



(51) International Patent Classification:

A61G 5/10 (2006.01) A61G 5/08 (2006.01)
A61H 3/04 (2006.01)

(21) International Application Number:

PCT/SG2018/050386

(22) International Filing Date:

30 July 2018 (30.07.2018)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

10201706161X 28 July 2017 (28.07.2017) SG

(72) Inventor; and

(71) Applicant: NATARAJAN, Krishnamurthy [IN/SG]; 329
Clementi Avenue 2, #12-260, Singapore 120329 (SG).

(74) Agent: ALPHA & OMEGA LAW CORPORATION;
100 Beach Road, #24-08, Shaw Tower, Singapore 189702
(SG).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,

HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,
KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to the identity of the inventor (Rule 4.17(i))
- as to applicant's entitlement to apply for and be granted a
patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the
earlier application (Rule 4.17(iii))
- of inventorship (Rule 4.17(iv))

(54) Title: SAFE-WALKER

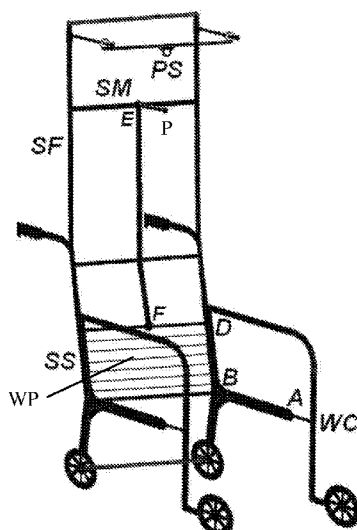


Figure 3A

(57) Abstract: The present invention describes a safe-walker, which is functionally a combination of a wheel-chair (WC) and a walker, with fall prevention support frame (SF) integral with a seat movement (SM) mechanism to enable a user, at least, to walk or to stand upright. The seat movement (SM) mechanism includes a pair of substantially L-shaped roller tracks (RT) with grooves within which rollers carrying seat slats (WP) move back or forth to take up either (i) seat in place (AB), or (ii) seat moved-away (BD) to give space and to allow the user to walk within that space. The seat movement (SM) is automatically operated by a linkage (EF) when the person stands up or sits down. The safe-walker is fail-safe because if the automated seat movement (SM) does not work, the user is still supported by a chest harness (CH) connected to the support frame (SF). The safe-walker is foldable.



Published:

- *with international search report (Art. 21(3))*
- *in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE*

SAFE-WALKER

Related Application

[001] The present invention claims priority to Singapore patent application no.
5 10201706161X filed on 28 July 2017, the disclosure of which is incorporated in its entirety.

Field of Invention

[002] The present invention relates to a safe-walker, which is a wheel-chair and a walker
10 combination and is equipped with some safety and convenience features.

Background

[003] There are many innovations in walking aids for physically challenged users. Despite
15 these innovations, there is still a need to provide a safe-walker; advantages of the safe-walker
will be appreciated after this device has been described.

Summary

[004] The following presents a simplified summary to provide a basic understanding of the
20 present invention. This summary is not an extensive overview of the invention and is not
intended to identify key features of the invention. Rather, it is to present some of the
inventive concepts of this invention in a generalized form as a prelude to the detailed
description that is to follow.

[005] The present invention seeks to provide a safe-walker, which is a wheel-chair and
25 walker combination; the safe-walker is equipped with the following safety and convenience
features: (1) a suspension frame from which the user of the safe-walker is suspended
in a support frame by means of a chest harness and if required by a pelvic harness; and (2)
a moveable seat which shifts away from the sitting location of the wheel-chair when the
user moves up to walk, and automatically moves back to the sitting position when the user
30 collapses or falls or moves down to rest.

[006] The device will be very useful in hospitals and clinics, physio-therapy labs, and in all
facilities where people who are temporarily or permanently physically challenged in their
walking abilities and balance while upright.

[007] In one embodiment, the present invention provides a safe-walker. The safe-walker comprises: a wheel-chair frame with two seat support members, with each seat support member being made from a roller-track; a moveable seat made up of a plurality of seat slats, with each seat slat being linked to an adjacent seat slat by a flexible connecting member and the ends of each seat slat being moveable along an inside of the associated roller-track; a support frame extending up from a rear of the wheel-chair frame; and a linkage connecting the moveable seat at a seat slat to an upper point located on the support frame; so that when a user, wearing a chest harness with the chest harness being connected to the upper point on the support frame, gets up from a sit position, the linkage is pushed up, thereby pulling the plurality of seat slats along the associated roller-track into a storage position and giving space for the user to walk, and when the user moves to sit down, the linkage is pulled down, thereby pulling the plurality of seat slats into the sit position to support the user.

[008] Preferably, each end of the seat slat terminates with a roller, with the roller being disposed to roll inside the associated roller-track and being supported by a roller bearing or a plain bushing. Preferably, the roller-track is formed in a substantially L-shape, with a substantially horizontal portion to support the seat slats in the sit position and a substantially vertical portion disposed at the rear of the wheel-chair frame.

[009] Preferably, a cable support/anchor point or a hook point is provided on the support frame at a location disposed above the upper point, to provide a fail-safe feature and to prevent fall injury or fall trauma.

[0010] Preferably, a wheel-chair arm support frame is pivoted. It is possible that the support frame is also pivoted or extensible; the seat slats can also be pivoted. These features allow the safe-walker to be foldable into a compact size.

[0011] In one embodiment of the L-shaped roller-track, the substantially vertical portion is upward and the seat movement is top-down. In another embodiment, the substantially vertical portion is downward and the seat movement is bottom-up; further, a pulley and a cable or chain goes over the pulley, with the cable or chain connecting a top end of the linkage with a lowest seat slat when the seat slats are in the stored position.

[0012] In another embodiment, the present invention provides a method for configuring a safe-walker. The method comprises: configuring a seat of a wheel-chair frame with a plurality of seat slats; flexibly linking each seat slat to an adjacent seat slat and allowing the ends of the seat slat to move along an inside of an associated roller-track that supports the seat; extending a rear of the wheel-chair frame with an upward support frame; and connecting a linkage between the plurality of seat slats and a slidable locate point on the support frame; so that when a user, wearing a chest harness with the chest harness connected to the slidable locate point, gets up from a sit position, the linkage is pushed up and the plurality of seat slats are pulled away from the sit position, thereby giving space for the user to walk, and when the user moves to sit down, the linkage is pulled down and the plurality of seat slats are moved into the sit position to support/receive the user.

[0013] Preferably, the method further comprises extending the upward support frame to provide an overhead cable support/anchor point or hook point, to serve as a fail-safe feature to prevent fall injury or fall trauma.

[0014] Preferably, the method further comprises pivoting a wheel-chair arm support frame to the wheel-chair frame to allow folding of the safe-walker. It is also possible to pivot the upward support frame, adjustably extending the upward support frame, telescopically or extendably, or pivoting the seat slats to achieve further folding of the safe-walker.

Brief Description of the Drawings

[0015] This invention will be described by way of non-limiting embodiments of the present invention, with reference to the accompanying drawings, in which:

[0016] Figures 1A-1B illustrate two types of wheel-chairs for use with the present invention;

[0017] Figures 2A-2B illustrate a safe-walker according to an embodiment of the present invention;

[0018] Figures 3A-3B illustrate a seat movement embodiment for the safe-walker shown in Figure 2A or 2B;

[0019] Figures 4A-4B illustrate another seat movement embodiment for the safe-walker shown in Figure 2A or 2B;

[0020] Figures 5A-5B illustrate arrangements of the roller tracks employed in Figures 3A, 3B, 4A or 4B;

[0021] Figures 6 illustrates various views of the rollers shown in Figure 5A or 5B;

[0022] Figure 7 illustrates folding of seat slats employed in the safe-walker;

[0023] Figure 8 illustrates folding of wheel-chair arms employed in the safe-walker; and

[0024] Figure 9 illustrates a fail-safe feature according to another embodiment of the present invention.

Detailed Description

[0025] One or more specific and alternative embodiments of the present invention will now be described with reference to the attached drawings. It shall be apparent to one skilled in the art, however, that this invention may be implemented without such specific details. Some of the details may not be described at length so as not to obscure the invention. For ease of reference, common reference numerals or series of numerals will be used throughout the figures when referring to the same or similar features common to the figures.

Figures 1A-1B:

[0026] Figure 1A shows a wheel-chair WC of the big wheel type and which may be self-operated by the user himself/herself; Figure 1B shows a wheel-chair WC of a small wheel type which normally requires an attendant to push it around. However, the all small-wheels type will be used in the description that follows to reduce the possible distraction and covering up of other salient details by the big wheels in the drawings.

Figures 2A-2B:

[0027] Figures 2A-2B show the concept of the safe-walker. There is a support frame SF attached to the wheel-chair WC. The support frame SF provides an overhead cable support/anchor PS to support the user from falling down by means of a chest harness CH as well as to provide the user with a seat formed by a plurality of seat slats WP, when the user is unable to or prefers to stand up or walk.

[0028] The user sits and moves around in the wheel-chair in the normal way. When he wishes to walk, he gets up and the wheel-chair seat slats WP move away (Figure 2A) on rollers running in roller tracks RT into an enclosure located at the back, either above the seat level or below the seat level. In one embodiment, the roller track RT has a cross-section of a lipped C-channel, as shown in Figure 6.

[0029] When the user collapses or falls or moves to sit down to rest, the seat slats WP automatically returns from its stored position to the seating position (Figure 2B) so that the user is gently supported in the sitting position without fear of a fall injury or trauma.

[0030] It may be noticed that the cable from the overhead cable support/anchor PS is adjusted to be just right in length when the worker is sitting, and hence it hangs loose when he is standing up or walking.

[0031] The automatic seat movement SM mechanism (shown in Figures 3A-3B) is operated by another rigid link EP attached to the chest harness CH at the shoulder level E, moved to the :seat-stored~ position (BD or BC) while the user is standing or walking, and to the :seat-in-place~ position (AB) as the user sinks or voluntarily sits down.

[0032] As long as the automatic seat movement SM mechanism works correctly, there will be no need for the overhead cable support/anchor PS system. But the cable support/anchor PS system serves both as a back-up in the rare event that the seat movement SM mechanism fails to operate, and also for the more likely sudden collapse or stumbling that may happen due to dizziness or loss of balance of the user.

[0033] A handle HH is provided for the user to stabilize himself and move the wheel-chair WC with him when he stands or walks. This handle HH is located on the wheel-chair arm support but is not shown in the rest of the figures to avoid clutter. There are two ways the seat slats WP can be stored when not in use and moved to the sit position: 1. Top-down system (ABD), when the seat slats WP are stored at the back of the wheel-chair (DB) above the seat level; and 2. Bottom-up system (ABC), when the seat slats WP are stored at the back of wheel-chair base (CB), below the seat level.

35 Figures 3A-3B:

[0034] Figures 3A-3B show the seat movement SM mechanism for automatic movement of the seat slats WP in top down mode, in the wheel-chair WC. The movement is effected by a metal linkage EF, E being rigidly attached or flexibly connected to the chest harness CH, and F to the series of rollers carrying the seat slats WP.

[0035] The rollers are pushed and/or pulled by means of straps attached to the metal linkage EF (just below label :SM). The metal linkage EF has an adjustable projection bar EP to attach to the chest harness CH so that as and when the user moves substantially vertically standing up or sitting down, the projection bar EP moves with him, pulling or pushing the seat slats WP within the grooved roller tracks RT located at the two sides of the wheel-chair WC. To avoid clatter, the roller tracks RT supporting the seat are shown but the back-rest of the wheel-chair WC is omitted.

[0036] When the user is standing or walking (Figure 3A), the seat slats WP are stored out of the way (SS) in BD, above the seat level at the back. When he collapses or wishes to rest (Figure 3B), as he sinks down the seat movement SM mechanism pushes the seat slats WP into the sitting position (SP) in AB. In another embodiment, the linkage EF or the projection bar EP may be made of a hard material, such as plastic, glass fibre, and so on, instead of a metal.

Figures 4A-4B:

[0037] Figures 4A-4B show the bottom-up movement for seat storage (whereas Figures 3A-3B show the top-down movement). Here, the seat slats WP are moved into the seat-stored position SS in a recess BC below the seat level while the user is standing or walking, or are moved back into the sit position SP along AB.

[0038] This linkage EF involves gears or cables running on pulleys to effect the seat movement. Although pulleys (P1, P2) are shown in the schematic diagram, the actual seat movement SM mechanism may differ in detail, and may be omitted or hidden safely (and aesthetically) inside casings, which are not shown in the figures.

[0039] While the top-down movement system is simpler to manufacture and operate, the bottom-up movement system may have advantages in actual use, particularly where it is

7

desired to make the wheel-chair and fall support frame SF foldable for storage and transportation.

5

Figures 5A-5B:

[0040] The seat movement SM mechanism comprises of a grooved metal roller track RT bent into an approximate L-shape (upright for top-down movement system and inverted for bottom-up movement system) with a series of rollers with ball bearings or plain bushings.

10

[0041] An angle slightly greater than 90 degrees is shown in the figures, to conform to most wheel-chair shapes. But it may vary from 90 degrees to a somewhat greater angle as desired. There will be a canvas or other fabric for back rest, but is not shown in Figures 5A-5B.

15

Figure 6:

[0042] This Figure 6 shows various views of the roller track (RT), rollers on ball bearings, and seat slats (WP) arrangements.

20

[0043] A actual device may differ in detail with the same functions.

[0044] The axles of the rollers carry seat slats WP made from wood, plastic, or other material for the user to sit on. Each seat slat WP is supported on the axle rod by triangular ribs, as shown in the elevation and cross-section views.

25

[0045] The series of rollers and seat slats WP are linked to an adjacent member by means of a flexible chain or a flexible connecting member, which is not shown in Figure 6.

30

Figure 7:

[0046] While the safe-walker described above will be the most rigid, economical and easy to maintain, modifications may easily be made to fold them into a width of about a third or less of their open width by making the seat slats WP fold at the middle in a scissor-fashion when not in use.

35

8

[0047] Figure 7 shows one embodiment of such a folding embodiment. Each seat slat WP will be made of two parts (PQ, RS) mutually supporting each other via a common hinge T in the middle.

5 [0048] Special means must be provided at the ends P, Q, R, and S to slot into the rollers/roller bearings at the grooved roller track RT to enable the seat movement SM between AB and BC or BD.

10

Figure 8:

[0049] An alternative, possibly simpler and cheaper embodiment (as shown in Figure 8) will be to hinge the two wheel-chair arms and the two seat brackets AB a short distance (say 5 cm) away from their junctions with the vertical or nearly vertical wheel-chair back and
15 base, with a hinge lock. When desired to be stored or transported, the hinge locks may be released, and the two sides folded across the back.

[0050] The hinge locks (shown schematically as small circles) will have to be specially designed to revert to proper functioning of the seat movement SM upon opening up and
20 locking.

[0051] Although not shown, the tall support frame SF may also be hinged at about mid-height and folded forward (or backward) to make the entire safe-walker quite compact.

25 [0052] While what has been described refers to the basic principles involved, the actual seat movement SM mechanism may be considerably simplified by a short rigid arm attached to the chest harness at the back as at C in Figure 9, and to the top of the roller-chain within the roller track RT, in such a way that when the user is seated, the seat slats WP will be moved to the horizontal support position, and when the user gets up to walk, the seat slats WP will
30 automatically be pushed up to the vertical position.

[0053] Figure 9 shows one embodiment of such a simplified embodiment.

Figure 9:

35

[0054] It is envisaged that the force necessary to move the roller-chain up or down will be small enough to be supplied by the user's effort in getting up or the body weight slumping

down, and if it is found to be insufficient, electronic and electrical devices may be used to facilitate/actuate the seat movements.

5 [0055] In any case, there will be a fail-safe mechanism consisting of a lanyard attached to the chest harness CH and to a hook (PH in Figure 9) at the top, such that if and when the seat slats WP fail to move down to support the downward movement of the user, the lanyard from the overhead hook PH will hold the user up and prevent him from crashing to the ground.

10

Design:

[0056] The support frame SF and the seat slats WP will be designed to withstand the maximum load of a person anticipated to use the safe-walker with a high factor of safety, including the small impact which may happen when the user slumps on the seat.

15

[0057] A third pair of horizontal bars may be provided at the base between the front and back wheel axles to stiffen the support frame SF or wheel-chair WC further. In this case, to enable the method of folding in Figure 8 above, this pair of stiffener bars will also be hinged in the same vertical line as the wheel-chair arm and seat level hinges.

20

[0058] The material of the wheel-chair frame may be aluminium or other light material. The moving parts are estimated to be within 5 or 6 kg. To avoid the user having to bear or move this weight with his chest harness CH, the weight of the moving parts may be counter-balanced by means of a counter-weight in a hidden casing or a spring of suitable stiffness but are not shown in the figures.

25

[0059] In the worst case scenario of the seat movement SM mechanism failing to work, the user will simply be suspended in a collapsed state, by the chest harness CH from the overhead support/anchor PS or hook PH, yet still safe against fall injury or trauma.

30

[0060] Unless something goes very wrong with the seat movement SM mechanism, the mechanism will only need a gentle nudge downward or upward at the top bar (near label SM) to continue to function in moving the seat back and forth normally.

35

[0061] In the wheel-chair WC of the folding type which can be collapsed horizontally for storage and transportation, the vertical support frame SF may also be modified to fold vertically for better portability.

Advantages:

5 [0062] The Safe-Walker will combine the functions of a wheel-chair and walker, with the support frame SF incorporating the fall support from cable support/anchor PS or hook PH by a cable attached to the chest harness CH.

[0063] The values added by the present invention to these basic functions are:

10

1. There is no need to change devices or locations while shifting back and forth from seated to standing/walking mode.

2. When user moves up to walk, the wheel-chair seat slats WP move out of the way, and when he falls or moves down to rest, the seat slats WP automatically move to
15 receive/support him.

3. The cable to the overhead anchor PS or hook PH is a double precaution, providing a fail-safe safe-walker under all potential hazards.

4. The safe-walker may be used not only in hospitals, but also in offices and homes, with the same portability as current wheel-chairs. For treadmill use in
20 physio-therapy, the framing may be modified.

5. As much as the physiological advantages, the psychological benefits of increased confidence and self-worth in the users' perception will be immeasurable.

25

Commercialization:

[0064] With increasing world-wide acceptance and encouragement of physically challenged persons both in home and workplace environments, manufacture and mass production of the Safe-Walker should pose no problems.

30

[0065] Inventor opines that by lowering costs, overheads and profits to the minimum, the ultimate cost differential between the Safe-Walker and the conventional wheel-chair will not be prohibitive, and the present invention will be a welcome and viable social and medical service.

35

[0066] While specific embodiments have been described and illustrated, it is understood that many changes, modifications, variations and combinations thereof could be made to the present invention without departing from the scope of the present invention. For example, the support frame may be extensible, either telescopically or by attaching an additional
5 section, so that the height of the safe-walker can be adjustably extended or shortened.

CLAIMS:

1. A safe-walker comprising:
 - a wheel-chair frame with two seat support members, with each seat support member being made from a roller-track;
 - 5 - a moveable seat made up of a plurality of seat slats, with each seat slat being linked to an adjacent seat slat by a flexible connecting member and the ends of each seat slat being moveable along an inside of the associated roller-track;
 - a support frame extending up from a rear of the wheel-chair frame; and
 - a linkage connecting the moveable seat at a seat slat to an upper point located on
 - 10 the support frame;
 - so that when a user, wearing a chest harness with the chest harness being connected to the upper point on the support frame, gets up from a sit position, the linkage is pushed up, thereby pulling the plurality of seat slats along the associated roller-track into a storage position and giving space for the user to walk, and when the user moves to sit down, the
 - 15 linkage is pulled down, thereby pulling the plurality of seat slats into the sit position to support the user.

2. The safe-walker according to claim 1, wherein each end of each of the seat slats terminates with a roller, with the roller being disposed to roll inside the associated roller-
- 20 track and being supported by a roller bearing or a plain bushing.

3. The safe-walker according to claim 1 or 2, wherein the roller-track is formed in a substantially L-shape, with a substantially horizontal portion to support the seat slats in the sit position and a substantially vertical portion disposed at the rear of the wheel-chair frame.
- 25
4. The safe-walker according to any one of the preceding claims, further comprising a cable support/anchor point or a hook point located on the support frame at a location disposed above the upper point.

- 30 5. The safe-walker according to any one of the preceding claims, wherein a wheel-chair arm support frame is pivoted, which allows the wheel-chair frame to be folded into a compact size.

6. The safe-walker according to claim 5, wherein the support frame is pivoted or extensible, which allows the safe-walker to be folded and/or shortened further in compactness.
- 5 7. The safe-walker according to any one of the preceding claims, wherein each seat slat is pivoted so that at least the seat is foldable.
8. The safe-walker according to any one claims 5-7, further comprising a handle located on each of the wheel-chair arm support frame.
- 10 9. The safe-walker according to claim 3, wherein the substantially vertical portion is upward and the seat movement top-down.
10. The safe-walker according to claim 3, wherein the substantially vertical portion is downward and the seat movement is bottom-up.
- 15 11. The safe-walker according to claim 10, further comprising a pulley and a cable or chain going over the pulley, with the cable or chain connecting a top end of the linkage with a lowest seat slat when the seat slats are in the stored position.
- 20 12. A method of configuring a safe-walker comprising:
- configuring a seat of a wheel-chair frame with a plurality of seat slats;
 - flexibly linking each seat slat to an adjacent seat slat and allowing the ends of the seat slat to move along an inside of an associated roller-track that supports the seat;
 - 25 - extending a rear of the wheel-chair frame with an upward support frame; and
 - connecting a linkage between the plurality of seat slats and a slidable locate point on the support frame, so that when a user, wearing a chest harness with the chest harness connected to the slidable locate point, gets up from a sit position, the linkage is pushed up and the plurality of seat slats are pulled away from the sit position, thereby giving space for
 - 30 the user to walk, and when the user moves to sit down, the linkage is pulled down and the plurality of seat slats are moved into the sit position to support/receive the user.
13. The method according to claim 12, further comprises extending the upward support frame to provide an overhead cable support/anchor point or hook point.

14. The method according to claim 12 or 13, further comprises pivoting a wheel-chair arm support frame to the wheel-chair frame to allow folding of the safe-walker to a compact size.

5

15. The method according to any one of claims 12-14, further comprises pivoting the upward support frame to allow folding of the safe-walker to a compact size.

16. The method according to any one of claims 12-14, further comprises adjustably
10 extending the upward support frame, telescopically or attaching another section.

17. The method according to any one of claims 12-16, further comprises pivoting the seat slats to allow at least folding of the seat to achieve compactness.

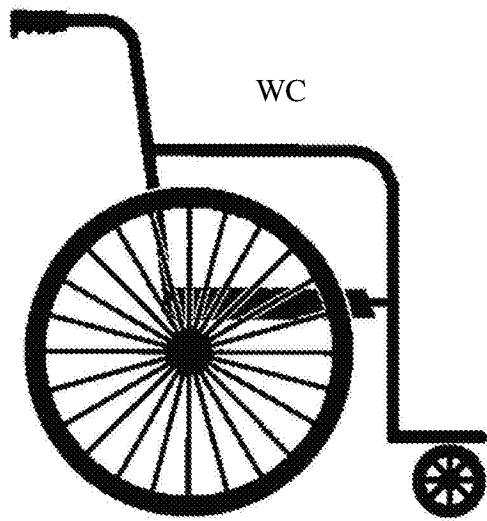


Figure 1A

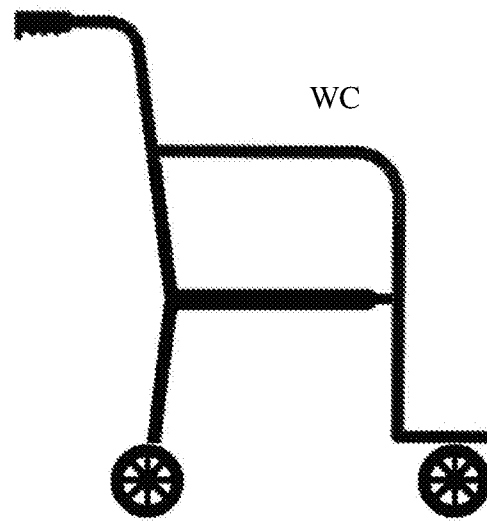


Figure 1B

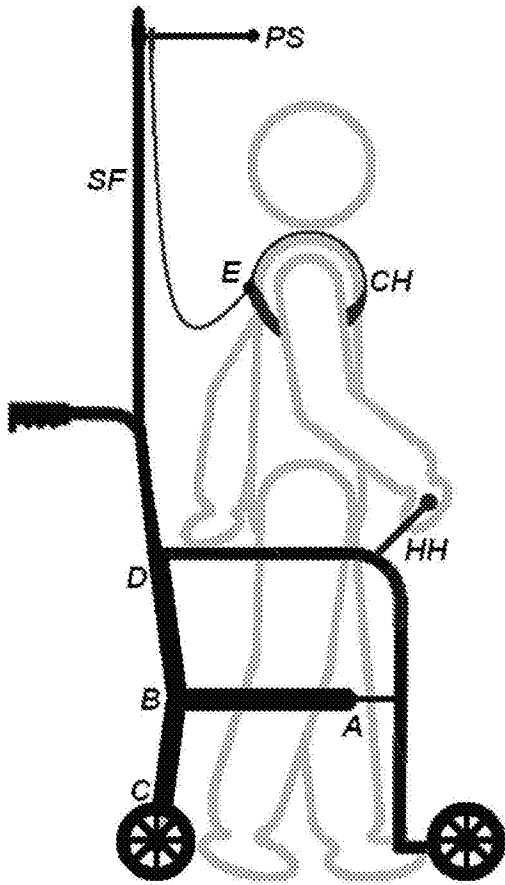


Figure 2A

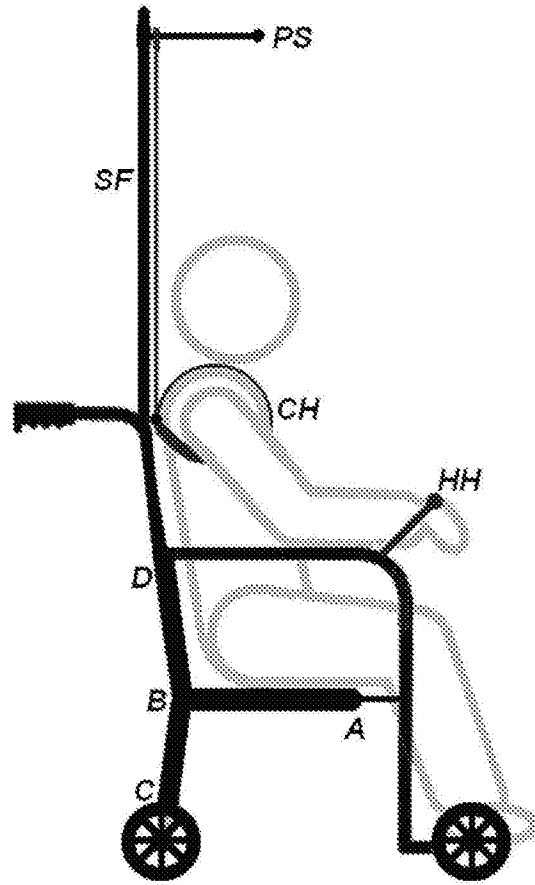


Figure 2B

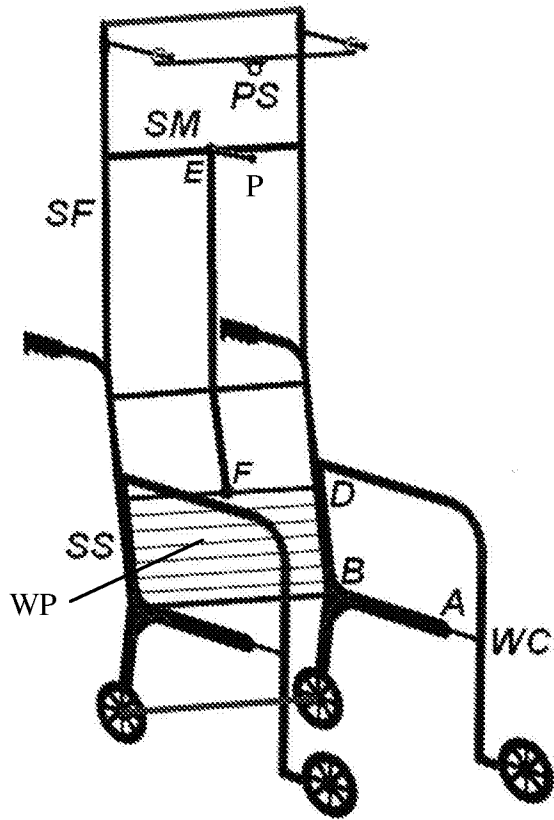


Figure 3A

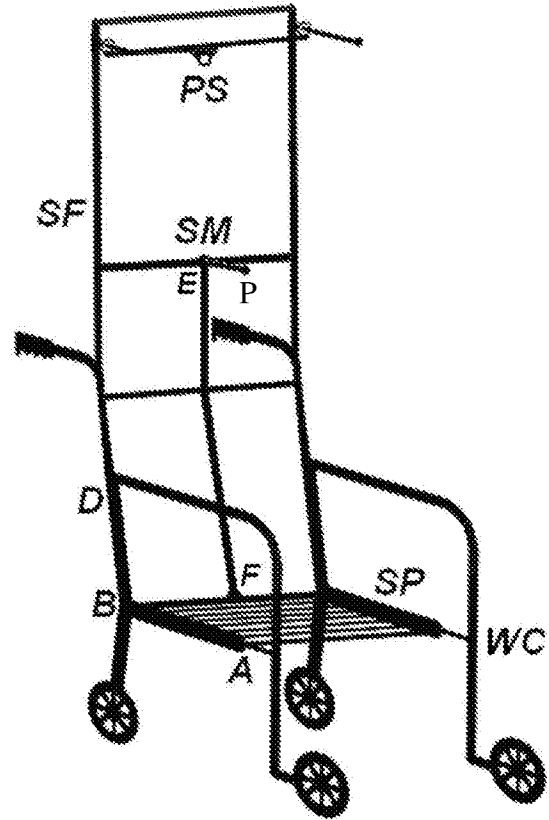


Figure 3B

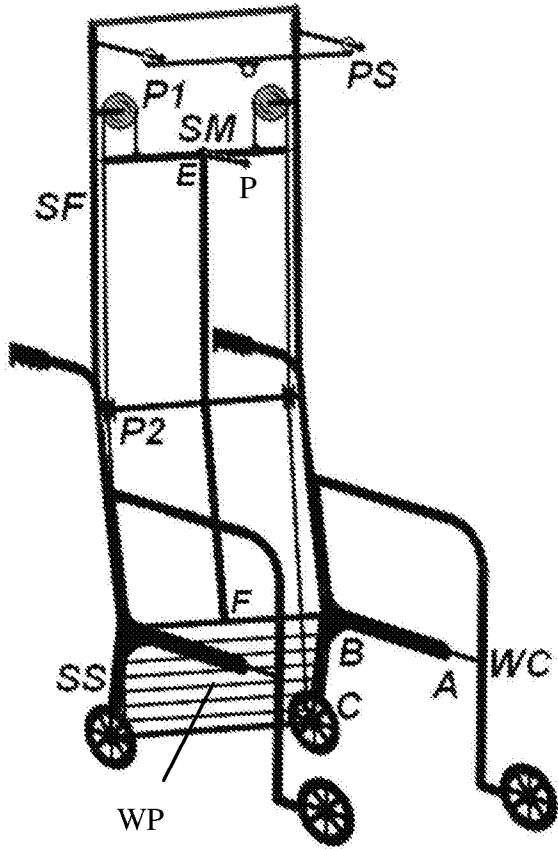


Figure 4A

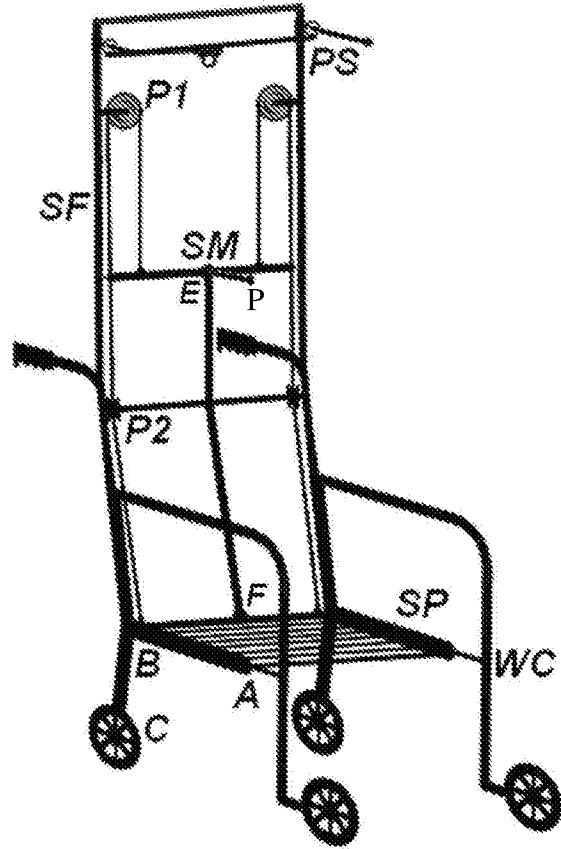


Figure 4B

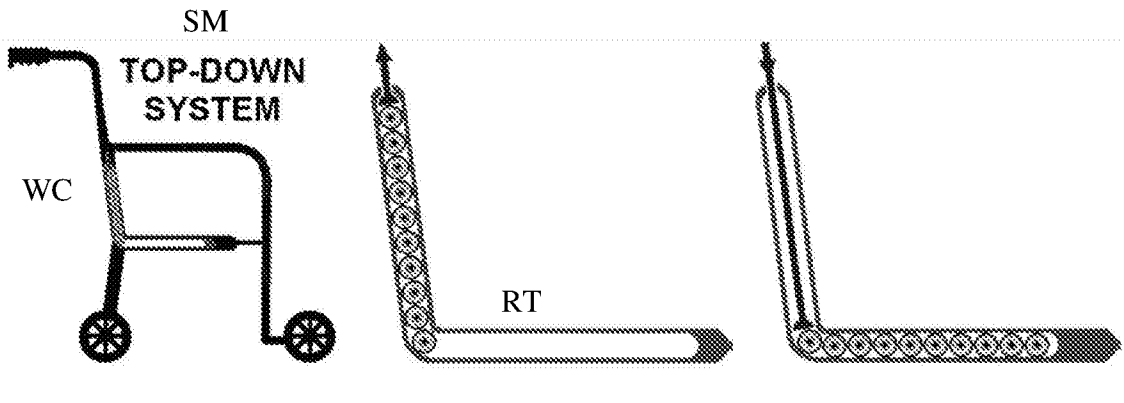


Figure 5A

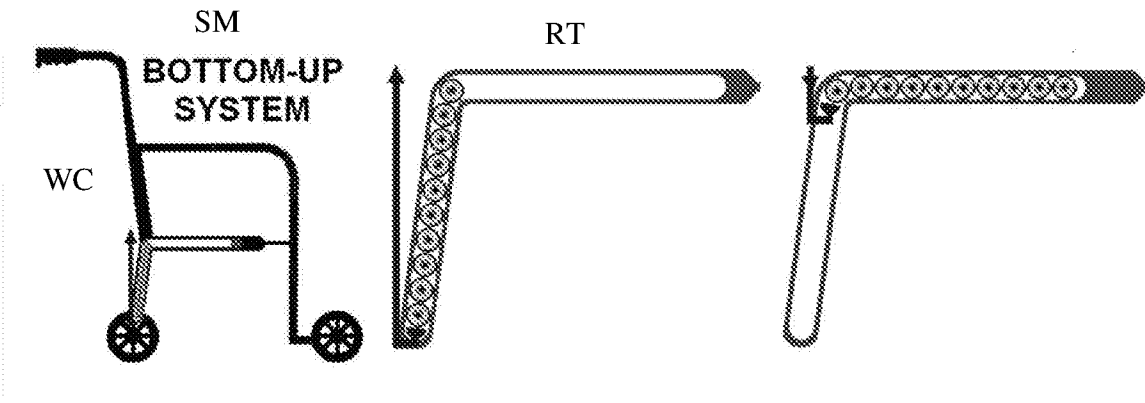


Figure 5B

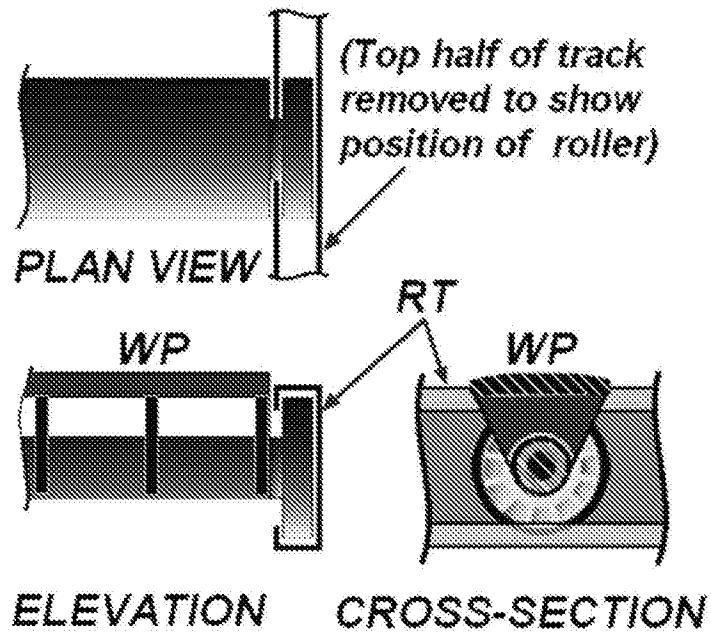


Figure 6

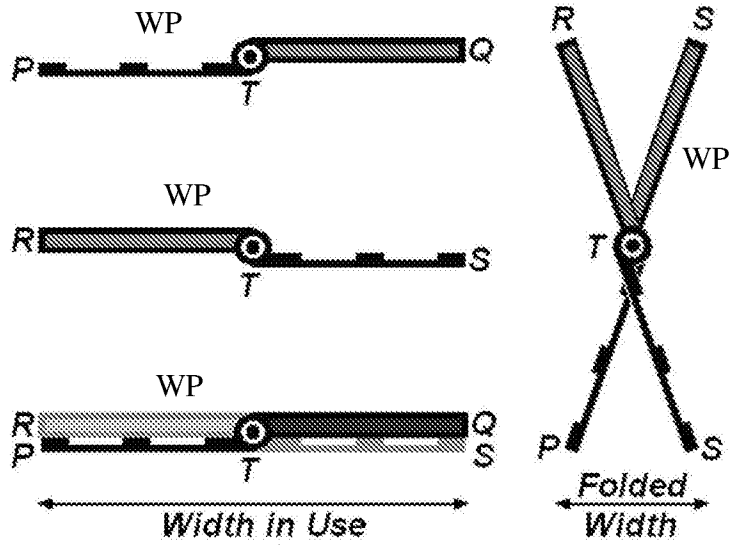


Figure 7

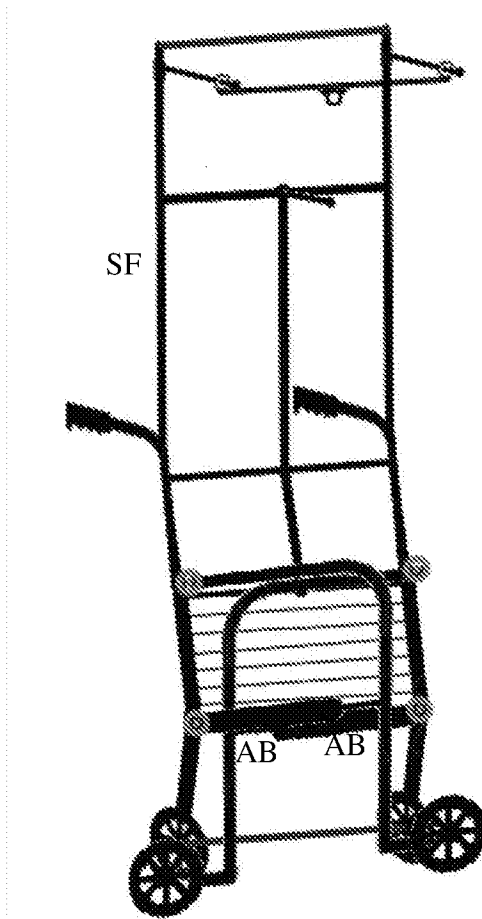
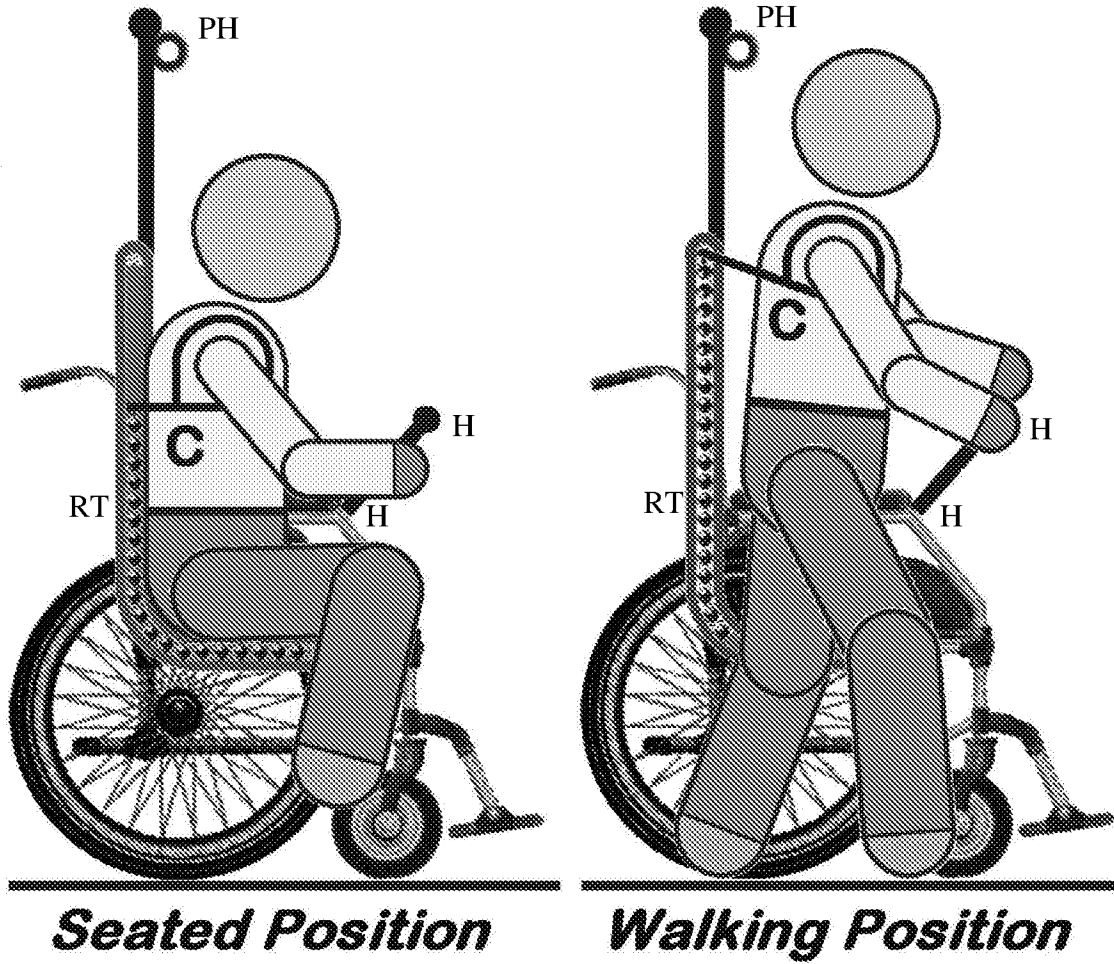


Figure 8

SafeWalker (without Pulleys)



HH - Handle Bar, C - Chest Harness

PH - Fail-safe Lanyard Hook

(Near-side of chair removed for easy viewing of mechanism.)

Figure 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SG2018/050386

A. CLASSIFICATION OF SUBJECT MATTER**A61G 5/10 (2006.01) A61H 3/04 (2006.01) A61G 5/08 (2006.01)**

According to International Patent Classification (IPC)

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61G; A61H

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

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

FAMPAT: walker, roller, wheel, track, rail, moveable, slidable, seat, chair, frame, support, linkage, harness, strap, 扶车, 轮椅, 助行器, 导轮, 滚轮, 滚道, 滑轨, 移动, 可调, 座椅, 座位, 支架, 连锁, 连杆 and related terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 9649236 B1 (WIKE, JR. C. K. ET AL.) 16 May 2017 Figures 1A, 13C; column 9, line 11-column 10, line 43; column 14, line 52-64; column 15, line 62-column 16, line 4	1-17
A	JP 2016-179047 A (NAKATA COATING CO. LTD.) 13 October 2016 Whole document of the machine translation	
A	US 5137102 A (HOUSTON, SR. T. T. ET AL.) 11 August 1992 Whole document	
A	CN 203852551 U (WANG X. K.) 1 October 2014 Whole document of the original non-English language document (a machine translation is enclosed only for your reference)	
A	US 2003/0146601 A1 (GUTIERREZ C.) 7 August 2003 Whole document	

 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

02/10/2018

(day/month/year)

Date of mailing of the international search report

04/10/2018

(day/month/year)

Name and mailing address of the ISA/SG

**Intellectual Property Office of Singapore**

51 Bras Basah Road

#01-01 Manulife Centre

Singapore 189554

Email: pct@ippos.gov.sg

Authorized officer

Wang Zhiying (Dr)

IPOS Customer Service Tel. No.: (+65) 6339 8616

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/SG2018/050386

Note: This Annex lists known patent family members relating to the patent documents cited in this International Search Report. This Authority is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 9649236 B1	16/05/2017	WO 2017/155629 A1 US 2017/0258653 A1	14/09/2017 14/09/2017
JP 2016-179047 A	13/10/2016	WO 2016/152232 A1	29/09/2016
US 5137102 A	11/08/1992	CA 1319313 C EP 0456718 A1 WO 90/08669 A1 AU 5041590 A	22/06/1993 21/11/1991 09/08/1990 24/08/1990
CN 203852551 U	01/10/2014	NONE	
US 2003/0146601 A1	07/08/2003	NONE	