have been developed in order to eliminate the above mentioned problems. For example, US5996133 describes a variant of
- 20 height-adjustable toilet seat whose height adjustment takes place by means of an expandable body. The height of the expandable body changes by the level of pressurization in the expandable body. This design differs to a significant extent from the design in accordance with the present patent application. For example, this design requires that pressurized air is available at the toilet bowl to pressurize the expandable body.
- 25 US6775858 describes a variant of a height-adjustable toilet. The height adjustment of the seat is accomplished by pressure cylinders or by mechanical means. Thus this design differs to a significant extent from the design in accordance with the present patent application. For example, the design, according to one embodiment requires that a source of a pressurized liquid is made available at the toilet seat. In the alternative embodiment, where the seat's
- 30 height is operated by mechanical means, the design lacks a lever to be used for adjustment of the seat's height.

Even US4168552 describes a variant of a toilet seat which comprises a function with which the toilet seat may be raised or lowered. This design differs to a significant extent from the design in accordance with the present patent application. For example, this design requires electrical energy to accomplish the height adjustment of the seat's height.

- 5 Even US3971077 describes a variant of a toilet seat which comprises a function with which the height (level) of the toilet seat may be raised or lowered. The design may be operated by hand. The design may only however be operated between a first and second position. The design does therefore not allow for multiple or non-incremental adjustment of seat height to occur. Thus this design differs to a significant extent from the design in accordance with the
10 present patent application.

These height-adjustable designs solve some but not all of the problems that are present. If the sitting height of a toilet seat is able to be adjusted according to the user's needs, essentially all of the above mentioned problems will either be minimized or even eliminated.

Brief Description of the Purpose

- 15 The main purpose of the present patent application is to create an improved height-adjustable toilet seat in relation to previously known designs. Another purpose of the present patent application is to create a height-adjustable toilet seat which is operated solely by hand. A further purpose of the present patent application is to create a height-adjustable toilet seat which may be adjusted to each user's individual need for height-adjustment. A still further
20 purpose of the present patent application is to create a height-adjustable toilet seat that is much more cost effective to both manufacture and install. A yet further purpose of the present patent application is to create a toilet seat that may be raised so that it may be utilized as a urinal and thereby prevent spillage of urine on the floor during standing urination.

Brief Description of the Drawings

- 25 In the following detailed description of the present invention, reference and references to the following figures will occur. Each figure is briefly described in the following figure list. The designs shown in the figures are exemplifying embodiments of the invention in accordance with the present patent application. Note that the figures are schematic and details may thus be omitted in these. The exemplifying embodiments of the invention are thus not limiting for
30 the scope of protection of the present patent application.

Fig. 1 shows a first embodiment of the present invention seen in perspective obliquely from above.

Fig. 2 and 3 show the first embodiment of the height-adjustable toilet seat without a housing.

Fig. 4A to 4C show the function of the control members in accordance with the first
5 embodiment.

Fig. 5A and 5B show the locking function, in accordance with the first embodiment, seen from above in a locked and released position respectively.

Fig. 6 and 7 show an alternate embodiment of the height-adjustable toilet seat.

Detailed Description of the Invention

10 With reference to the figures, a height-adjustable toilet seat 1 in accordance with the present invention is shown. The toilet seat 1 is comprised of at least one first part 2 and at least one second part 3 whose mutual distance is adjustably arranged via at least one height adjusting device 4.

The toilet seat 1 is further comprised of at least one connection device, with which the toilet
15 seat 1 is intended to be connected to a toilet bowl's rim 5 (the rim is partially shown in Fig. 2 and 3). The connection device in the exemplifying embodiments consists of the first part 2. The toilet seat 1 is further comprised of at least one attachment device 6 with which the toilet seat's connection device may be temporarily or permanently connected to the toilet bowl. The toilet seat's height adjusting device 4 is further comprised of at least one operating device 7
20 with which height adjustment of the toilet seat's second part 3 in relation to the first part may be accomplished. The toilet seat also preferably includes at least one lid (cover) 8 (shown in Fig. 6 and 7). In the figures the lid 8 is shown with the included inner cover removed. The toilet seat 1 is further preferably comprised of at least one housing 9 which completely or partially encases the toilet seat's other components in the direction toward the sitting user. The
25 toilet seat also includes at least one splashguard 10. The splashguard 10 in the exemplifying embodiments consists of a funnel-like design which is integrated with the housing 9. The funnel-like design in alternative embodiments may include at least one first part and at least one second part in the funnel's longitudinal direction. In alternative embodiments, the splashguard may be a separate part of the toilet seat's housing 9.

With reference to Fig. 1 to 5, is shown a first preferred embodiment of the present toilet seat. In this embodiment, the toilet seat 1 is connected with at least one attachment device 6 to the toilet seat's normal attachment holes in the rear edge of the rim, in which customary toilet seats are normally connected, to the toilet bowl. In alternative embodiments it is conceivable
5 that the toilet seat be connected to at least one second position on the toilet bowl. It is thus conceivable that the toilet seat be connected to the toilet bowl's front edge or connected to another for the purpose suitable position.

The operating device 7 in the first embodiment includes at least one first handle 11 and preferably at least one first handle 11 and at least one second handle 12. The handles 11 and
10 12 in the shown embodiment are placed on each side of the toilet seat. The positions of the handles 11 and 12 are not limiting for the present design. Each respective handle 11 and 12 is connected to at least one handle bracket 13 extending from the second part 3 toward, and conceivably beyond, the first part 2. The handle bracket 13 may be attached to or alternatively be integrated with the second part 3.

15 The handles 11 and 12 include an operating function for the height adjustment device 4. The operating device 7 allows for the first part 2 and second part 3 to be maneuvered between a locked position, where the mutual distance between the first part 2 and the second part 3 is fixed, and an unlocked position, where the first part's 2 and second part's 3 mutual distance may be adjusted.

20 The height adjustment device 4 in the first embodiment includes at least one first gear rack (guide) 14, at least one second gear rack 15, at least one third gear rack 16 and at least one fourth gear rack 17 or similar arrangements. In alternative embodiments, the number of gear racks may be greater or fewer than four. The gear racks 14 to 17 are solidly (immovably) fixed (attached) to the second part 3 and movably arranged (connected), preferably via at least
25 one bearing, to the first part 2. In the exemplifying embodiment, the gear racks are solidly fixed (attached) to the second part 3 (upper part) and movably connected to the first part (lower part) 2. The arrangement includes at least one locking device 18 with which the second part 3 may be temporarily locked to the different levels of the gear racks 14 to 17 in the second part 2. The height adjustment between the first part 2 and the second part 3 in the
30 exemplifying embodiment occurs in increments (stepwise). This incremental locking takes place by the gear racks 14 to 17 each including a plurality of recesses 19, grooves, notches (indentations) or the like in the gear racks' (longitudinal direction) vertical direction. In

alternative embodiments, it is conceivable that the height adjustment of the second part 3, in relation to the first part 2, is accomplished non-incrementally (steplessly). The gear racks preferably include at least one jam that prevents the gear racks from becoming unintentionally disengaged from the first part 2. In alternative embodiments, it is conceivable that the height adjustment of the second part 3, in relation to the first part 2, does not occur in a manner that keeps the second part 3 and the first part 2 parallel or essentially parallel with each other. It is conceivable that height adjustment by the height adjusting device 4 raises the front end of the toilet seat 1 to a higher or lower position than the back end of the seat 1 or that the back end of the toilet seat 1 is raised to a higher or lower position than the front end of the seat 1.

10 The locking device 18 in the exemplifying embodiment includes at least one first locking member 20, at least one second locking member 21, at least one third locking member 22 and at least one fourth locking member 23. In alternative embodiments, the number of locking members may be greater or lesser than four. Locking members 20 to 23 in the shown embodiment consist of control arms (link arms) that are pivotally arranged around an axis of rotation. The locking members 20 to 23 are operated by a maneuvering device between a locked position, where the first part 2 and the second part 3 are locked mutually to each other, and a second position in which the first part's 2 and second part's 3 relative mutual positions are adjustable. Operation is accomplished via at least one first operating device 7. In the exemplifying embodiment, operation takes place via at least one first operating device 7 and at least one second operating device 7.

Each respective operating device 7 is comprised of at least one first control member 24 and at least one second control member 25. The first control member 24 consists of a grip segment 26 in the handle and the second control member 25 in the exemplifying embodiment consists of a disc-shaped part 27. The second control member 25 (disc-shaped part 27) may be of any shape, size and thickness suitable for the purpose. The first control member 24 is connected to the second control member 25. Preferably, the first control member 24 is pivotally connected to the second control member 25. The grip segment 26 may be pushed into the handle by way of the user's hand (fingers).

With reference to Fig. 4A to 4C and 5A and 5B, the operation of the locking function is shown. During the operation of the first control member 24, a movement of the disc-shaped part between a first position, in accordance with Fig. 4A and 5A, where the locking members 20 - 23 are locked in the gear racks 14 - 17 to a second position, in accordance with Fig. 4C

and 5B, where the locking members are released from the gear racks occurs, and by this the adjustment of the mutual distance between the first part 2 and the second part 3 is thereby made possible. In the exemplifying embodiment, the disc-shaped part 27 in the first operating device 7 affects the first locking member 20 and the fourth locking member 23. The disc-shaped part in the second operating device 7 affects the second locking member 21 and the third locking member 22. Each locking member 20 - 23 springs back to a locked position relative to the gear racks 14 - 17 when they are not affected by any of the disc-shaped parts 27.

Fig. 4B shows an intermediate position between a locked and unlocked position, where the disc-shaped part 27 is angled in relation to the handle bracket 13 by pressing in the grip segment 26. Specific to the exemplifying embodiment is that the disc-shaped part's angle, relative to the first control member 24, changes during its operation. The angular change is preferably within the range of 5 to 15 degrees. By way of the articulated connection between the first control member and the disc-shaped part, jamming (wedging) is essentially avoided because of the torque that would otherwise arise. In the exemplifying embodiment, operation of the disc-shaped part results in the disc, in its one end, resting against the locking member, and the other edge constitutes a stop against the handle bracket 13. The disc-shaped part's angle is thus different between the upper position and the lower position.

With reference to Fig. 6 and 7, a first alternative embodiment of the present invention is shown. In the figures the inner cover (lid) has been removed. In the embodiment, the height-adjustable toilet seat includes at least one attachment device 6 with which the height-adjustable toilet seat is attached or connected to the toilet bowl. Preferably, the toilet seat 1 is attached with at least one attachment device 6 to the toilet's normal connection apertures at the rear edge of the rim. In this embodiment, the toilet seat 1 attaches to the toilet's normal connection apertures in the rear edge of the rim, in which ordinary toilet seats are normally connected to the toilet bowl. In alternative embodiments it is conceivable that the toilet seat be connected to at least one second position on the toilet bowl. It is thus conceivable that the toilet seat be connected to the toilet bowl's front edge or be connected to another for the purpose suitable position. The attachment device 6 may include at least one first fastener 28. In alternative embodiments, the attachment device may include at least one first fastener 28 and at least one second fastener 29. In alternative embodiments, additional fasteners may be used to attach the toilet seat 1 to the toilet bowl.

The design includes at least one first support slide (runner) 30 and at least one second support slide 31, that each slide (glide), or alternatively are bearingly arranged, against parts of the height-adjustable toilet seat's 1 attachment device 6, alternatively to the first part 2. In the exemplifying embodiment, adjustment of the height of part 3 is accomplished with the aid of an operating member such as a lever 33 in the lid (cover). By a turning of the pulley wheel 32 with the lever 33 in one direction, the toilet seat is raised. By a turning of the pulley wheel 32 with the lever 33 in the other direction, the toilet seat is lowered. The lever's shown positions in the figures are not limiting for the present design's function.

The function of raising and lowering the toilet seat may vary within the scope of protection for the present patent application. The operating device in the exemplifying embodiment includes at least one pulley wheel 32 to which a lever 33 is connected. At least one first wire 34 and at least one second wire 35 are connected to the pulley wheel 32. The wires may alternatively consist of cables (lines) or other for the purpose suitable flexible elongated objects. The first wire 34 runs from the pulley 32 via at least one sheave 36 down to attachment device 6 or another for the purpose suitable attachment point in the first part. The second wire runs from the pulley 32 via at least one second sheave 37 down to attachment device 6. During rotation of the pulley wheel 32 with the lever 33 in one direction, partial lengths of the wires 34 and 35 will be wound on the pulley wheel 32 causing the support slides 30 and 31 and the toilet seat to be forced upward (relative to the attachment device). During rotation of the pulley wheel 32 with the lever 33 in the other direction, partial lengths of the wires 34 and 35 will be wound off the pulley wheel 32 causing the toilet seat to be lowered. This function allows each user to adjust seat height according to their preferences.

In the embodiment, the height-adjustable toilet seat 1 includes a locking feature with which the toilet seat's vertical position may be temporarily locked. This locking feature may be accomplished by a specific ratchet or by means of a jamming (wedging) effect which arises when the user sits down on the toilet seat. Jamming occurs when the torque from the user's own weight affects the third part in relation to the attachment of said part.

The design also includes a counterforce-generating device 38 that creates a counterforce that balances (the second parts) the toilet seat's weight. This counterforce prevents the toilet seat from falling down when the other part is in the unlocked position. Preferably, the level of force of the counterforce essentially equals the weight of the second part. This counterforce means that less force must be applied to the second part during the raising of the toilet seat, so

that it may be moved by less force between the lower position and the upper position. This counterforce also has the purpose, in applications where the locking of the toilet seat's height occurs with a jamming effect, of preventing the third part (the toilet seat) from moving downward after height adjustment has been accomplished with the lever, but before the user sits down on the toilet seat, whereby the toilet seat temporarily locks.

In the exemplifying embodiment, counterforce is achieved via at least one counterforce device which is connected to at least one wire 39 that runs from the pulley wheel 32 in the opposite direction in relation to wires 34 and 35. In alternative embodiments, wire 39 may consist of cable (line) or other for the purpose suitable elongated object. Wire 39 runs to the pulley 32 via at least one sheave 40 that is attached to at least one counterforce-generating element 41. This design in the exemplifying embodiment includes at least one gas spring 42 and preferably at least one first gas spring 42 and at least one second gas spring 43 and at least one sheave 44. The wire 39 stretches from sheave 40 via at least one sheave 44 to attachment point (bracket) 45.

Specific to this embodiment is that the operating device is integrated in the lid (cover) 8 of the toilet seat. During adjustment of the toilet seat's height, the lid is raised up after which a release of a locking device occurs, after which the toilet seat is maneuvered with the operating device. When the user raises the lid and seat, the center of gravity is shifted which provides for a locking function. When the desired height is reached, the first part and the second part are mutually locked by the earlier discussed jamming effect. In alternative embodiments it is conceivable that another type of locking device or similar be used.

The assembly, according to the second embodiment may be equipped with a housing 9 and a splashguard 10 (not shown in the figures).

Specific to the present height-adjustable toilet seat is that adjustment of the seat's height and its locking may occur with a hand grip.

In the detailed description of the present invention, design details may have been omitted which are apparent to persons skilled in the art in the field of the method and device. Such obvious design details are included to the extent necessary so that the proper and full performance of the present toilet seat is achieved.

Even if certain preferred embodiments have been described in more detail, variations and modifications of the method and device may become apparent for persons skilled in the art in

the field of the invention. All such modifications and variants are regarded as falling within the scope of the following claims. For example, it is conceivable in alternative embodiments that the adjustment of height occurs non-incrementally, which for example occurs in the alternative embodiments that are shown in Fig. 6 and 7. It is conceivable that the toilet seat be
5 presented as a separate addition to toilet bowls or be included as a part of a toilet bowl.

In alternative embodiments, it is conceivable that the present invention also be defined as a height-adjustable urinal. The shape of the included housing as well as the shape of the first part and the shape of the second part, should for this application be modified accordingly.

Advantages of the Invention

10 Several advantages are achieved with the present invention. The most obvious is that an improved height-adjustable toilet seat is obtained. Another advantage of the present invention is that the height-adjustable toilet seat's height and locking may be accomplished by hand operation. An additional advantage of the present invention is that the toilet seat may be mounted onto existing toilets without costly refurbishment or electrical wiring. A still further
15 advantage of the present invention is that the toilet seat may be non-incrementally adjusted to each individual user's needs of sitting height. Further, it is another advantage of the present invention, that it is cost effective to manufacture and install, and that it may be operated as quickly and easily as a motorized variant. A yet further advantage of the present invention is also that with one variant of it, it is possible to adjust the height of the invention so that it may
20 be used as a urinal thereby preventing spillage of urine on the floor during standing urination.

Claims

1. Height-adjustable toilet seat (1), for attachment to a toilet bowl or similar with at least one attachment device (6), comprised of at least one first part (2) and at least one second part (3), in which the first (2) and second parts (3) are arranged to be adjustable in distance from each other via at least one height adjusting device (4), and that the first part (2) and the second part (3) may be locked and released at multiple positions by at least one locking device (18), where the distance between the first part (2) and the second part (3) may be adjusted in the released position, said seat (1) also including at least one operating device (7) that is comprised of at least one handle (11) to which at least one first control member (24) is arranged together with at least one second control member (25) and at least one handle bracket (13) **wherein** the second control member (25) is comprised of at least one disc-shaped part (27) which in the first operating device (7) affects the first locking member (20) and the fourth locking member (23) and in the second operating device (7) affects the second locking member (21) and the third locking member (22), where each locking member (20–23) springs back to a locked position relative to the gear racks (14–17) when they are not affected by any of the disc-shaped parts (27).
2. Height-adjustable toilet seat (1) in accordance with claim 1 **wherein** the first control member (24) has an articulated connection to the disc-shaped part (27), and that the disc-shaped part's (27) angle changes during its operation relative to the first control member (24).
3. Height-adjustable toilet seat (1) in accordance with one of the previous claims **wherein** the handle bracket (13) is attached to the second part (3) and that said bracket has a length that is at least as long as the height of the disc-shaped part (27).
4. Height-adjustable toilet seat (1) in accordance with at least one of the previous claims **wherein** the operation of the disc-shaped part (27) by pressing in the grip segment (26) results in said disc-shaped part, at its one end, resting against the locking member, and that its other end constitutes a stop against the handle bracket (13), said disc-shaped part's (27) angular change is preferably within the range of 5 to 15 degrees.

5. Height-adjustable toilet seat (1) in accordance with at least one of the previous claims **wherein** the second part (3) may be height adjusted and locked into a forward incline and a backward incline by the height adjusting device (4).
6. Height-adjustable toilet seat (1) in accordance with at least one of the previous claims **wherein** the toilet seat (1) is equipped with a housing (9) and a splashguard (10).
7. Height-adjustable toilet seat (1) in accordance with claim 1 **wherein** the height adjusting device (4) includes at least one pulley wheel (32), equipped with at least one lever (33), to which at least one first wire (34) and at least one second wire (35) are connected, whose wire (34) runs from the pulley wheel (32) via at least one sheave (36) down to the attachment device (6) and that the second wire runs from the pulley wheel (32) via at least one second sheave (37) down to the attachment device (6), and that during an operation of the lever (33) and the pulley (32) in the one direction lengths of wires (34) and (35) will be wound on the pulley (32) which allows the support slides (30) and (31) and the toilet seat to be forced upwards and that in the other direction lengths of wires (34) and (35) will be wound off the pulley (32) allowing the toilet seat to be lowered.
8. Height-adjustable toilet seat (1) in accordance with claim 6 **wherein** the counter-force generating device (38) creates a counter-force that balances the second part's weight.
9. Height-adjustable toilet seat (1) in accordance with claim 7 **wherein** the counter-force generating device (38) includes at least one wire (39) which runs from the pulley wire (32), in the opposite direction in relation to wires (34) and (35), to at least one sheave (40) that is connected to at least one counter-force generating element (41) connected to at least one sheave (44) that stretches from sheave (40) via at least one sheave (44) to an attachment point (45).
10. Height-adjustable toilet seat (1) in accordance with claim 8 **wherein** the counter-force generating element (41) consists of gas spring (42).
11. Method for use of a height-adjustable toilet seat (1), attached to a toilet bowl, in accordance with at least one of claims 1-9 **wherein** the operation of the toilet seat's height and locking of the seat is accomplished by hand.

12. Use of a height-adjustable toilet seat (1), in accordance with at least one of claims 1-10, as a urinal.

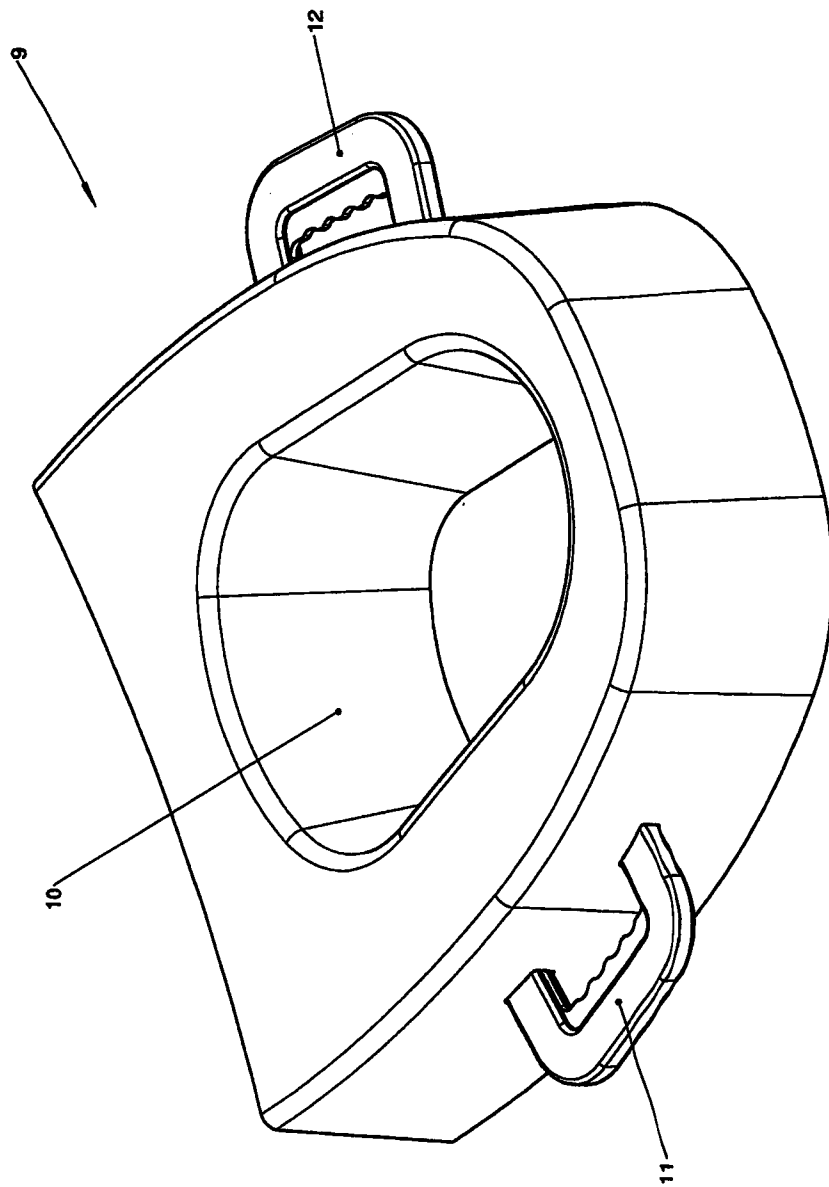


FIG. 1

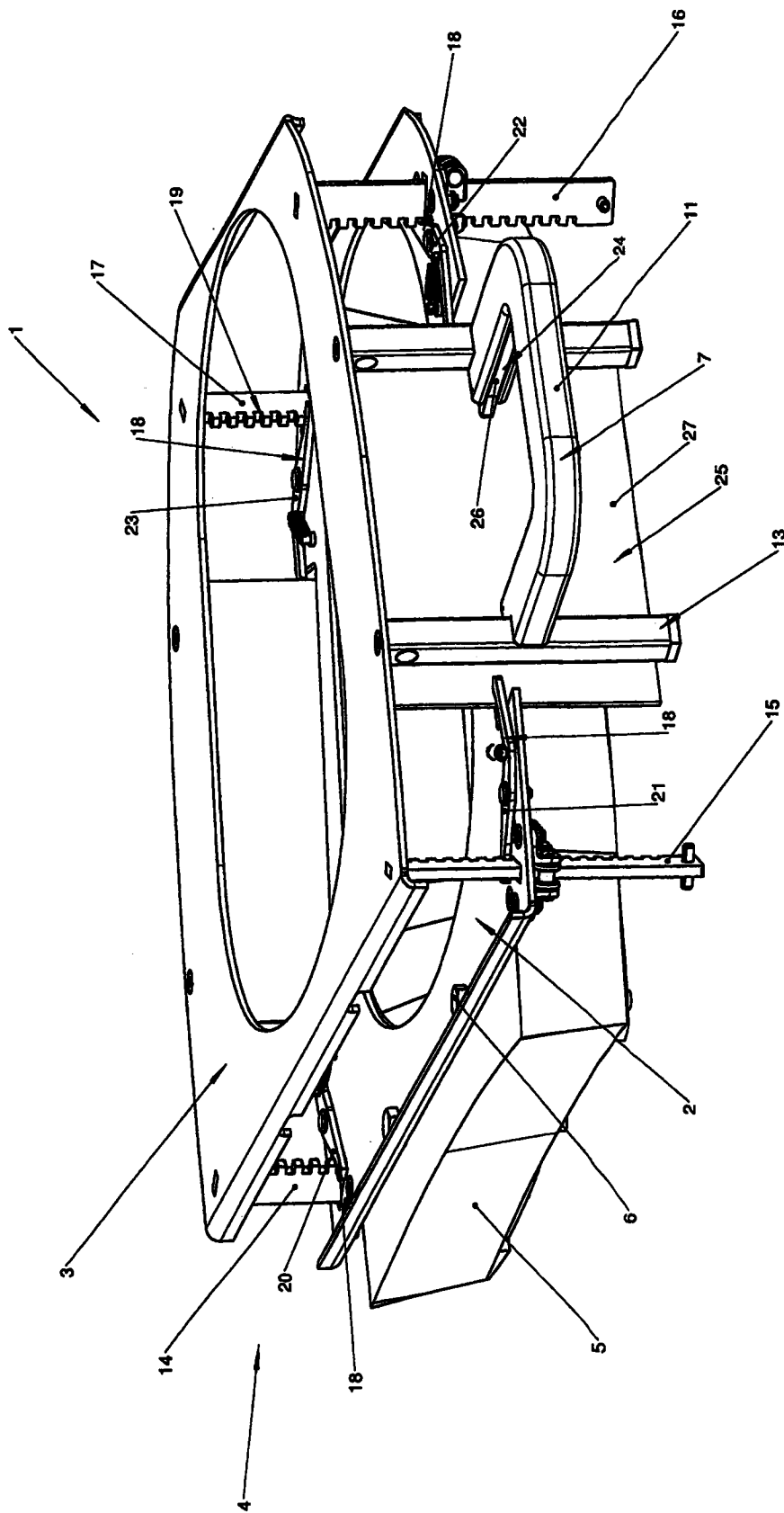


FIG. 2

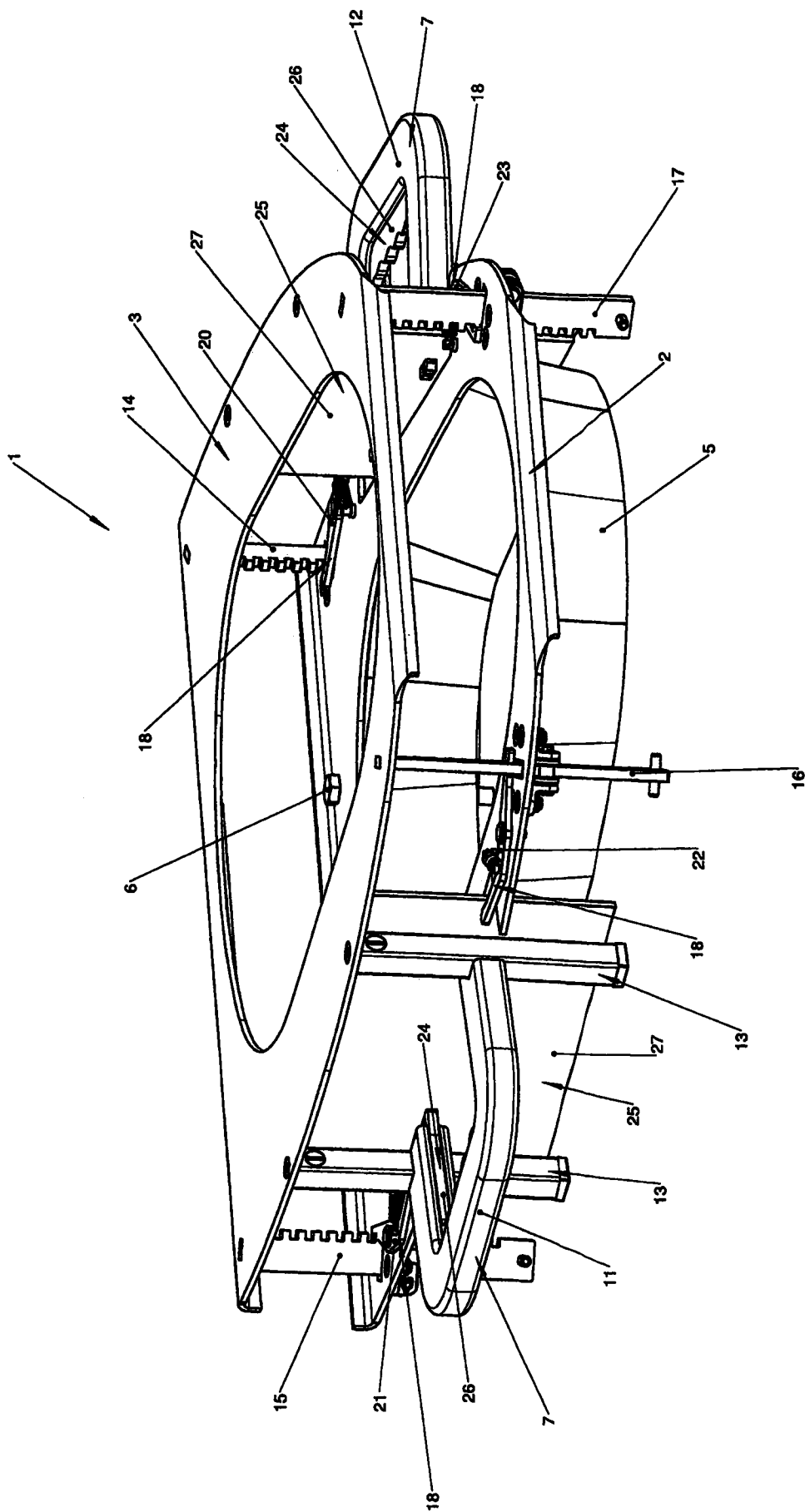


FIG. 3

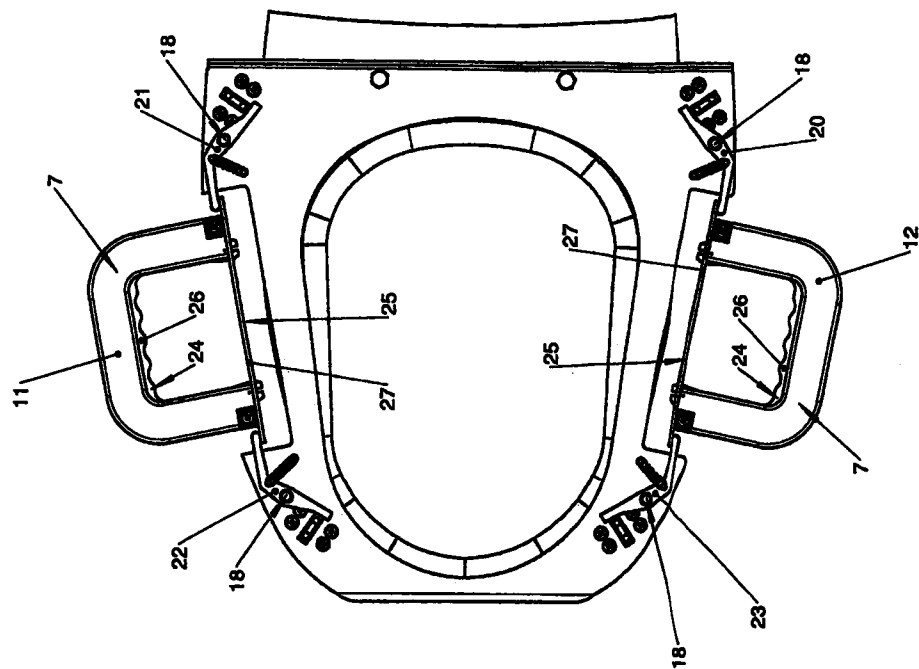


FIG. 5B

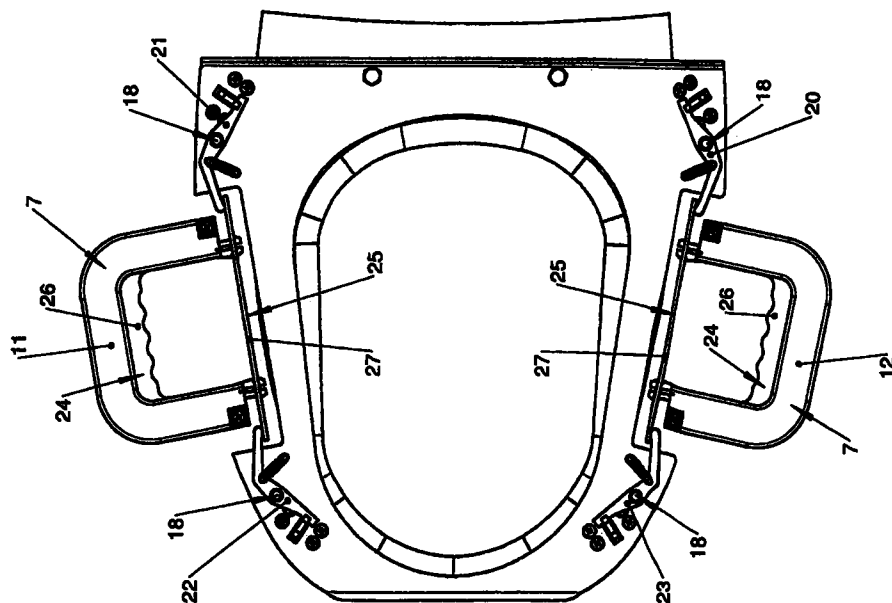


FIG. 5A

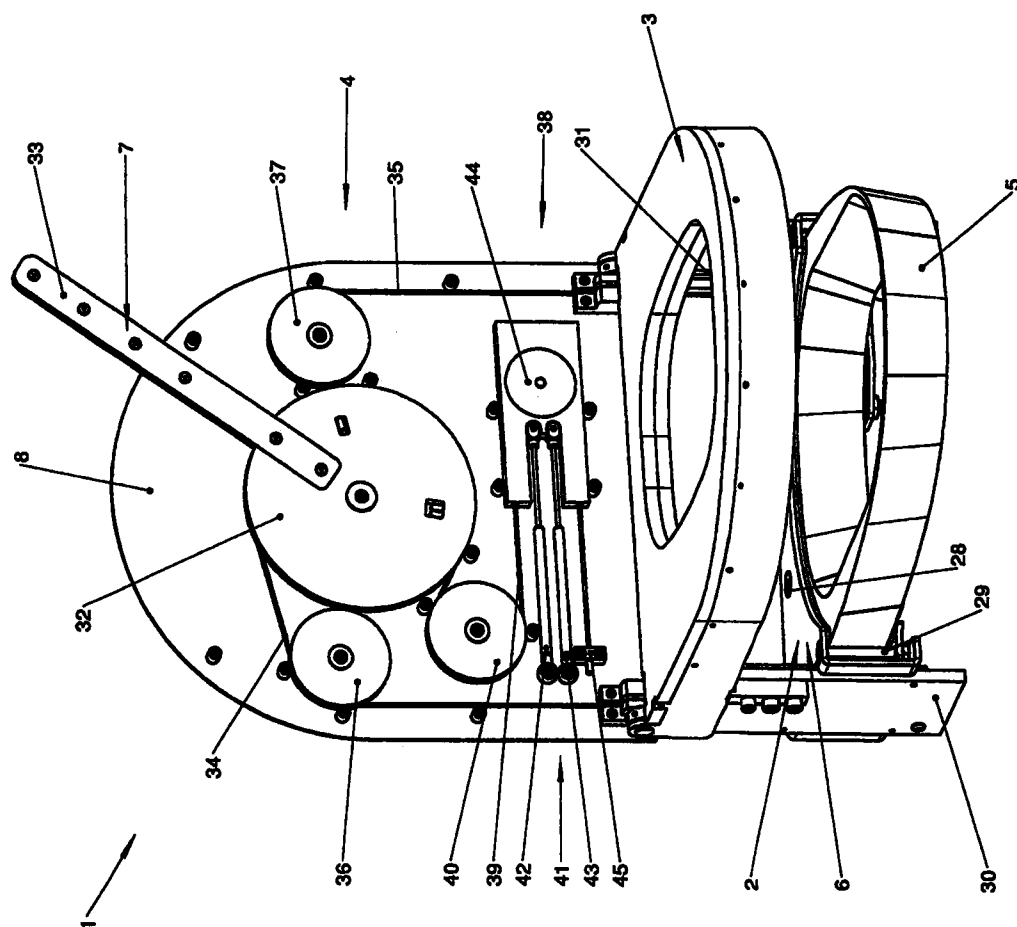


FIG. 6

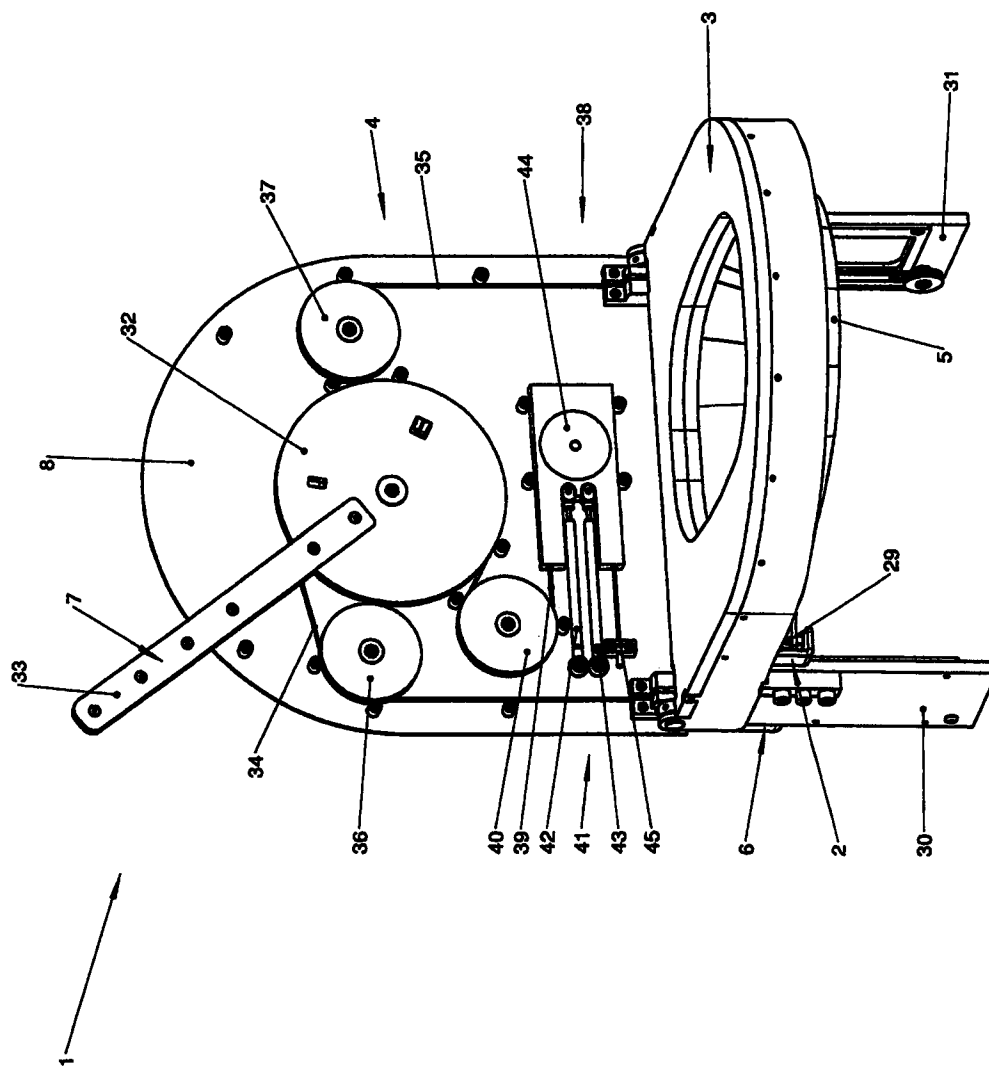


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2013/000039

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A47K, A61G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3971077 A (O'NEIL ROBERT), 27 July 1976 (1976-07-27); abstract; column 3, line 60 - column 4, line 36; figures 1-3,5 --	1-12
A	GB 2289070 A (KINKAID ROBERT WILLIAM), 8 November 1995 (1995-11-08); abstract; page 5; figures 1-4 --	1-12
A	US 3086223 A (FRANCIS GASS JAMES), 23 April 1963 (1963-04-23); column 1, line 52 - column 2, line 64; figures 1-3 --	1-12
A	US 2790182 A (MALIN EDGAR L), 30 April 1957 (1957-04-30); column 1, line 51 - column 2, line 69; figures 1-2 --	1-12



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

20-06-2013

Date of mailing of the international search report

24-06-2013

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2013/000039

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 4432716 A1 (GOBBERS REHABILITATIONSTECHNIK), 21 March 1996 (1996-03-21); column 1, line 46 - column 2, line 55; figures 1-2 --	1-12
A	US 3490082 A (MURCOTT CHARLES E), 20 January 1970 (1970-01-20); column 1, line 54 - column 2, line 66; figures 1,4 --	1-12
A	WO 9741765 A1 (ADVIES EN REALISATIEBURO OP MA ET AL), 13 November 1997 (1997-11-13); abstract; page 3, line 12 - page 4, line 5; figures 1-4 --	1-12
A	US 6775858 B1 (MILLER STUART EARL CRISPIN), 17 August 2004 (2004-08-17); abstract; column 5, line 16 - line 34; column 6, line 4 - line 23; figures 1,3,5,7a -- -----	1-12

Continuation of: second sheet

International Patent Classification (IPC)

A47K 13/28 (2006.01)

A47K 13/10 (2006.01)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/SE2013/000039

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