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A61H 3/04 (2006.01)

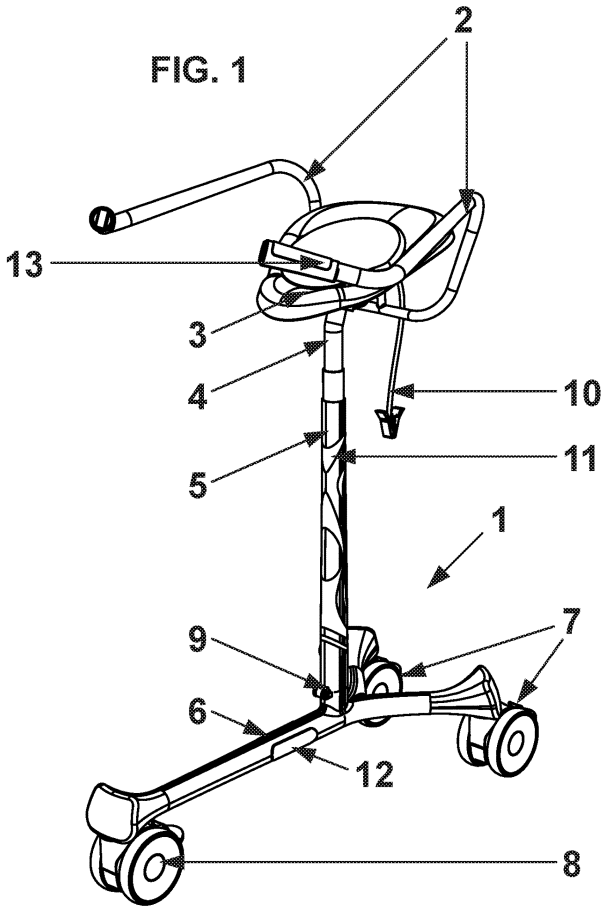
(56) Documents Cited:
WO 2015/148578 A2 **WO 2015/063765 A1**
WO 2015/043286 A1 **WO 2006/074029 A1**
WO 2006/014533 A2

(58) Field of Search:
INT CL **A61B, A61G, A61H**
Other: **WPI, EPODOC**

(54) Title of the Invention: **Smart elderly walker**
Abstract Title: **Foldable smart walker**

(57) A smart walker 1, for assisting a user with temporary impaired ambulatory skills in walking while having his/her body weight partially supported, is equipped with a seat 3 and an adjustable handle 2. The walker has means for collecting data regarding the number of steps taken by a user (for example a pedometer 12,13) and the user's heart rate and means for wirelessly transferring the data to an external location, for example another electronic device or server. The device is also able to receive data wirelessly from the said remote device. The device may have a base frame 6 with three legs with castor wheels 7, 8, a seat supporting column 4 by which the height of the seat can be adjusted and a clip 10 which can attach to the clothing of the user and send an alert signal to a caregiver or medical practitioner. The device may furthermore be foldable for easy storage.

FIG. 1



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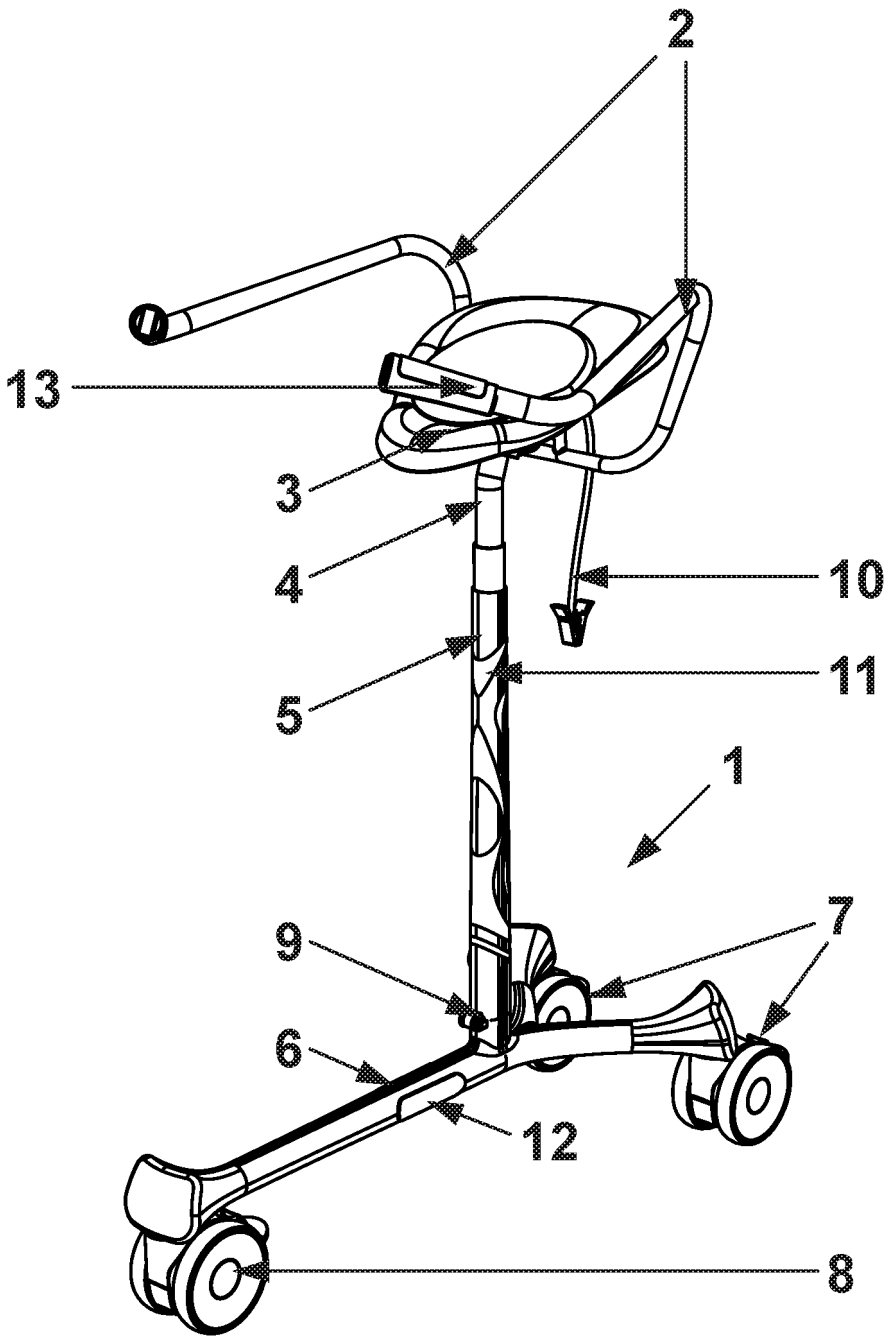

FIG. 1

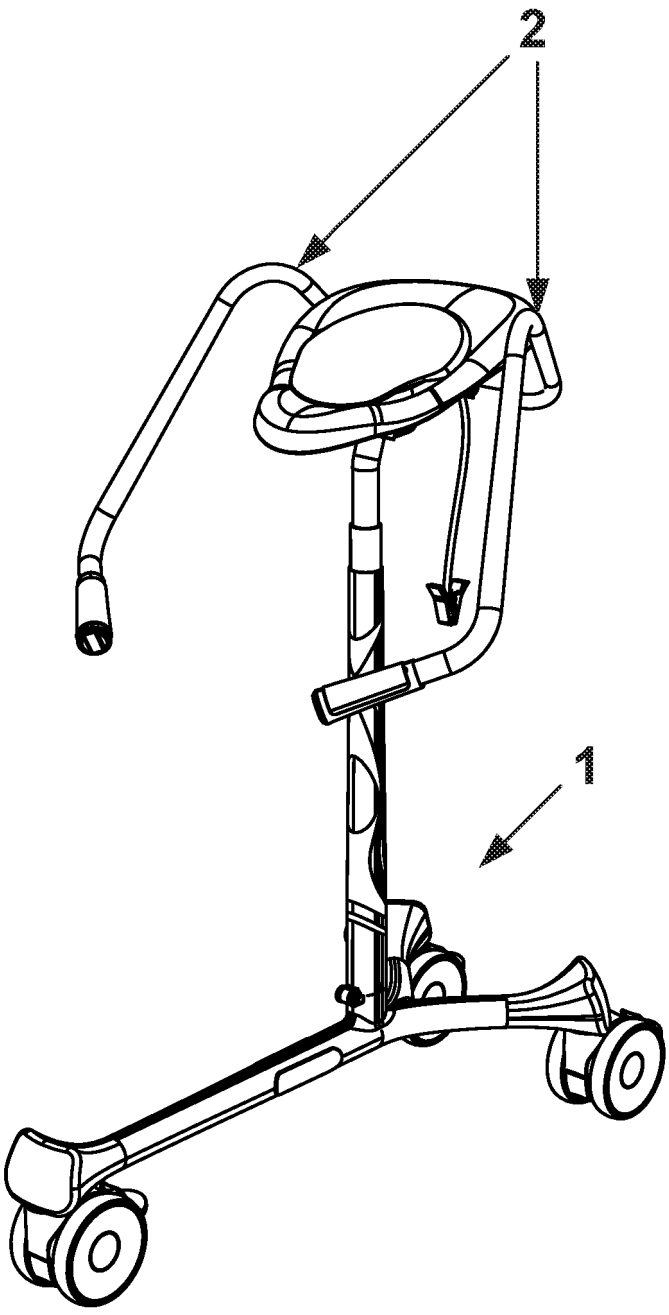

FIG. 2

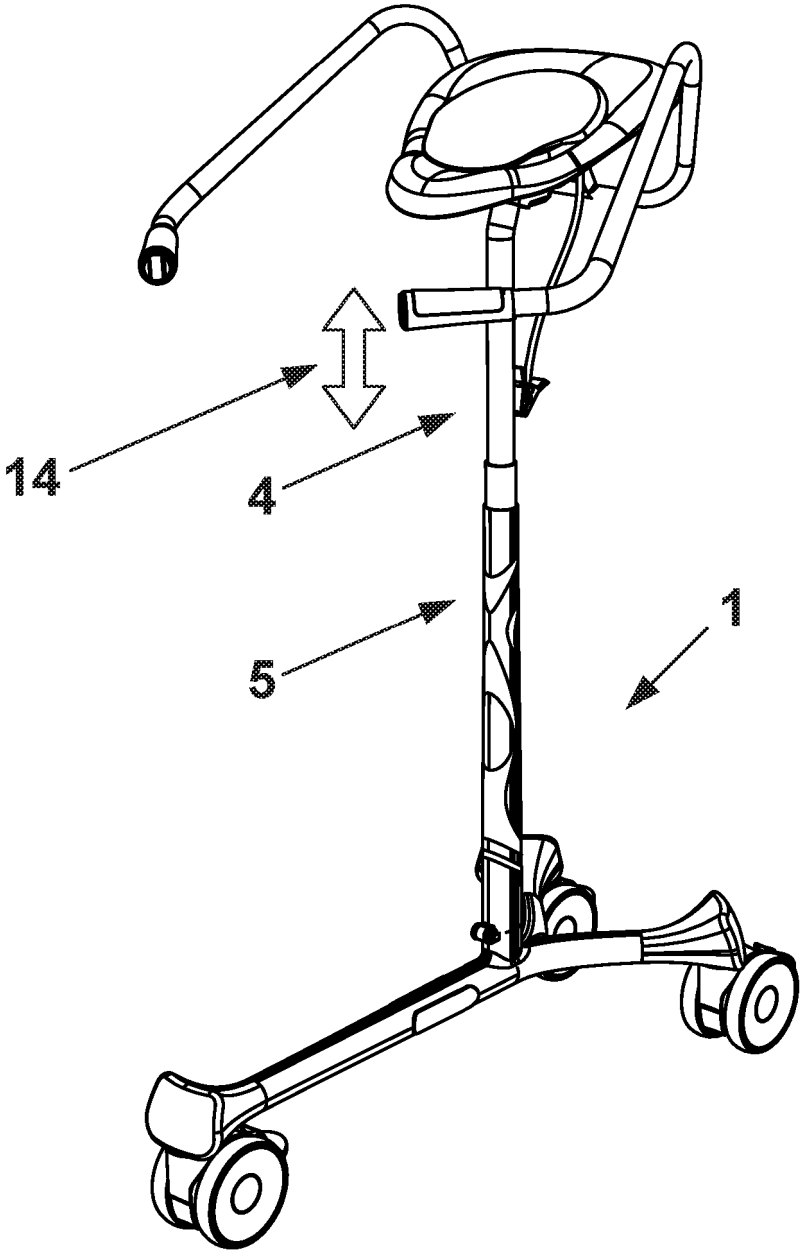

FIG. 3

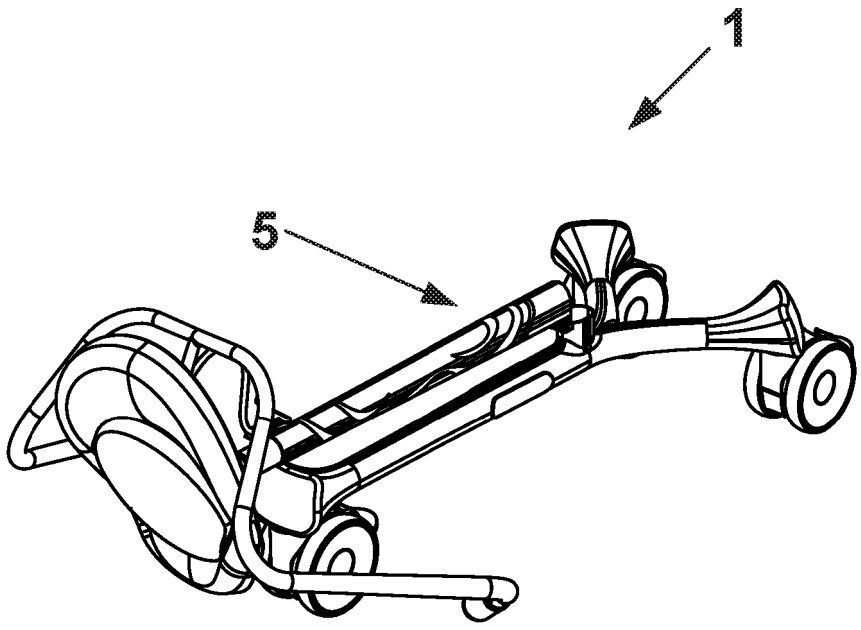

FIG. 4

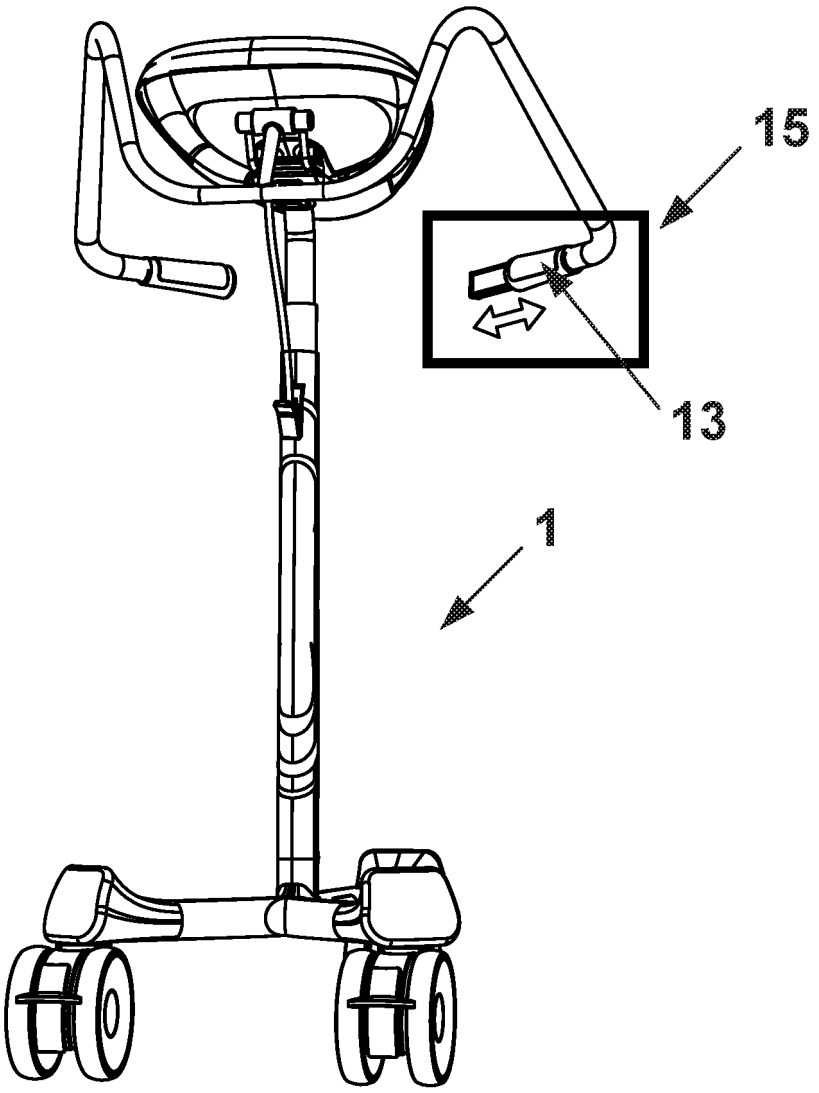

FIG. 5

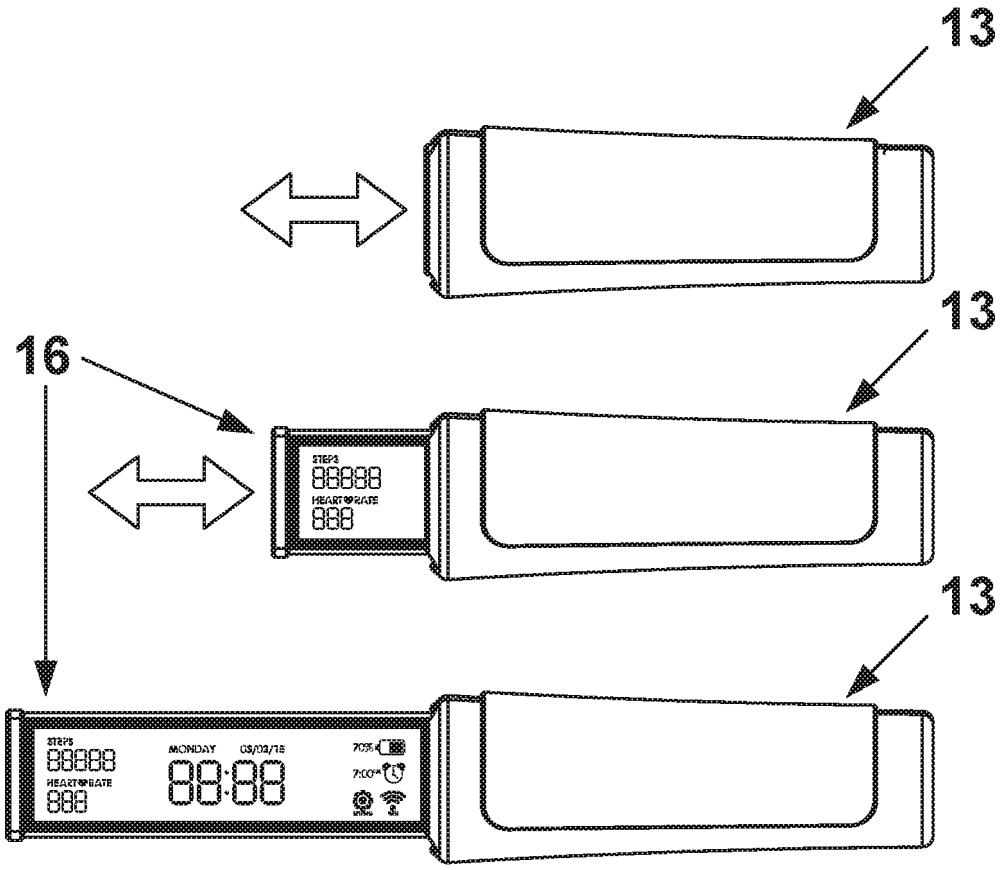

FIG. 6

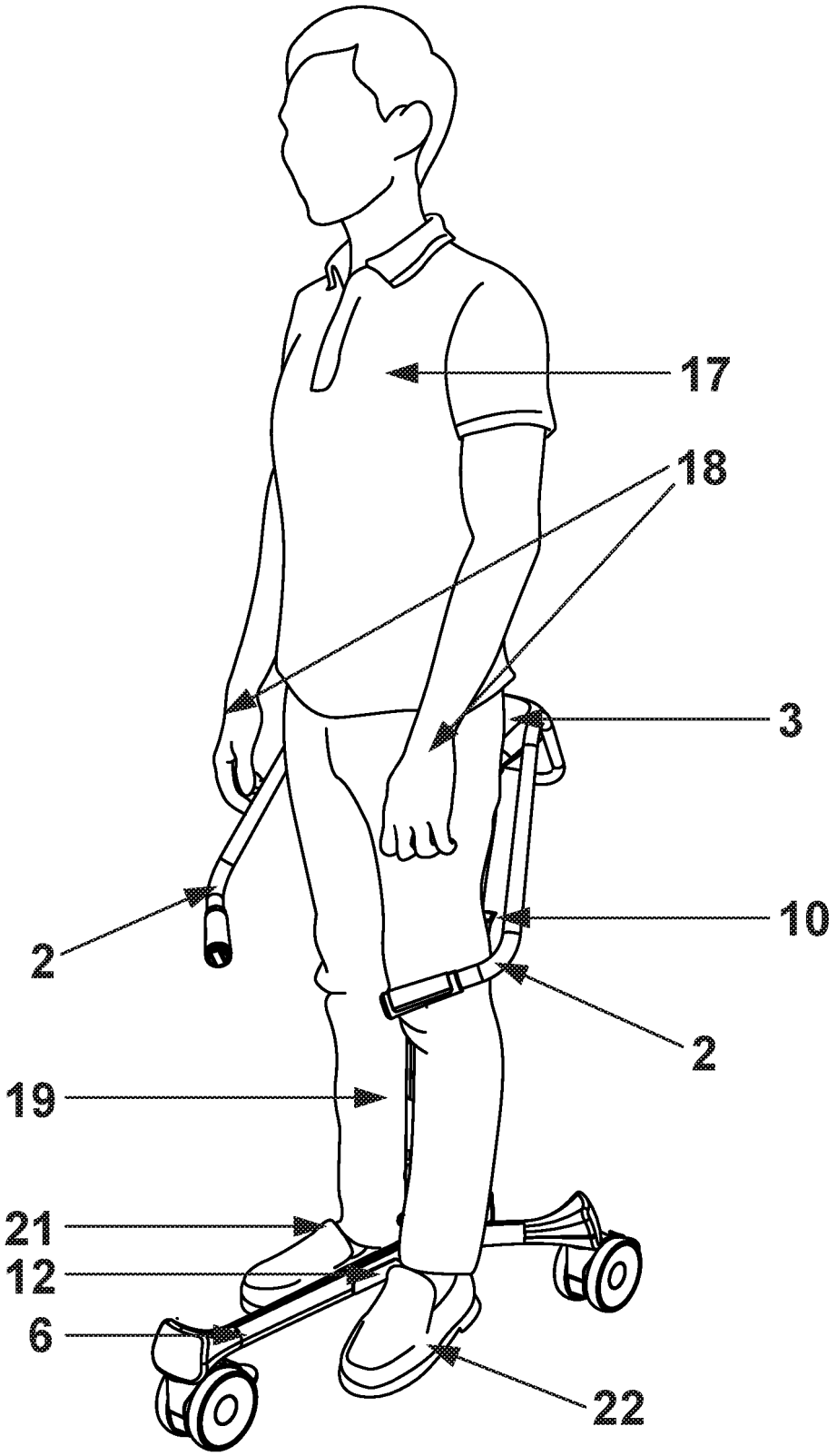

FIG. 7A

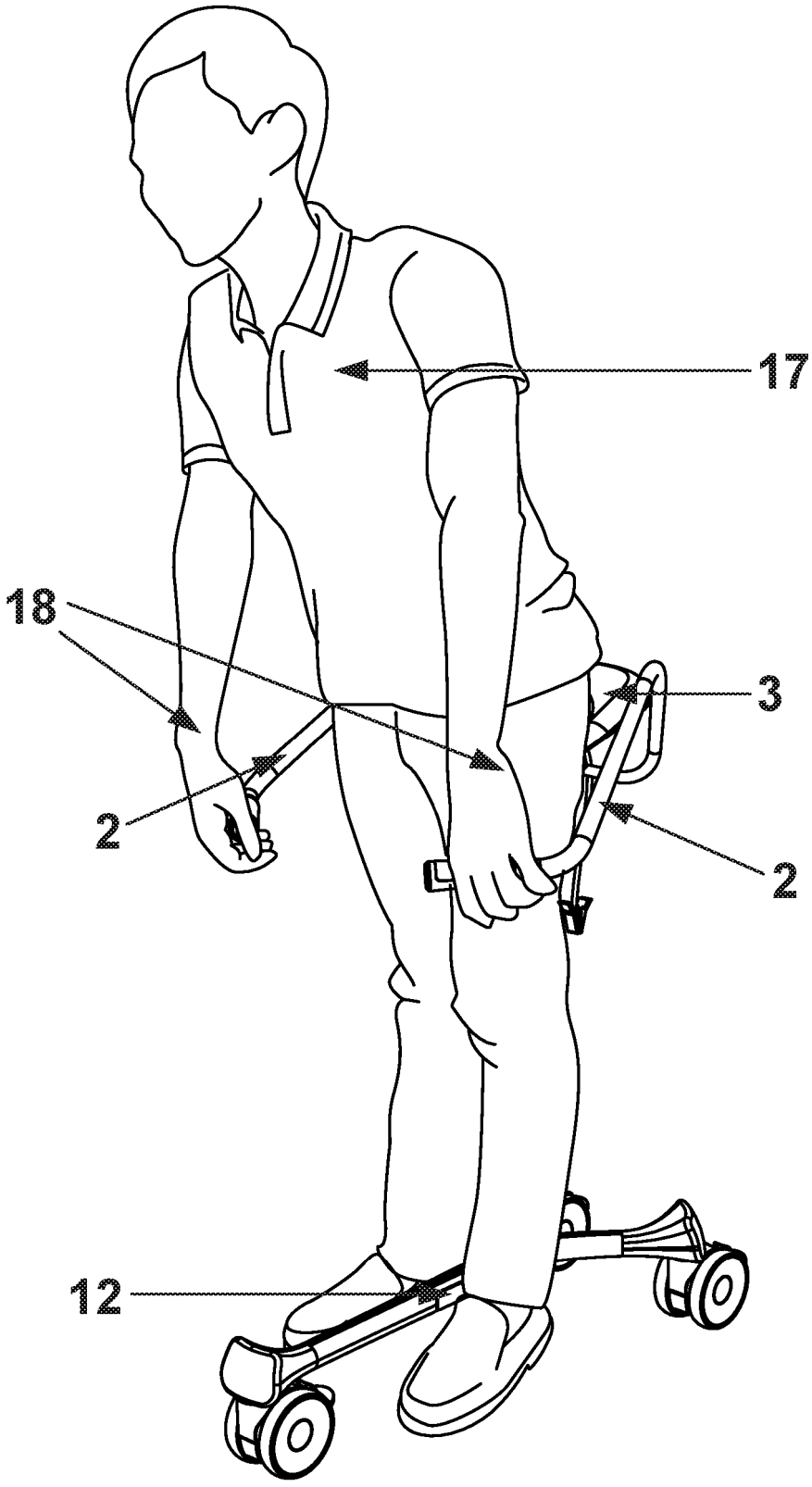

FIG. 7B

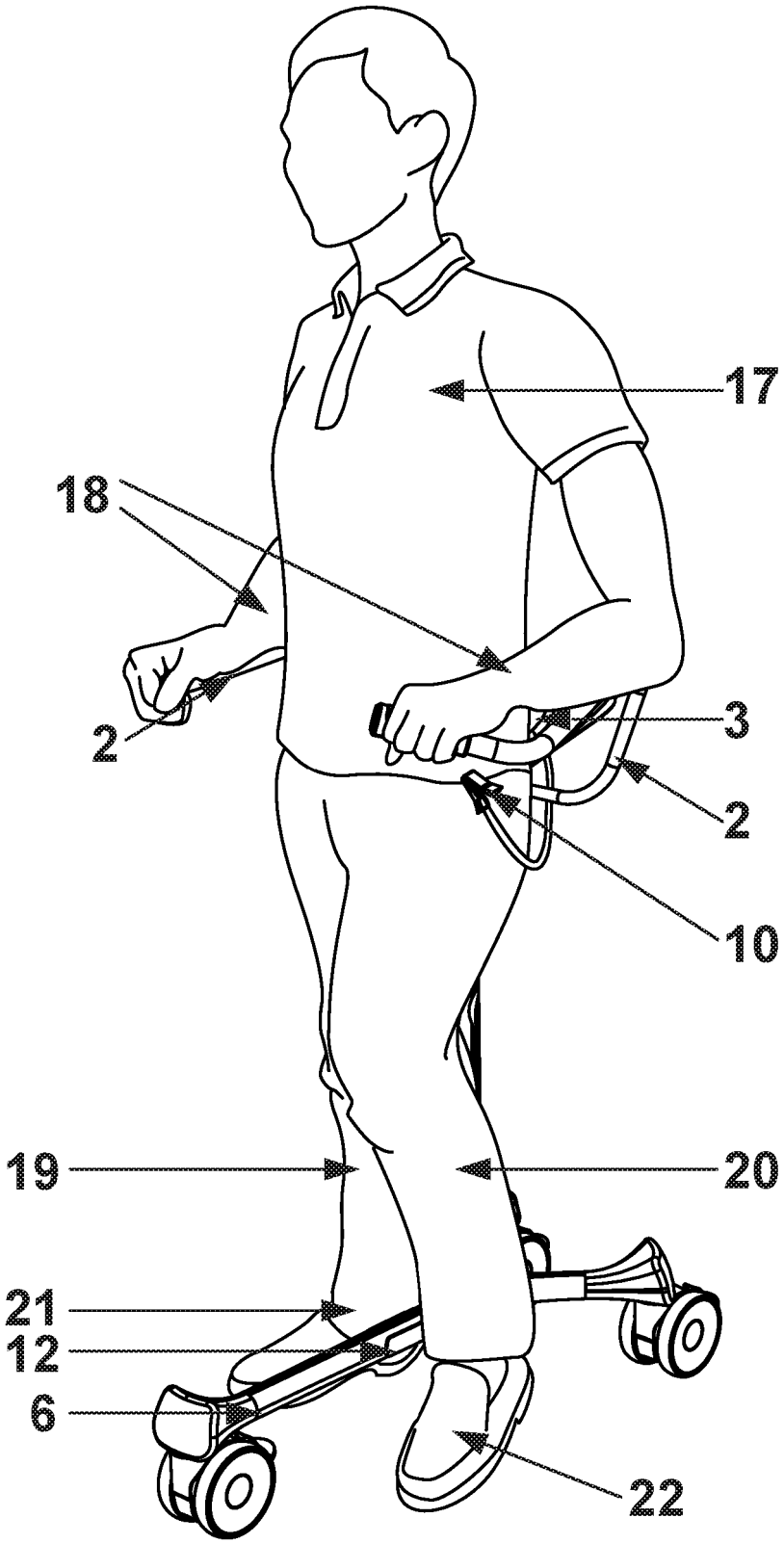

FIG. 7C

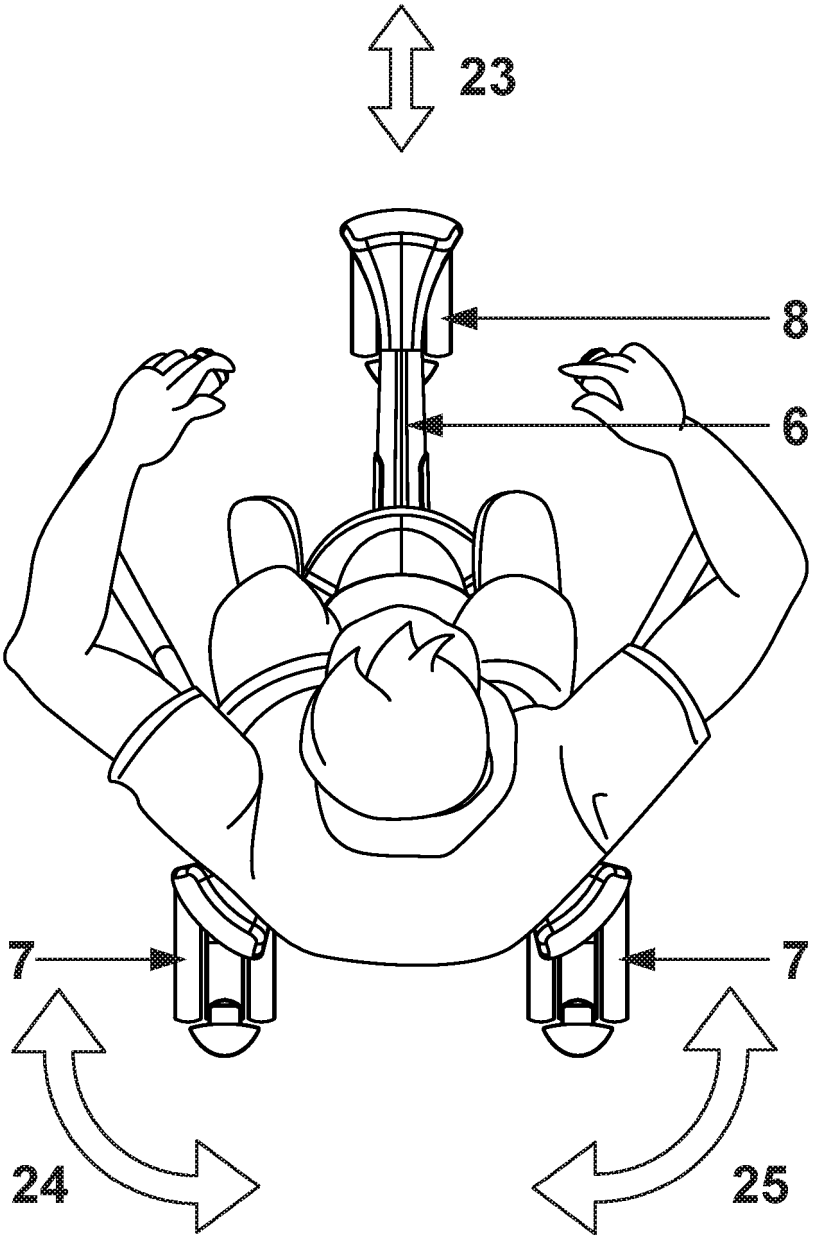

FIG. 8

The following terms are registered trade marks and should be read as such wherever they occur in this document:

Bluetooth (page 6, 13, 21)

SMART ELDERLY WALKER

FIELD OF INVENTION

The present invention here relates to a field of walking aids for the elderly or persons who have temporary impaired ambulatory skills, and more particularly, it is directed to a smart foldable three-wheeled walker with wireless capabilities and the ability to measure the number of steps taken, heart rate monitoring and alerting feature should the elderly fall.

BACKGROUND OF THE INVENTION

It is well-known in the prior art that there are various types of walker devices being used by the elderly who may have difficulty in standing and walking for long unaided or persons who have temporary impaired ambulatory skill. Majority of these devices involved the user moving in a two-step process with the user first leaning towards the walker device when taking steps and then lifts and moves the walker ahead when the user has reached a stable equilibrium with respect to their movement. Some of the walkers in the prior art have wheels but without a seat while some have wheels and are also equipped with a seat for the user while at the same time, allowing the user with reduced or temporarily impaired ambulatory skills to move around within a certain area using their legs.

Significant resources and research has been done to assist the elderly who are temporarily or chronically experiencing difficulty walking within a certain area or space. Some of the elderly do require some form of support while walking, and such a support can also be a seat being incorporated into the walker device. Typically, such walkers with wheels and a seat are preferred. Walkers with wheels and seat in the prior art would include US Patent Numbers 4,065,145, 4,239,248, 4,861,051, 5,158,313, 5,167,597 and 6,149,170.

US 4,065,145 discloses a three-wheeled vehicle for semi-ambulatory patients, whereby it consists of a pair of rear wheels supporting an adjustable height seat and a forward single wheel that is pivotably supported by a frame which is then coupled to a pair of hand grips to provide steering. US 4,239,248 discloses a steerable collapsible walker consisting of three relatively large wheels, whereby the seat is in the centre and the middle wheel is able to be steered by an interconnected cable and lever system. US 4,861,051 discloses a rehabilitation walker device with an open symmetrical frame with means to support the seat, handlebar means to support the handlebar portion, centerbar means for connecting the seat support to the handlebar means, a pair of widely spaced front caster wheels and a pair of closely spaced caster wheels at the rear of the device supporting a chair-like seat.

US 5,158,313 discloses a wheeled walker with a frame with a front inverted U-shaped section coupled to fixed axis front wheels, and a height adjustable handlebar that is slidable and lockable at the front frame section. There is a central frame member that is curved and directed to the rear, with the rear frame section that is adjustably coupled to the centrally disposed front frame member and a vertically adjusted seat.

US 5,167,597 discloses a wheeled walker more for therapeutic treatment of a person with difficulty in walking. The wheeled walker consists of a raised seat which supports a large portion of the user's weight, in the manner of a bicycle. The walker is propelled using feet and is steerable with a handlebar. For stability at very slow rate of forward movement as well as at rest, the walker is supported on four small wheels of the roller skate or skateboard type, rather than on two large wheels of the bicycle type.

US 6,149,170 discloses a bike-like rehabilitation device with a frame consisting of a longitudinal member supported on a rear-wheel and a transverse member supported on a pair of front wheels. The longitudinal member includes a descending section

which is located substantially close to the ground to facilitate ease of getting on and off the rehabilitation device.

As highlighted in the prior art, most of these walker devices shared a similarity in which a seat is being equipped for the user to sit on it and then propel or move forward using their legs. In addition, most of the designs mentioned in the prior art would require the user to fully sit on the walker device, thus the user would need to use his/her legs power to propel the walker device forward. Moreover, most of the designs mentioned in the prior art are targeted at persons with ambulatory problems or for rehabilitation purposes. The use of the walker would facilitate the user or the elderly to walk without much effort on the user side. This would be especially useful in societies or countries where aging would be an issue in the future with the declining birth rates being prevalent and lesser births per family to be more common in the future. Typically a walker can be applied in an indoor home environment setting where the user stays or resides. A lot of the walkers mentioned in the prior art are for rehabilitation purposes and for outdoor use. Moreover most of the walker in the prior art has no monitoring capability and has no means to ensure that the elderly is safe or is doing the necessary exercise required for therapy treatment. Hence there is a need for a walker catered for such home use indoor environment.

In addition, such a walker could also incorporate smart intelligent features that could enable the monitoring of the user or the elderly within the indoor home environment setting.

Hence in response to what was available in the prior art, the embodiment in the present invention serves to provide a smart walker for use in the indoor home environment. The invention relates to an apparatus for use particularly by the elderly in the home environment, utilizing a front wheel and two smaller rear wheels with the user's weight being supported on a raised seat with a small lower back support. The raised seat is supported on a vertical column which in turn is connected to a frame at the base of the walker supported by the wheels. The vertical column is coated with a type of chemical coating that can glow in the dark, something which is useful for the user or the elderly when using the walker in the dark as it enhances the visual effect of the walker. An adjustable handle extends from the vertical column underneath the raised seat provides the necessary grip and support for the user.

There is a pedometer that can be retracted in and out from the end at the column of the adjustable handle. It can be programmed to connect wirelessly (e.g. via

Bluetooth or WIFI) in a smart home environment that is digitally wired-up to contact the caregiver or the loved ones of the user / elderly or any designated hospital or nursing home should anything happen to the user / elderly. The pedometer has a display unit that is able to display parameters like the number of steps taken and heart rate monitoring. The number of steps taken can be sensed via the sensor mounted at the base frame while the heart rate can be monitored when the user touches the adjustable handle. The pedometer is also smart enough to communicate wirelessly to the cloud database downloading and uploading of information in real-time. It has the capability to communicate wirelessly to any electronic device hardware and its corresponding software applications (or "apps") so that the user can download and see the data in real-time for personal tracking and monitoring purposes. Such data is captured wirelessly by a local server or a server on a real-time cloud platform. In addition, data analytics is generated to analyze the user behavioral and usage patterns. Targeted health-related products, write-ups or articles are streamed to the user periodically through the software applications (or "apps") that the user has installed on his/her electronic device. Moreover, there is a clip at the base edge of the seat which will be clipped onto either the shirt or the pants of the user / elderly. When the user / elderly trip or fall, the chip will be dislodged from the user / elderly's clothing and it will send an alert signal to contact

the caregiver or the loved ones of the user / elderly or any designated hospital or nursing home.

The vertical column is extendable in the vertical direction at varying heights, thus making it suitable for the elderly of different heights and bend of legs in order to have ease of access from the bed or from anywhere else, including sofa seat, etc. In addition, the whole walker itself is collapsible for ease of keeping. It is also light and portable and makes it easy for the caregiver to carry it around when the elderly travels, be it from home to hotel (or vice-versa) or even shuttle from plane, taxi to train (or vice-versa).

The whole body for the embodiment of the present invention is quite compact and lightweight in order to facilitate ease of usage by the elderly. It is lightweight and portable as the walker is manufactured from composite material. The walker is propelled forward or backwards by the feet in a normal motion and is useful for those elderly who have difficulty walking or difficulty in standing too long on their own body weight. The present invention helps such elderly to gain muscle strength while being able to push oneself with their own legs within the home environment, thus empowering their independence. For such elderly, the raised seat would be able to

support a substantial portion of their body weight while seated in the resting position and with their legs providing motion. This means that the user (i.e. in this case the elderly) would then still be in an almost standing-like position and not at fully-seated level so as to ensure ability to work at table level height such as cooking, washing dishes, ease of access to stuff, etc.

As a result, the embodiment in the present invention is suitable for use in a home environment whereby the floor area would not be that big to pose a huge challenge for such elderly who have difficulty moving around.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawings attached here are to aid in better understand the description of the invention here. The drawings are not to scale and they are to be used for merely illustrating the principles and concepts of the invention.

To aid in the description of the invention, the drawings are broken up into various Figures as described below:

Figure 1 illustrates a perspective view of the embodiment of the present invention.

Figure 2 illustrates another perspective view of the embodiment of the present invention, with the adjustable handle in another different position.

Figure 3 illustrates a perspective view of the embodiment of the present invention, highlighting the adjustable vertical column.

Figure 4 illustrates another perspective view of the embodiment of the present invention in a collapsible state.

Figure 5 illustrates a perspective view of the embodiment the present invention, highlighting the retractable pedometer from the column-end of the adjustable handle.

Figure 6 illustrates the pedometer with the pop-out screen.

Figure 7A - 7C illustrates a perspective view of the embodiment of the present invention, highlighting the different stages when in use by a user practicing the

method of the invention.

Figure 8 illustrates a top view of the present invention, highlighting the different directional movement when in use by a user practicing the invention.

Reference numbers

1	Walker
2	Adjustable Handle
3	Seat
4.	Vertical Column
5	Seat sleeve
6	Base Frame
7	Smaller Castor Wheels
8	Bigger Castor Wheels
9	Unlocking Pivot Point
10	Clip
11	Glow in the Dark coating
12	Pedometer Sensor
13	Pedometer (within the adjustable handle)
14	Adjustable upwards or downwards direction
15	Zoom-In Area of the Pedometer
16	Pedometer Screen (Pop-out)
17	User
18	User's Pair of Hands
19	User's Right Leg
20	User's Left Leg

21 User's Right Feet

22 User's Left Feet

23 Forward and/or backward movement for Bigger Castor Wheels

24 Forward and/or backward movement for Smaller Left Castor Wheel

25 Forward and/or backward movement for Smaller Right Castor Wheel

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT OF THE PRESENT INVENTION

The drawings attached here are to aid in better understand the description of the invention here. The drawings are not to scale and they are to be used for merely illustrating the principles and concepts of the invention. In the following description, details are provided to describe the embodiment of the application. It shall be apparent to the person skilled in the art, however, that the embodiments may be practiced without such details.

The present invention here is directed at a smart foldable three-wheeled walker equipped with a seat so as to assist the elderly in walking with a shuffling motion with his/her feet/foot on the ground while being seated concurrently. It has wireless capabilities and the ability to measure the number of steps taken, heart rate monitoring and alerting feature should the elderly fall.

Figure 1 illustrates a perspective view of the embodiment of the present invention. The invention consists of the walker **1** comprising of an adjustable handle **2** attached to base of a seat **3**, with the seat **3** being fixed to a vertical column **4** which can be adjusted upwards or downwards via seat sleeve **5** attached to the base frame **6.** The base frame **6** is three-legged, consisting of two (2) smaller castor wheels **7** and

one bigger castor wheels **8** align to the front of the base frame **6**. The seat sleeve **5** is collapsible by activating the unlocking pivot point **9** situated at the intersection between base frame **6** and seat sleeve **5**. Also illustrated in **Figure 1**, the vertical column **4** is coated with a type of chemical coating denoted as **11**, whereby it can glow in the dark, something which is useful for the user or the elderly when using the walker in the dark as the coating **11** can enhance the visual impact of the walker **1** on the user.

Figure 1 also illustrates a pedometer **13** that can be retracted in and out from the end at the column of the adjustable handle **2**. It can be programmed to connect wirelessly (e.g. via Bluetooth or WIFI etc) in a smart home environment that is digitally wired-up to contact the caregiver or the loved ones of the user / elderly or any designated hospital or nursing home should anything happen to the user / elderly. The pedometer **13** has a display unit that is able to display parameters like the number of steps taken and heart rate monitoring. The number of steps taken can be sensed via the pedometer sensor **12** mounted at the base frame **6**. The pedometer **13** is also smart enough to communicate wirelessly to the cloud database downloading and uploading of information in real-time. It has the capability to communicate wirelessly to any electronic device hardware and its corresponding

software applications (or "apps") so that the user can download and see the data in real-time for personal tracking and monitoring purposes. Such data is captured wirelessly by a local server or a server on a real-time cloud platform. In addition, data analytics is generated whereby the information can be periodically transmitted to, for example, the user's designated family doctor. Targeted health-related products or health-related write-ups or articles are streamed to the user periodically through the software applications (or "apps") that the user has installed on his/her electronic device. There is a clip **10** at the base edge of the seat **3** whereby the clip can be clipped onto either the shirt or the pants of the user / elderly. It can send an alert signal to contact the caregiver or the loved ones of the user / elderly or any designated hospital or nursing home should anything happen to the user / elderly, such as when the user / elderly trip or fall, with the clip dislodged from the user when that happens.

Figure 2 illustrates another perspective view of the embodiment of the present invention, with the adjustable handle **2** in another different position. The adjustable handle **2** can be adjustable upwards or downwards according to the user's preference and it also helps to facilitate the user ease of entry to the seat **3** when using the embodiment in the present invention. Moreover with the handle **2** being

adjustable, it can also enable ease of keeping and storage of the walker **1** when not in use by the user, as illustrated in **Figure 4**.

Figure 3 illustrates a perspective view of the embodiment of the present invention, whereby seat **3** can be adjusted at varying heights to suit the height of the user via the adjustable vertical column **4** so that the user can have ease of access from the bed or from anywhere else, including sofa seat, etc. This means that the user or the elderly would then be able to work at table level height on an almost standing-like position on activities such as cooking, washing dishes, etc. Depending on the configuration and design preferences, the vertical column **4** can be telescopically adjusted upwards or downwards within the seat sleeve **5** as illustrated in the direction **14**, or via any external adjustment knob or any other suitable means.

Figure 4 illustrates another perspective view of the embodiment of the present invention in a collapsible state, with the seat sleeve **5** being able to be collapsed flat horizontally via the unlocking pivot point **9.** In this collapsible state, the present invention is compact enough for ease of keeping and storage when the user is not using it. This will be especially useful when there are constraints in the storage space/area, thus freeing up useful space. Moreover, having the walker itself being

collapsible will make it portable and easier for the elderly to carry it around when the elderly travels, be it from home to hotel (or vice-versa) or even shuttle from plane to train (or vice-versa). It is easier to carry since it is made of lightweight composite material.

Figure 5 illustrates a perspective view of the embodiment the present invention, with a zoom-in **15** highlighting the retractable pedometer **13** from the column-end of the adjustable handle **2.** The pedometer **13** can be either hidden within the column-end of the adjustable handle **2** when in use or have it popped-out for reading of the data on the pedometer screen.

Figure 6 illustrates the pedometer **13** with the pop-out screen **16** with a slight manual depress at the side. The pop-out screen **16** can be retracted back with another slight depress. The pop-out screen **16** is customisable to highlight key menus such as the current day / date / time, number of steps taken, heart-rate, wireless connection settings, etc. Moreover, the pedometer **13** is battery-powered, either by means of a rechargeable or via a disposable non-rechargeable battery.

Figure 7A - 7C illustrates a perspective view of the embodiment of the present

invention, highlighting the different stages when in use by a user **17** practicing the method of the invention. A typical approach to use the embodiment of the present invention is hereby described as follows. First, the user **11** is provided with the walker **1** constructed accordingly to what has been described in the previous paragraphs. Next, the user **11** will then adjust the height of the seat **3** according to his/her preferences such that it will support a portion of the user's body weight (i.e. not the entire body weight) when he/she is standing in a normal upright position with his/her buttocks resting on seat **3**. The remainder of the user's weight will then be distributed by the user's legs **19** and **20** and feet **21** and **22** which are positioned on opposite sides of the base frame **6.** At this position, the user's pair of hands **18** is at the free resting position as illustrated in **Figure 7A**. Moreover at this position, the pedometer sensor **12** is able to sense and detect that the user's legs **19** and **20** and feet **21** and **22** are not moving, hence there will no reading shown on the pedometer **13**. Similarly since the user's hands **18** are at the free resting position, no heart rate can be monitored, thus no reading is taken too.

Figure 7B illustrates the position where the user **11** would then bend slightly forward to grab hold of the adjustable handle **2** using both hands **18.** The adjustable handle **2** would then be adjusted to an angle that is comfortable enough for the user **11** to

hold onto before moving the entire walker **1** around with his/her weight partially supported by the seat **3**. Similarly at this position, there is no leg movement from the user **11**, hence the pedometer sensor **12** is able to sense and detect non-movement, which in turn translate into a nil-reading shown on the pedometer **13**. However as the user's hands **18** are gripped onto the adjustable handle **2**, the user's heart rate can be monitored prior to him / her shuffling around with the walker **1**.

Figure 7C illustrates the position where the user **11** would walk with the walker **1** with his/her hands **18** firmly gripped onto the adjustable handle **2**. The clip **10** at the base edge of the seat **3** can be clipped onto either the shirt or the pants of the user **11**. It can send an alert signal to contact the caregiver or the loved ones of the user / elderly or any designated hospital or nursing home should anything happen to the user / elderly, such as when the user / elderly trip or fall, with the clip dislodged from the user should that happens. With the user's legs **19** and **20** and feet **21** and **22** on opposite sides of the base frame **6**, the user **11** would then be able to walk with the walker **1** using his/her legs **19** and 20 and feet **21** and **22** in a shuffling motion while being seated concurrently with the user's weight being partially supported by seat **3**. This means that the user (i.e. in this case the elderly) would then still be in an almost standing-like position and not at fully-seated level so as to ensure ability to work at

table level such as cooking, washing dishes, ease of access to stuff, etc. Hence while in shuffling motion, the pedometer sensor **12** is able to sense and detect that the user's legs **19** and **20** and feet **21** and **22** are moving, which in turn is translated into the number of steps taken as shown on the pedometer **13.** As the user **1** shuffles around with the walker **1**, his / her heart rate is also being monitored since the user's hands **18** are firmly gripped on the adjustable handle **2**. The heart-rate can be monitored from the pedometer screen **16** which can be popped out from pedometer **13.**

Figure 8 illustrates a top view of the present invention, highlighting the different directional movement when in use by a user **11** practicing the method of the invention. The present invention can move forward or backwards in the direction **23** taking reference from the base frame **6**. Moreover the present invention is able to swivel in the direction **24** and **25** due to the presence of the bigger castor wheel **8** and the two (2) rear castor wheels **7** at the bottom of the seat **3.** The design of the castor wheels are such that it will swivel 360 degrees around. This provided added flexibility and mobility to the user **1** when moving around especially within a confined area.

It is to be understood that the foregoing description of the preferred embodiment is intended to be purely illustrative of the principles of the invention, rather than exhaustive thereof, and that changes and variations will be apparent to those skilled in the art, and that the present invention is not intended to be limited other than as expressly set forth in the following claims.

CLAIMS

1. A system of utilizing the smart walker for assisting the elderly or persons who have temporary impaired ambulatory skills, comprising of

- The user holding onto the adjustable handle and having his/her body weight partially supported by a seat; and
- Shuffling around using his/her legs while partially supported by a seat; and
- Having the number of steps and heart rate digitally recorded; and
- Downloading of information such as number of steps, heart rate via
  - current wireless technology such as Bluetooth or WIFI in a smart home environment that is digitally wired-up to contact the caregiver or the loved ones of the user or any designated hospital or nursing home should anything happen to the user; and / or
  - communicate wirelessly to any electronic device hardware and its corresponding software applications (or "apps") so that the user can download and see the data in real-time for personal tracking and monitoring purposes;
- Capturing of data by a local server or a server on a real-time cloud platform for data analytics to analyze the user behavioral and usage

patterns,

- Wherein targeted health-related products, write-ups or articles are streamed to the user periodically through the software applications (or "apps") that the user has installed on his/her electronic device.

2. A smart walker of **Claim 1**, comprising of

i) a three-legged base frame consisting of two smaller castor wheels attached to the rear of the base frame and one bigger castor wheels align to the front of the base frame, and

wherein there is a pedometer sensor located at the front of the base frame;

ii) a seat sleeve attached to the base frame;

iii) a vertical column that can be adjusted upwards or downwards via seat sleeve attached to base frame;

iv) a seat fixed to the vertical column,

wherein the seat can be adjusted upwards or downwards accordingly to the height of the adjustable vertical column; and

wherein there is an unlocking pivot point situated at the intersection between base frame and seat sleeve; and

wherein there is a clip at the base edge of the seat that can be clipped onto either the shirt or the pants of the user, whereby it can send an alert signal to contact the caregiver or the loved ones of the user / elderly or any designated hospital or nursing home should anything happen to the user / elderly, such as when the user / elderly trip or fall with the clip dislodged from the user when that happens;

v) an adjustable handle that is connected to the base of the seat,

wherein the handle can be adjusted to suit the user's preferences; and

wherein the user can monitor his/her heart rate by holding on to the adjustable handle with his /her hands; and

vi) a pedometer located within the adjustable handle with a pedometer screen that can be popped-out from the pedometer within the adjustable handle,

3. A device of **claim 2**, wherein

- the seat sleeve is collapsible by activating the unlocking pivot point situated at the intersection between the base frame and the seat sleeve, and
- the seat sleeve is coated with a glow-in-the-dark chemical for visual impact.

4. A device of **claim 2**, wherein the vertical column can be telescopically adjusted or via any suitable external adjustment knob or any other suitable means.

5. A device of **claim 2**, wherein the pedometer is battery-powered with either a rechargeable battery or a non-rechargeable disposable battery.

Intellectual Property Office

Application No:	GB1509098.8	**Examiner:**	Dr Elinor Styles-Davis
Claims searched:	1 to 5	**Date of search:**	23 November 2015

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1	WO 2015/148578 A2 (ALGHAZI) See whole document, noting especially paragraphs [0087] to [0093]
A	--	WO 2015/043286 A1 (PROVIDENCE ENTERPRISE (SHENZHEN) LIMITED) See especially WPI Abstract Accession No. 2014-H60086
A	--	WO 2015/063765 A1 (RABIONWITZ & ZAM) See whole document
A	--	WO 2006/074029 A1 (FLAHERTY et al.) See whole document
A	--	WO 2006/014533 A2 (ALWAN et al.) See whole document

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

Worldwide search of patent documents classified in the following areas of the IPC

A61B; A61G; A61H

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC

Intellectual Property Office

International Classification:

Subclass	Subgroup	Valid From
A61H	0003/06	01/01/2006
A61B	0005/00	01/01/2006
A61G	0005/02	01/01/2006
A61H	0003/04	01/01/2006