

TITLE OF THE INVENTION
A DRIVING MECHANISM FOR A WHEELCHAIR

BACKGROUND OF THE INVENTION

The present invention generally relates to a driving mechanism for a wheelchair. In particular, the present invention relates to a driving mechanism, detachably mounted onto a wheelchair, driven by electric motors which are powered by an electrical source, for instance, a plurality of batteries, and is directionally steered and controlled by the user via manually controlling the wheels of the wheelchair.

In general, wheelchairs are used by people (patients) who cannot walk as a normal healthy person. With respect to conventional wheelchairs, in particular, to a manually driven wheelchair, rounded circular gripping rails may be provided on the wheels of the wheelchairs. The user may propel the wheel himself by pulling down the gripping rails attached to the side of the wheel. As a result of low arm strength of the user, in particular, the patient or the user needing the wheelchair, will normally not have sufficient strength to propel the wheelchair manually, especially to propel the wheelchair along a upramp ground surface and downramp ground surface, or curbs.

In respect of wheelchairs mounted with a driving device powered with motors, such as the device disclosed in US patent no. 4,759,418 issued to Goldenfeld et al. the device comprises an electric motor attached to a drive wheel and mounted on a carrier. The device may be pivoted about an attachment to the frame between a raised and lowered position. A cable is used to achieve the pivoting and one end of the cable is placed within reach of the wheelchair user. When the cable tension is released, the drive wheel and motor pivot down under their own weight to a ground engaging position. When the drive wheel is pushing against resistance, a force component keeps the drive wheel engaged with the ground to propel the wheelchair. The drawback of the device is that it does not provide braking when going down a downramp.

In other conventional wheelchair, a steering column or a joystick is used to steer the wheelchair for moving direction. This may pose as an obstacle to the user when he gets onto or off the wheelchair. In other words, the conventional manually driven wheelchairs and the existing motorised wheelchairs tend to be bulky and heavy, thus transportation of both the patient and the motorised wheelchair is inconvenient and laborious.

This Sheet Has Been Replaced



THIS SHEET HAS BEEN
REPLACED

SUMMARY OF THE PRESENT INVENTION

In accordance with the teachings of the present invention, the driving mechanism comprises a pair of motors mounted onto a shaft at one end and powered by an electrical source; a pair of frictional wheels mounted at the other end of the shaft and in contact with the surface of the driven wheel; a controller for automatically control the activation of the frictional wheels; a pair of electromagnetic clutch coupled to the friction wheel and the motors such that minimum effort is needed to manual propel the wheelchair; a tachogenerator connected to a bracket to produce a signal to the controller; a spring mechanism to ensure constant contact of the frictional wheels and the tachogenerators with the driven wheels, and an electronic inclinometer mounted in said controller and is used to input a signal when the wheels go up/down the slop to the controller and to enabling additional current to supply to the motors to generate additional torque. In accordance with the present invention, the wheelchair is propelled by the pair of friction wheels which are coupled by means of an electromagnetic clutch to their respective geared DC motor. The tachogenerator is connected to the bracket and is used to sense the rotational speed of the individual wheel of the wheelchair. These tachogenerator provides an electrical signal based on the rotational speed of the wheels of the wheelchair to a control circuit within the controller. Upon reaching a predetermined speed limits, the controller turns ON/OFF the DC motors which in turn drive the wheelchair.

It is an object of the present invention to provide a driving mechanism for a wheelchair which mitigates the drawbacks of conventional powered wheelchair.

It is another object of the present invention to provide a driving mechanism for a wheelchair, wherein the said mechanism can be detachably clamped onto conventional wheelchairs and converts the manually driven wheelchair to a motorised wheelchair without modification.

It is yet another object of the present invention to provide a driving mechanism for a wheelchair, which facilitates or relieves the patient or his/her assistant off the task of rolling or pushing the wheelchair.

It is another object of the present invention to provide a driving mechanism for a wheelchair, which needs no joystick to control the direction of movement of the wheelchair.

It is yet another object of the present invention to provide a driving mechanism for a wheelchair, wherein the wheelchair is operated as normal but will automatically switch to

motorized mode once the wheelchair has achieved a certain speed.

It is another object of the present invention to provide a driving mechanism for a wheelchair, wherein the moving direction of the wheelchair is controllable by the hands of the user and the mechanism can sense the turning and/or stopping of wheels and will response accordingly.

It is yet another object of the present invention to provide a driving mechanism for a wheelchair, which maintains a constant speed while the wheelchair moves downhill.

These and other features, aspects, and advantages of the present invention will become more better understood with regard to the following description, appended claims, and accompanying drawings where:

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1a is a perspective view of a prior art, showing the attachment of a conventional motorised driving device to a manually driven wheelchair;

Fig. 1b is a perspective view of the prior art used and operated by a user;

Fig. 2 is a schematic rear view of the driving mechanism in accordance with the present invention; and

Fig. 3 is a schematic elevational view, showing the contact of the frictional wheels and the tachogenerator with the wheel of the wheelchair, in accordance with the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Fig.1a or 1b, there is shown a prior art, a power assisted mechanism being attached to a standard manually driven wheelchair. This mechanism is clumsy and it causes the wheelchair mounted with such mechanism to be more bulky in transportation.

Figure 2 is shows the rear view of a wheelchair (10) having a pair of driven wheels (12) and a frame (14) being mounted with the driving mechanism (20) of the present invention. In accordance with the preferred embodiment, the driving mechanism (20), having a pair of vertical support (15), is detachably mounted onto the frame (14) of the wheelchair (10) and secured by a pair of clamps (16). As shown in Figs. 2 and 3, the mechanism (20) comprises a pair of frictional wheels (22), tachogenerators (24) being mounted to a bracket (26); a spring mechanism (25) to ensure contact of the frictional wheels

(22) and the tachogenerators (24) to the driven wheels (12); an electromagnetic clutch (26) coupled, at one end, to the frictional wheel (22); DC motor (28) being coupled to the other end of the electromagnetic clutch (26); a controller (281) having a circuit (not shown) and being connected to the DC motor (28). The frictional wheels (22) are in alignment with the electromagnetic clutch (26) which in turn, are connected to the DC motors (28). A plurality of batteries (40) as being the power source are used to produce the required power to drive the motors (28). In accordance with the present invention, the driving mechanism (20) is detachably mounted onto the frame (14) by means of support (15) and clamps (16) so that the mechanism (20) is securely fastened onto the wheelchair (10) when it is in use.

In order to be operational, a switch (not shown) on the controller (281) must be turned on. In accordance with the present invention, the motion is transmitted via friction between the frictional wheel (22) and the wheels (12) of the wheelchair (10). In the preferred embodiment, the driving mechanism (20) is mounted in between the wheels (12) and adjacent to the frame (14) of the wheelchair (10).

Unlike conventional power assisted or motorized wheelchairs, the wheelchair (10) of the present invention does not require any steering column, or joystick or the like to steer the moving direction of the wheelchair (10). The motion steering of the wheelchair (10) is similar to that of a manually driven wheelchair. In other words, the operation of the wheelchair (10) is similar to that of a conventional wheelchair but it will automatically switch to the motorised mode once the wheelchair (10) has achieved a certain speed. The tachogenerator (24) senses turning of the wheels (12) or stopping of the wheels (12) and will response accordingly. Signal is produced in response to the rotational speed of the wheels (12). The user slows down whichever wheel (12) that he desires in order that the wheel (12) turns in that desired direction. For instance, if the user wishes to make an U turn, it is possible by stopping one of the wheel (12) from turning by holding onto it and let the other wheel (12) to turn as usual until the desired direction is achieved. In the present invention, no steering column is used and therefore there is no obstruction for the user to get on or off the wheelchair. When the wheelchair (10) goes up a slope, a signal is produced by an electronic inclinometer within the controller (281) and this provides additional current to the motors (28) so as to drive the wheelchair (10) up the slope. The electromagnetic clutch (26) coupled to the frictional wheel (22) and the motor (28) is used to ensure that minimum effort is needed to manual propel the wheelchair (10).

In accordance with the present invention and referring to Figure 3, there is shown the contact of the frictional wheel (22) with that of the wheel (12) of the wheelchair (10). The activation of the mechanism (20) is by means of propelling the wheelchair (10) forward. Once the wheelchair (10) has achieved a predetermined speed the drive will automatically be activated. Similarly the drive will be deactivated and come to a halt when the wheelchair (10) slows to a predetermined speed. A self compensatory circuit is built in to the controller (281) in order that the wheelchair (10) can move in a straight path as it uses separate motors (28). The electronic inclinometer in the controller (281) enable additional current to be supplied to the motors (28) so as to generate additional torque for the wheelchair (10) to move up an incline. In a preferred embodiment an audio signal in the form of a beep is incorporated in the controller (281) to alert the user prior to the ON/OFF of the motors (28).

In accordance with the present invention, the activation of the driving mechanism (20) is by mean of motion and thus the wheelchair (10) is activated by the user/patient or helper. In other words the wheelchair (10) fitted with the driving mechanism (20) in accordance with the present invention can be used by all patients regardless of their physical and health condition.

Although the present invention has been described with reference to a preferred example. It is to be understood that to those skilled in the art that modifications may be carried out without departing from the broad scope of the following claims.

CLAIMS

1. A driving mechanism for a wheelchair having a frame and driven wheels comprising:
 - a pair of DC motors powered by an electrical source;
 - a pair of frictional wheels being mounted along a shaft and in contact with the surface of the driven wheels to drive the wheels;
 - a controller for automatically controlling the activation of the frictional wheels;
 - a pair of electromagnetic clutch coupled to the friction wheel and the motors such that minimum effort is needed to manual propel the wheelchair; and
 - a tachogenerator being connected to a bracket to produce a signal to the controller.
2. A driving mechanism for a wheelchair having a frame and driven wheels as set forth in Claim 1, further comprises:
 - a pair of vertical support detachably mounted onto the frame of the wheelchair and secured with a pair of clamps.
3. A driving mechanism for a wheelchair having a frame and driven wheels as set forth in Claim 1 or 2, further comprises a spring mechanism to ensure constant contact of the frictional wheels and tachogenerator with the driven wheels.
4. A driving mechanism for a wheelchair as set forth in Claim 1, wherein the electrical source is a plurality of batteries being used to drive the DC motors.
5. A driving mechanism for a wheelchair as set forth in Claim 1, wherein a signal by the tachogenerator is produced in response to the rotational speed of the wheels of the wheelchair.
6. A driving mechanism for a wheelchair as set forth in Claim 1, wherein an electronic inclinometer is mounted in the controller to provide a signal and in turn provide additional current to the DC motors.
7. A driving mechanism for a wheelchair as set forth in Claim 1, wherein the mechanism is activated by just propelling the wheelchair forward.



8. A driving mechanism for a wheelchair as set forth in Claim 1, wherein the mechanism is deactivated when the wheelchair slows to a predetermined speed.



* C L M S *