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(54) **LIFTING DEVICE**

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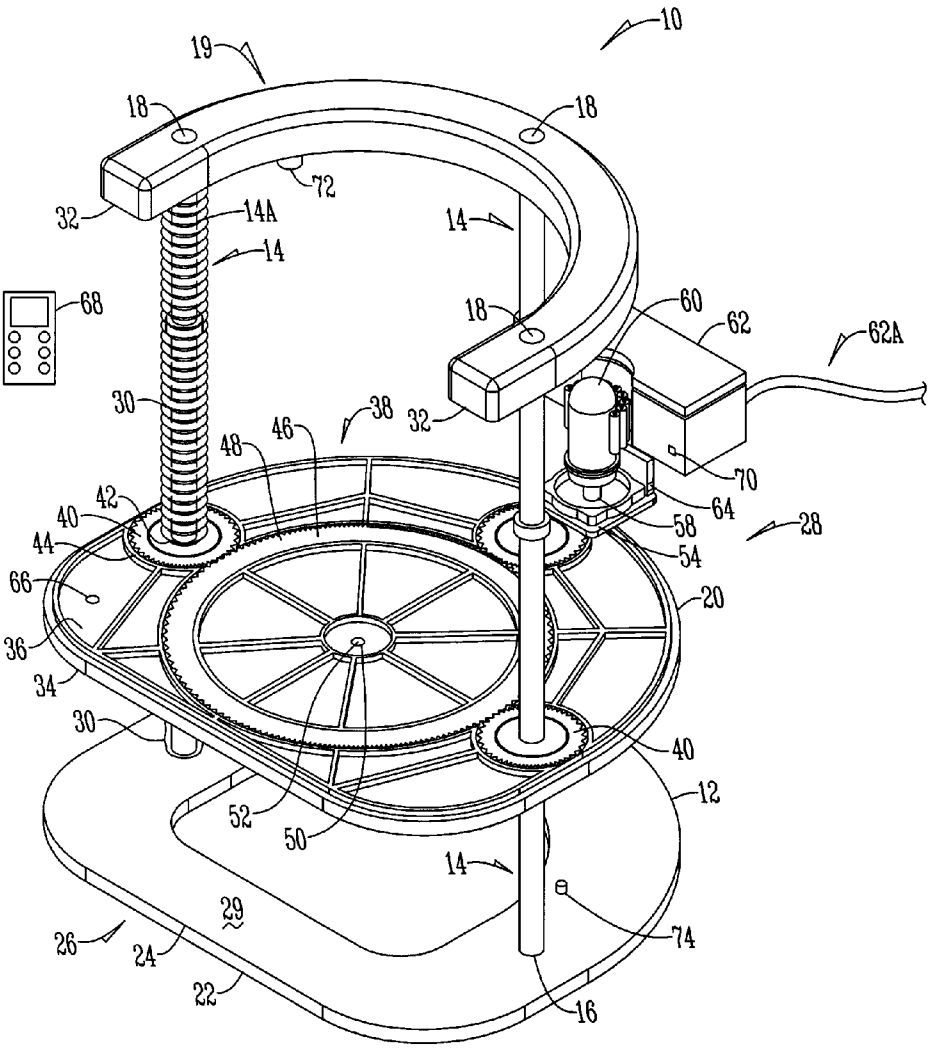
(57) **ABSTRACT**

A lifting device that raises persons with limited mobility from a first position, such as lying on the floor, to a second position, such as a sitting or standing position, and vice versa. The lifting device has a base, a plurality of supports which extend from the base and a platform connected to the supports. The platform travels upon the supports by way of a plurality of gears which are connected to a power source which is controlled by a controller. In this way the platform travels between a first position, such as adjacent the floor, and the second position, such as sitting or standing.



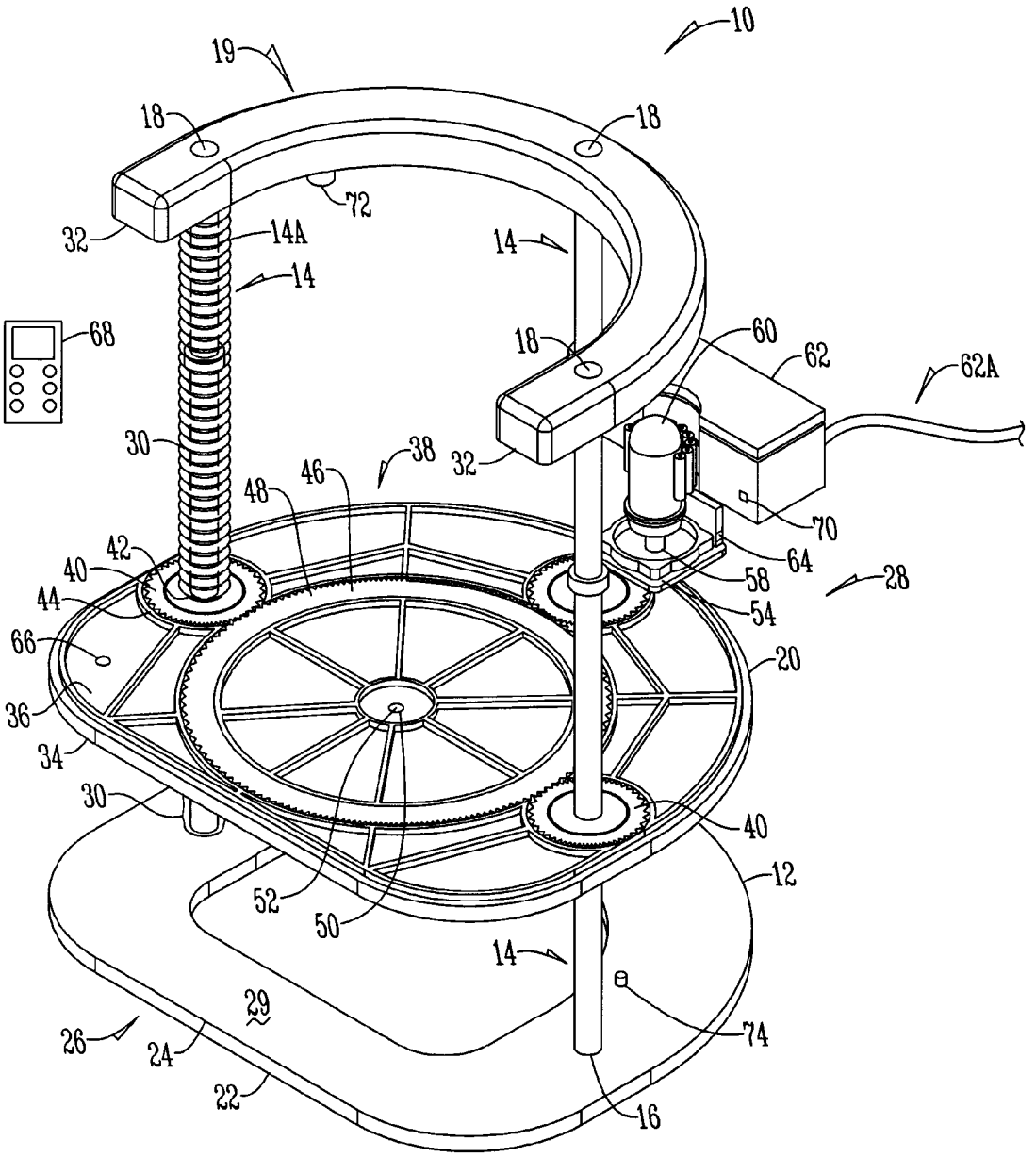

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Fig. 1

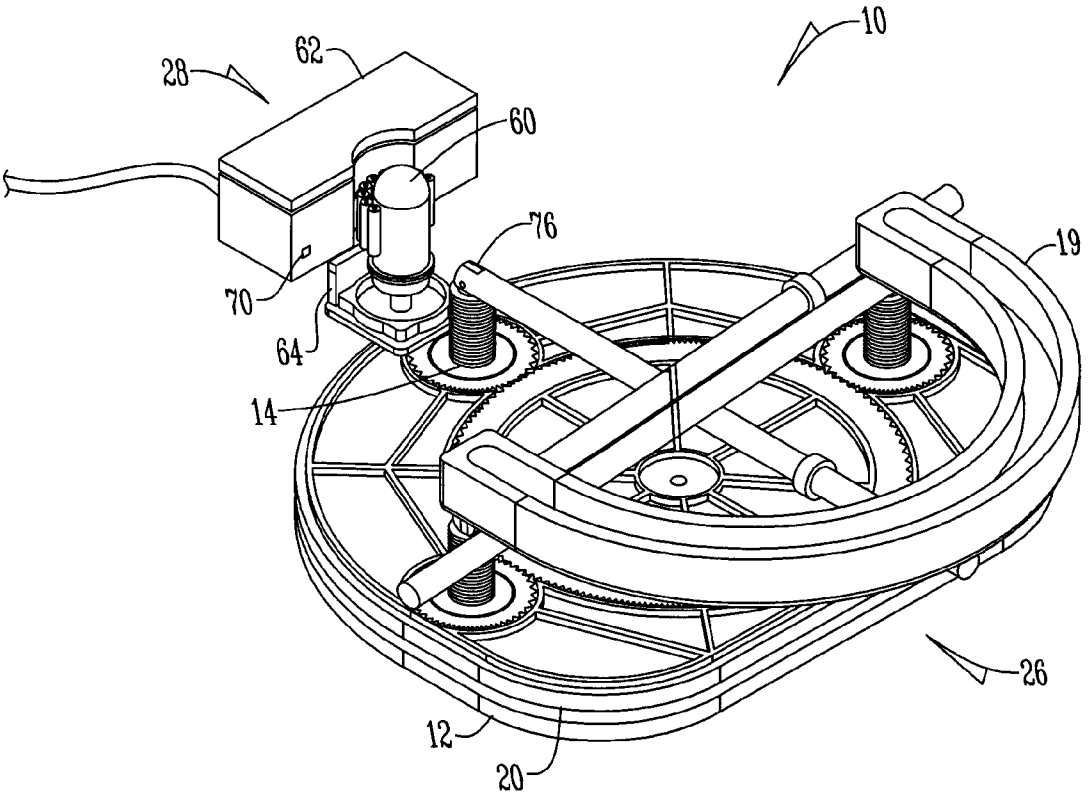

Fig. 2

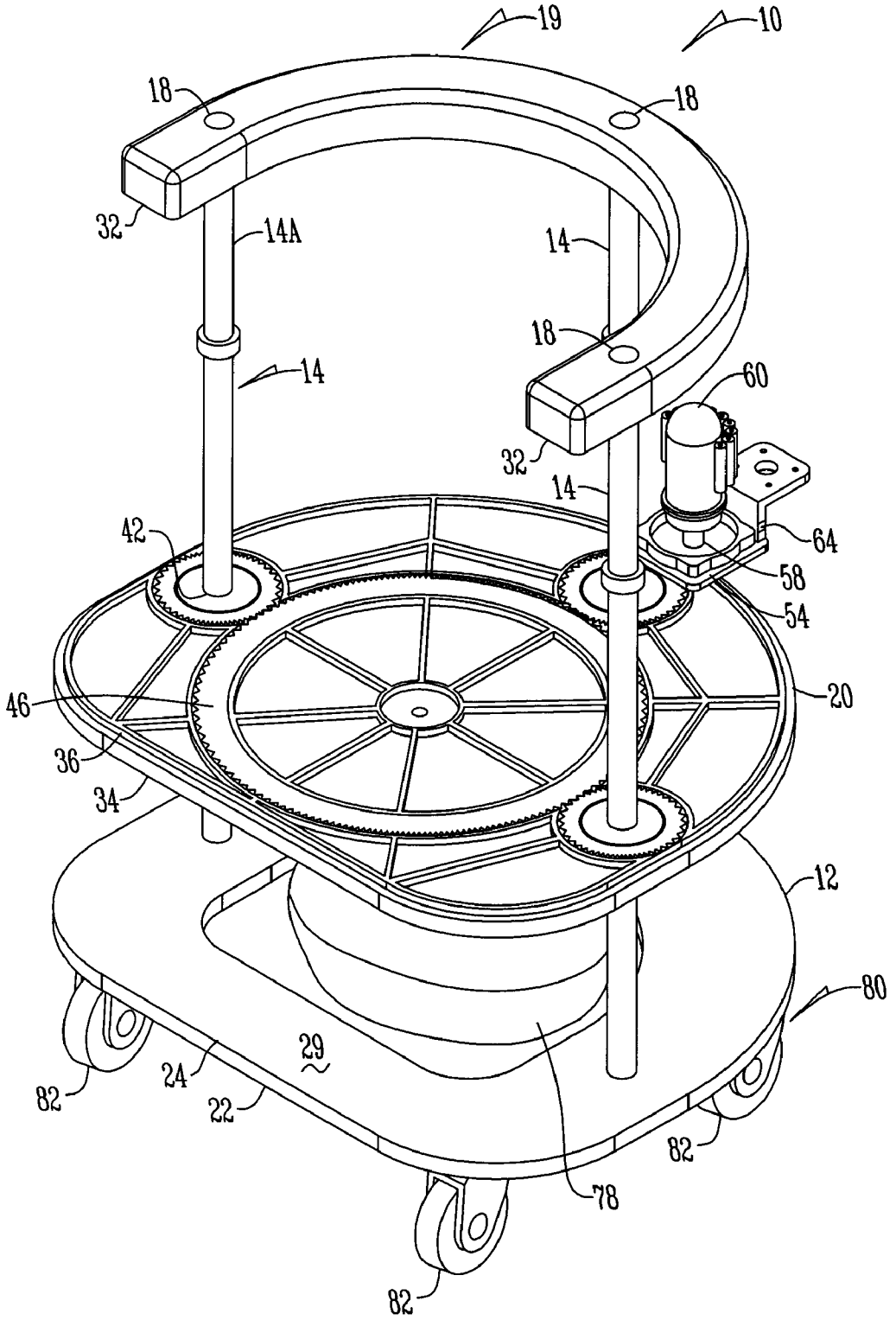
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Fig. 3

LIFTING DEVICE

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 61/530,042 filed Sep. 1, 2011.

FIELD OF THE INVENTION

[0002] This invention relates to a lifting device. More specifically and without limitation, this invention relates to a lifting device for lifting objects, including persons from a first position to a second position, and vice versa.

BACKGROUND OF THE INVENTION

[0003] Many people suffer from mobility inhibiting conditions such as age related degeneration, a traumatic injury, a birth defect, a recent surgery, disease, obesity or various other defects. There are a plurality of devices which assist persons that suffer from limited mobility, such as elevators, wheel chairs, and articulating beds.

[0004] While the prior art devices assist with some forms of mobility and certainly improve the quality of life of persons that suffer from these conditions, there are still deficiencies in the prior art. Specifically, a particularly distressful situation occurs when persons with limited mobility are unable to raise themselves from the floor, such as when older persons fall to the floor. Currently, none of these devices adequately assist persons with limited mobility from raising themselves from the floor in a convenient and cost effective manner. Accordingly, there exists a need in the art for a device that addresses these deficiencies.

[0005] Therefore, an object of the present invention is to provide a lifting device that assists persons with limited mobility to raise themselves from a first position to a second position, and vice versa.

[0006] Another object of the present invention is to provide a lifting device that is mobile.

[0007] Yet another object of the present invention is to provide a lifting device that is cost effective.

[0008] These and other objects, features, or advantages of the invention will become apparent from the specification, drawings and claims.

SUMMARY OF THE INVENTION

[0009] A lifting device that raises persons with limited mobility from a first position, such as lying on the floor, to a second position, such as a sitting or standing position, and vice versa. The lifting device has a base, a plurality of supports which extend from the base and a platform connected to the supports. The platform travels upon the supports by way of a plurality of gears which are connected to a power source which is controlled by a controller. In this way the platform travels between a first position, such as adjacent the floor, and the second position, such as sitting or standing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. **1** is a perspective view of a lifting device;

[0011] FIG. **2** is a perspective view of a collapsible lifting device; and

[0012] FIG. **3** is a perspective view of a lifting device having an air bladder.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0013] With reference to the figures, a lifting device **10** is presented. The lifting device **10** has a base **12**. The base has at least one, and preferably a plurality of supports **14** which are connected to and extend upwardly from the base **12**. At their lower end **16** supports **14** are connected to base **12**, at their upper end **18**, supports **14** are connected to rest member **19**. Connected to supports **14** between their lower end **16** and their upper end **18** is platform **20**.

[0014] Base **12** is of any size and shape which allows base **12** to adequately and rigidly support lifting device **10**. Preferably base **12** is made of a sturdy but light-weight material such as wood, composite, plastic, aluminum, or any other suitable material. Preferably, base **12** is thin in vertical height with a flat bottom surface **22** so as to sit flushly on the floor and a flat upper surface **24** so as to minimize its vertical height. Alternatively, the upper surface **24** is arcuately curved or dished so as to ergonomically conform to the human body and provide a more comfortable sitting surface. To further reduce the weight of the device, yet without reducing the structural rigidity or strength of device **10**, base **12** has an opening of any size and shape which is preferably placed in the center of base **12**. Base **12** connects the bottom end of all supports **14** to one another to improve rigidity.

[0015] Supports **14** are preferably connected to base **12** at their lower end **16** by passing a portion of support **14** through base **12** and bolting the support **14** to the base **12**. However, any other means may be used to connect support **14** to base **12** such as a snap fit arrangement, screwing, gluing, welding or forming the base and the supports from a single solid piece of material, or the like means. Supports **14** are connected to rest member **19** at their upper end **18** in a similar manner. The supports **14** extend between base **12** and rest member **19** in parallel spaced alignment to one another. Preferably supports **14** are solid or hollow threaded metal rods of fixed and equal length. Supports **14** can also have a non-threaded portion **14**A which connect to and extend above the threaded portion. In a preferred arrangement, three supports **14** are used in a triangular arrangement when viewed from above. One support **14** is positioned adjacent either side of the front side **26** of device **10** and one support **14** positioned in the center of the rear side **28** of the device **10**. This arrangement allows for easy ingress and egress while providing rear support for the user. Alternatively, the use of one, two, four, or more supports **14** is hereby contemplated. In addition, a flexible and collapsible sheath **30** covers supports **14** and extends between base **12** and platform **20**, and platform **20** and rest member **19** so as to prevent users from being injured by the threads of supports **14**.

[0016] Rest member **19** extends across and connects each upper end **18** of supports **14** to one another. In this way, rest member **19** provides additional rigidity and support for the device **10**. Preferably, rest member **19** extends in an arcuate U-shaped fashion terminating at opposing ends **32** which extend just past each opposing support member **14** positioned adjacent front side **26** of device **10**. This arrangement allows the user easy ingress and egress to the front of the device while simultaneously providing rear support for the user.

[0017] Platform **20** is moveably and controllably connected to supports **14**. Preferably platform **20** has a flat bottom surface **34** and a flat upper surface **36** which extend in parallel spaced alignment. Alternatively, the bottom and upper surfaces **34**, **36** are arcuately and ergonomically designed to comfortably accommodate a user. Positioned within platform

20 is lifting mechanism **38** which is any arrangement which raises and lowers platform **20** upon supports **14**. In one embodiment, lifting mechanism **38** has a driven gear **40** connected to each support **14**. Driven gear **40** extends between an interior edge **42** and an exterior edge **44**. Interior edge **42** contains threads which match, matingly receive and intermesh with the exterior threads of support **14** such that when driven gear **40** is rotated in one direction it travels upwardly along support **14**, when driven gear **40** is rotated in the opposite direction it travels downwardly along support **14**. Exterior edge **44** contains a gear-teeth arrangement. Lifting mechanism **38** also has a sun gear **46**. Sun gear **46** has an exterior edge **48** which contains gear-teeth which match, matingly receive and intermesh with gear-teeth of driven gear **40** such that when sun gear **46** rotates, driven gears **40** similarly rotate. Sun gear **46** and driven gears **40** are sized such that sun gear **46** engages and rotates all driven gears **40** simultaneously. As pictured in FIG. **1**, this means that as sun gear **46** rotates, all three driven gears **40** simultaneously rotate. Supports **14** are arranged in a balanced triangular arrangement such that sun gear **46** is trapped within the supports **14** and cannot escape laterally. This eliminates the need to connect sun gear **46** to an axel, thereby allowing sun gear **46** to be a hollow gear which reduces both the cost and the weight of device **10**. Alternatively, an axel **50** is connected to the center of sun gear **46** so as to provide additional support, strength and rigidity by requiring sun gear **46** to spin upon axis **52**. While a gear-arrangement is described herein, a chain-arrangement can be used, as well as a belt-arrangement as well as any other similar mechanical arrangement with similar or identical results.

[0018] A driver gear **54** is connected to the lifting mechanism **38**. Driver gear **54** has an exterior edge **56** which contains gear-teeth which match, matingly receive and intermesh with gear-teeth of driven gear **40** and/or gear-teeth of sun gear **46** such that when driver gear **54** is rotated, driven gears **40** and sun gear **46** simultaneously rotate. As pictured in FIG. **1**, preferably, driver gear **54** is connected to the rear **28** side of the driven gear **40** which is connected the rearwardly positioned support **14**. Alternatively, driver gear **54** is connected to any other gear of lifting mechanism **38**. Driver gear **54** is connected to axel **58** which is controllably rotated by reversible motor **60** which extends outwardly and/or above platform **20** so as to not interfere with the bottom surface **34** of platform **20** for engaging the upper surface **24** of base **12**. Motor **60** is connected to power source **62** which can include portable batteries or a battery pack, a conventional electrical plug, a generator, a fuel-powered motor, a tank of compressed air, an air compressor, or any other source or power or a combination of these sources of power. In the event power source **62** is a battery, a rechargeable battery or an array of batteries, preferably said battery is an AC/DC adaptable battery that is chargeable/rechargeable by plugging electrical cord **62**A into a conventional electrical outlet. Alternatively, said battery is removable and replaceable as is known in the hand tool art (such as a removable rechargeable cordless drill motor battery). Motor **60** is connected to a controller **64** which includes any device which activates and deactivates the operation of lifting mechanism **38** such as a switch **66** which is connected to platform **20**, or a remote **68** which is wirelessly connected to a receiver **70** which is connected to and activates, deactivates and controls motor **60**.

[0019] In operation, in a first position, and lowermost position, the bottom surface **34** of platform **20** engages the upper surface **24** of base **12**. In this position, the upper surface **36** of the platform **20** is only a very limited distance above the surface of the floor, which makes it easy for users with limited mobility to pull themselves onto platform **20**. In this position, the user pulls themselves onto the upper surface **24** of platform **20**, between opposing supports **14** on either side of the front **26** of device **10**. In this position, the user can lean their back against rest member **19** which secures the user on platform **20**. Once the user is positioned upon the platform **20** the user engages either the switch **66** which is directly connected to the device or the remote **68** which is wirelessly connected to receiver **70**. In either case, when controller **64** is activated power flows from power source **62** which activates motor **60**. Motor **60** rotates axel **58** and driver gear **54**. When driver gear **54** rotates, the gear-teeth on its exterior edge **56** engage with the gear-teeth on the exterior edge **44** of driven gear **40** which is connected to the support **14** which is positioned at the rear **28** of device **10**. Alternatively, the gear-teeth of driver gear **54** engage the gear-teeth on the exterior edge **48** of sun gear **46**. Either way, the rotation of driver gear **54**, rotates each driven gear **40** connected to each support **14**. Torque and rotation is transferred from the driver gear **54** through the sun gear **46** to all driven gears **40**. As the driven gears **40** rotate, the threads on the interior edge **42** interengage and slide upon the threads on the exterior surface of supports **14**. In this way the, platform **20** is raised. As the platform **20** raises, the sheath **30** connected between the base **12** and the platform **20** extends to cover the threads of the support between the base **12** and the platform **20**, in contrast, the sheath **30** connected between the platform **20** and the rest member **19** simultaneously compresses. This process continues until the user deactivates the motor **60** or until the platform reaches a second position, or highest position, wherein the platform will trip an upper limit switch **72** which is connected to platform **20**, a support **14** and/or rest member **19**. In the second position, the upper surface **24** of platform **20** engages the bottom surface of rest member **19** at which point limit switch **72** deactivates motor **60** and the platform **20** has reached its maximum height.

[0020] The opposite process takes a user from the second position, or highest position to the first position, or lowermost position. In this process the motor **60** rotates in the opposite direction, thereby causing the gears, **54**, **46**, **40** to rotate in the opposite direction until the motor **60** is deactivated or the lower limit switch **74** which is connected to the base **12**, a support **14** or the platform **20** is engaged at the first position wherein the bottom surface **34** of platform **20** engages the upper surface **24** of base **12**. In this way, platform **20** is infinitely adjustable to any position between the first position and the second position to suitably accommodate the user's needs to raise or lower them from one position to another.

[0021] In an alternative embodiment, lifting mechanism **38** is arranged such that supports **14** rotate within their connection to base **20** and rest member **19** and driven gears **40** remain static within platform **20**. In this arrangement sun gear **46** engages and rotates supports **14** which allows lifting mechanism **38**, including sun gear **46** to be positioned within base **12**. This arrangement provides a similar yet different way of accomplishing the same result.

[0022] In an alternative embodiment, driven gears **40** are independently controlled. Specifically, to assist the user with standing from a sitting position, the rearwardly positioned driven gear **40** is independently activated by motor **60** such that the user can tilt platform **20** so as to assist with going from a sitting position to a standing position or vice versa. As the

rearwardly positioned driven gear **40** travels upwardly on the rearwardly positioned support **14**, while the forwardly positioned driven gears **40** and supports **14** remain static the angle of platform **20** changes. This requires the supports to give, bend or angle towards one another as the angle of platform **20** increases, or deviates from parallel to the base **12**. This angular give can be accomplished by using a flexible joint between supports **14** and base **12** and rest member **19** and supports **14** such as a ball and socket joint, hinge, rubber bushings, or the like. In this way platform **20** can be tilted to assist with sitting or standing.

[0023] In an alternative embodiment, instead of using supports **14** which are static threaded rods, extending or telescoping supports **14** are used which have a plurality of pieces which interengage and slide upon one another to raise and lower platform **20**. These telescoping pieces of support **14** are controlled by pneumatic or hydraulic pressure, or through any other mechanical means. This includes the use of a cylinder with an arm that protrudes from and retracts into the cylinder to raise and lower platform **20**.

[0024] In an alternative embodiment, with reference to FIG. **2**, a collapsible version of device **10** is presented. In this arrangement, supports **14** have joints **76** therein which allow supports **14** to fold. When supports **14** are in a folded position, device **10** occupies a smaller volumetric space which allows for easier shipping, transport and use. As can be seen in FIG. **2**, the supports **14** are also extendable/collapsible to further allow for adjustment as well as space savings.

[0025] In an alternative embodiment, with reference to FIG. **3**, an air bladder **78** is positioned between base **12** and platform **20**. In this arrangement, when air bladder **78** is inflated by way of activating controller **64** through switch **66** or remote **68**, platform **20** is raised; as air bladder **78** is deflated platform **20** is lowered. In one arrangement, air bladder **78** is contained within column **79**, which retains air bladder within the column **79** and prevents air bladder **78** from extending beyond the desired area. Preferably, column **79** is a vertically compressible tube with a cylindrical opening in which the air bladder **78** resides. In this arrangement sun gear **46** can be eliminated leaving driven gears to rotate freely upon supports **14**. Alternatively, driven gears **40** are also eliminated as well as the threads on supports **14**, allowing platform **20** to freely slide upon supports **14**, which merely act as smooth rails or guides.

[0026] In an alternative embodiment, device **10** is equipped with a smart mobility assembly **80**. Mobility assembly **80** has a plurality of retractable wheels **82**, at least one of which is driven by a power source and motor **84**. When the wheels **82** are retracted the bottom surface **22** of base **12** is flush with the floor; when wheels **82** are not retracted base **12** is spaced above the floor. Mobility assembly **80** is equipped with and connected to controller **64** and remote **68**, such that when a user needs lifting device **10**, the user activates the mobility assembly **80** through remote **68**. When activated, mobility assembly **80** drives lifting device **10** to the location of the remote **68** through use of power source **62**. Once there, the wheels **80** are automatically retracted and the user is able to use lifting device **10** as described above at a remote location thereby providing a mobile lifting device **10** when and where it is needed.

[0027] From the above discussion it will be appreciated that provided is a lifting device that provides a convenient method and means to assist those with limited mobility to raise themselves from a first position to a second position that improves upon the state of the prior art. Accordingly, the lifting device presents many advantages over the prior art.

[0028] It will be appreciated by those skilled in the art that other various modifications could be made to the device without parting from the spirit and scope of this invention. All such modifications and changes fall within the spirit and scope of the claims and are intended to be covered thereby.

What is claimed:

1. A lifting device for the assistance of disabled persons, comprising:
- a base;
- a plurality of supports connected to the base;
- a platform positioned above the base and connected to the plurality of supports;
- a motor connected the platform;
- a controller connected to the motor;
- wherein when activated, the motor raises and lowers the platform between a first position to a second position;
- wherein the second position is above the first position.

2. The lifting device of claim **1** wherein when the platform is in the first position the platform a bottom surface of the platform engages a top surface of the base.

3. The lifting device of claim **1** wherein a rest member is connected adjacent a top end of the plurality of supports.

4. The lifting device of claim **1** wherein the motor is connected to a driver gear.

5. The lifting device of claim **1** wherein a sun gear is positioned within the platform.

6. The lifting device of claim **1** wherein a driven gear is connected to each of the plurality of supports.

7. The lifting device of claim **1** wherein each of the plurality of supports has a threaded exterior surface.

8. The lifting device of claim **1** wherein each of the plurality of supports is extendable.

9. The lifting device of claim **1** wherein a driven gear is positioned around a threaded exterior surface of each of the plurality of supports such that when the driven gear rotates it travels vertically along the surface of said support.

10. The lifting device of claim **1** further comprising an upper limit switch connected to the lifting device, wherein when the upper limit switch is actuated the motor is deactivated thereby stopping the upward travel of the platform.

11. The lifting device of claim **1** further comprising a lower limit switch connected to the lifting device, wherein when the lower limit switch is actuated the motor is deactivated thereby stopping the downward travel of the platform.

12. The lifting device of claim **1** further comprising a smart mobility assembly having a plurality of wheels and a controller, wherein the plurality of wheels and the controller drive the lifting device to a desired location.

13. The lifting device of claim **1** further comprising a remote which is wirelessly connected to the controller which remotely and wirelessly actuates the motor.

14. A lifting device for the assistance of disabled persons, comprising:
- a base;
- a platform positioned above the base and connected to the plurality of supports;
- the platform having a sun gear and a plurality of driven gears;
- each of the plurality of driven gears having threads on an interior edge;
- wherein the sun gear is meshingly engaged with each of the plurality of driven gears;

each driven gear is threadably engaged around one of the plurality of supports,

a motor connected the platform;

the motor having a driver gear;

a controller connected to the motor;

the driver gear connected to the sun gear and the plurality of driven gears;

wherein when activated, the motor rotates the driver gear which rotates the driven gears and the sun gear thereby raising and lowering the platform between a first position to a second position;

15. The lifting device of claim **14** wherein the driver gear, the plurality of driven gears and the sun gear aligned in a flat plane.

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