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(54) **Drive unit for a wheelchair**

Antriebseinheit für Rollstuhl

Unité de propulsion pour fauteuil roulant

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Description

Field of the Invention

[0001] The present invention concerns a wheelchair comprising a drive unit, said drive unit comprising at least a pair of drive wheels, where the wheelchair is provided with large rear main wheels and with small pivotable front wheels, where the drive unit is mounted between the main wheels and where the drive wheels of the drive unit is in contact with the base at or close to the connection line between the contact points of the main wheels with base, where the drive unit is mounted to a crossbar provided transversely under the wheelchair at its front end, where on this crossbar is provided a coupling member for coupling the drive unit and the wheelchair together, and where the drive unit comprises a corresponding coupling member, and where the wheelchair and the drive unit are coupled together in that the coupling members are brought into mutual contact.

Description of Prior Art

[0002] It is commonly known that wheelchairs may be provided with a motor, e.g. an electric motor for propelling the wheelchair. Such a wheelchair is normally termed an electric wheelchair, and a such may be operated by the user himself and may be equipped with many different facilities. Moreover, it is also known with wheelchairs made for manual operation, typically such that the user is turning the wheels by hand in the direction which the wheelchair is desired to be moved. Such wheelchairs for manual operation are typically provided with a handle behind the back of the wheelchair and which may be used for pushing the wheelchair and for manoeuvring it.

[0003] EP 0 592 427 discloses a solution where an auxiliary electric drive unit is mounted on a wheelchair made for manual operation. The drive unit is mounted under the seat of the wheelchair in such a way that the force from the drive unit is transmitted to a crossbar provided at the front between the two longitudinal frame members of the wheelchair. Thus is achieved safe driving in that the drive unit is pushing on the crossbar such that the front wheels are not pressed too hard against the base, whereby safe and easy driving is effected. Such a drive unit is particularly suited for use on a wheelchair in connection with the user is moved or goes/drives for trip together with an assistant. It is thus no longer required to use so much muscle power while driving a wheelchair fitted with such a drive unit, as in principle it is only required with strength for controlling the wheelchair in precisely the same way as if it is pushed manually. The drive unit may be disengaged by actuating a pedal such that the drive unit is elevated, and the wheelchair may then be operated manually.

[0004] Also EP 1 046 384 A2 discloses a wheelchair with a drive unit where the problem solved is to be able to put extra pressure on the drive unit while driving under

specific circumstances. The drive unit in this document can be attached and detached via primitive and simple coupling means, which can be hard to see when attaching the drive unit, and thus not very user friendly. It can easily be foreseen that a use has to bow down to watch the coupling means while attaching the drive unit to the wheelchair. The solution for providing the necessary load on the drive unit is obtained by having a rigid connection from a handle to the drive unit. By putting pressure on the handle, the pressure is transferred to the drive unit. By a design as shown in EP 1 046 384 A2 it is very important to have this extra pressure on the drive unit, as it is mounted behind the main wheels on the wheelchair and thus pushes the wheelchair in front of the drive unit. This is however not a good solution as in the worst case the wheelchair can be pushed so hard that it will raise the front wheels and eventually tip over. In fact this can be compared to a car with rear wheel drive, where the grip of the wheels is depending on the load directly on the wheels. It is thus very important that a drive unit is mounted under the wheelchair whit the drive wheels in a position in proximity of a line between the contact area of the main wheels on a wheelchair and even better if the contact line of the drive wheels is in front of said line as the wheelchair thus will be pulled instead of pushed. The present solution is not suitable for mounting in the optimum position as the design of the coupling means calls for a very precise positioning, which only can take place when the user is on the knees in front of or behind the wheelchair.

[0005] This type of auxiliary drive units are widespread in connection with the nursing sector, e.g. in nursing homes or hospitals, where wheelchairs are used daily for transporting persons over long distances. Since an actual electric wheelchair is costly and not always suited for the individual patient, it is a clear advantage to equip a traditional, manually operated wheelchair with an auxiliary electric drive unit.

[0006] When e.g. a wheelchair user with a broken leg is to be transported in a car, it is common that the wheelchair is carried in collapsed condition, and therefore it is advantageous to be able to dismount the drive unit. Also, it is advantageous to be able to dismount the drive unit after performing moving of a patient in a hospital, when the patient has been moved to the intended place, such that the drive unit can be used on another wheelchair.

[0007] By the prior art solution, this mounting and dismounting is feasible, however in a somewhat inexpedient way, as the nursing staff has to go down on the knees behind the wheelchair and in front of the wheelchair in order to release the drive unit from the wheelchair or in order to attach the drive unit. Particularly the fact that the nursing staff has to go down on their knees and practically work between the legs of the wheelchair user for releasing the drive unit is found uncomfortable and offensive by many wheelchair users.

[0008] It is the purpose of the invention to indicate a drive unit for a wheelchair where dismounting and mount-

ing can be done behind the wheelchair, whereby the wheelchair user is not embarrassed and where both mounting and dismounting is effected easily and rapidly.

Description of the Invention

[0009] As mentioned in the introduction, the invention concerns a wheelchair, according to claim 1, comprising an auxiliary drive unit, where the drive unit is mounted to a crossbar at the front end of the wheelchair, and where a coupling member is provided on the crossbar for coupling drive unit and wheelchair together. The drive unit is with a corresponding coupling member, where the wheelchair and the drive unit are coupled together in that the coupling members are brought into mutual contact.

[0010] In a preferred variant of a wheelchair comprising a drive unit according to the invention, the coupling member is constituted by a forward directed elongated coupling member for receiving a corresponding coupling member which is fitted on a wheelchair and constituting a rearwards directed elongated coupling member, said coupling members respectively being a elongated pipe and a elongated spear-shaped coupling member, where the coupling members are locked together by a locking mechanism. This locking together is secure and stable as a consequence of corresponding coupling members being elongated such that ample rigidity is attained in the coupling. In that way, the forces transmitted to the wheelchair from the drive unit may be transmitted with certainty and without imprecise movements arising due to play or looseness between wheelchair and drive unit. The elongated coupling members may, as mentioned, be constituted by a pipe in which a spear-shaped, other coupling member is received. This pipe and spear may be designed as a round tube and a round rod member, respectively, but may advantageously be designed with edged profiles, e.g. four-edged profiles with suitable mutual tolerances, such that a torsionally stable coupling is obtained. The coupling may, however, also be effected with coupling members that are different from the mentioned, and whereby the same torsionally stable and secure coupling between wheelchair and drive unit is achieved.

[0011] In a preferred embodiment of a wheelchair and a drive unit according to the invention the coupling member constituting a pipe can have a funnel-shaped opening for easy coupling with the corresponding coupling member. This way an easier coupling or attachment between the two elongated coupling means is obtained.

[0012] In a variant of a wheelchair and a drive unit according to the invention, the locking mechanism is manual and in another variant, it is at least partially automatic. A manual locking mechanism may e.g. be a bolt which is passed through the coupling means when these are in the coupled position, and an at least partially automatic locking mechanism can be a spring actuated mechanism which, when the coupling members are in proper position, automatically locks the two coupling members together by releasing a spring or by pushing a spring-load-

ed locking pin away during the joining of the coupling members. Operation of the locking means may advantageously occur from the draw handle or in another position where it is not necessary to bow down in order to operate the coupling and locking mechanism.

[0013] In a preferred variant of a wheelchair and a drive unit according to the invention, the drive unit is equipped with a set of batteries for powering the drive unit during use in connection with a wheelchair and during transport/towing to a central location for charging or storage.

[0014] A wheelchair comprising a drive unit according to the invention may be provided with an operating handle for controlling propulsion, where the operating handle is arranged for mounting close to a handle on a wheelchair. Such an operating handle may thus be adapted for an assistant to operate it while rolling the wheelchair. The operating handle may also be used during towing of the drive unit as it is easily moved between the draw handle and the handle of the wheelchair. Alternatively, the operating handle may be provided such that the user of the wheelchair himself can operate the handle and thus move around independently without using an assistant.

[0015] In yet an embodiment of the invention the drive unit may additionally be provided with a draw handle, preferably a draw handle which is adjustable in height. By equipping the drive unit with a corresponding coupling member and a draw handle there is achieved the advantage that coupling and uncoupling between wheelchair and drive unit may easily be performed, where both coupling and uncoupling may occur behind the wheelchair and thus without nursing staff or similar having to go on their knees between the wheelchair user's legs or behind the wheelchair. Moreover, there may be achieved the advantage that the drive unit can be transported or moved to another wheelchair or to a storage place by its own power, as the drive unit is simply activated in the same way as during use while mounted under a wheelchair.

[0016] By a wheelchair comprising a drive unit according to the invention, there is thus indicated a solution allowing easy and rapid coupling and uncoupling of a drive unit in connection with nursing staff assisting a wheelchair user with transport. By such a solution is achieved the clear advantage that a motor device is not needed for each of the manual wheelchairs, as the same drive unit in principle may follow the individual assistant and thus may be used for many different wheelchairs in the course of a day. Thus there is no need for purchasing so many drive units, and it is no longer required to perform mounting of the drive unit in kneeling position in front of the user of the wheelchair.

Short Description of the Drawing

[0017] The invention is described in more detail with reference to the drawing, wherein:

FIG. 1 shows a cross-section of a wheelchair with a coupling member as seen from above;

FIG. 2 shows a drive unit with draw handle and coupling member.

Detailed Description of the Invention

[0018] In Fig. 1 appears a cross-section of a wheelchair 1 with wheels 2, a frame 3 and with footrests 4. At the front, at the frame 3, a crossbar 5 is provided, having a rearwardly directed spear 6 at the centre constituting one part of the coupling members. Behind the wheelchair 1 is seen a drive unit 7, also viewed from above. The drive unit 7 also appears from Fig. 2 where it is seen from the side. The drive unit 7 has two drive wheels 8 between which there is mounted an electric motor 9 which via a differential gear is connected with the drive wheels 8. There is also provided a coupling member 10 corresponding to the coupling member 6 on the wheelchair 1. In the shown embodiment, the drive unit 7 is provided with a coupling member 10 having a funnel-shaped opening for easy coupling with the corresponding coupling member 6. A battery pack 11 is arranged above the wheels 8 and connected to electric motor 9 and to a not shown operating handle that is either provided on the draw handle 12 of the drive unit or on the wheelchair 1 itself. The draw handle 12 is connected with the motor device with a rod-shaped connection 13 which, when drive unit 7 and wheelchair 1 are coupled together, extend up behind the wheelchair 1. This connecting rod 13 can be adjusted in height whereby it is ensured that transport of the drive unit 7 can be effected in a suitable work position and that the height possibly may be reduced during use on a wheelchair 1.

Claims

1. A wheelchair (1) comprising a drive unit (7), said drive unit (7) comprising at least a pair of drive wheels (8), where the wheelchair (1) is provided with large rear main wheels (2) and with small pivotable front wheels (2), where the drive unit (7) is mounted between the main wheels (2) and where the drive wheels (8) of the drive unit (7) is in contact with the base at or close to the connection line between the contact points of the main wheels (2) with base, where the drive unit (7) is mounted to a crossbar (5) provided transversely under the wheelchair (1) at its front end, where on this crossbar (5) is provided a coupling member (6) for coupling the drive unit (7) and the wheelchair (1) together, and where the drive unit (7) comprises a corresponding coupling member (10), and where the wheelchair (1) and the drive unit (7) are coupled together in that the coupling members (6, 10) are brought into mutual contact, **characterised in that** the coupling member (10) on the drive unit (7) is constituted by a forward directed elongated coupling member (10) for receiving a corresponding coupling member (6) which is fitted on the

wheelchair (1) and constituting a rearwards directed elongated coupling member (6), said coupling members (6, 10) respectively being an elongated pipe and an elongated spear-shaped coupling member (6, 10), where the coupling members (6, 10) are locked together by a locking mechanism.

2. Wheelchair (1) and a drive unit (7) according to claim 1, **characterised in that** the coupling member (10) constituting a pipe has a funnel-shaped opening for easy coupling with the corresponding coupling member (6).
3. Wheelchair (1) and a drive unit (7) according to any of claims 1 or 2, **characterised in that** the locking mechanism comprises manual locking means.
4. Wheelchair (1) and a drive unit (7) according to any of claims 1 or 2, **characterised in that** the locking mechanism comprises at least partly automatic locking means.
5. Wheelchair (1) and a drive unit (7) according to any of claims 1 to 4, **characterised in that** drive unit (7) comprises a set of batteries (11).
6. Wheelchair (1) and a drive unit (7) according to any of claims 1 to 5, **characterised in that** the drive unit (7) is provided with an operating handle for controlling propulsion, where the operating handle is adapted for mounting close to a handle on a wheelchair (1).
7. Wheelchair (1) and a drive unit (7) according to any of claims 1 to 6, **characterised in that** the drive unit (7) is provided with a draw handle (12), preferably a draw handle (12) which is adjustable in height.

Patentansprüche

1. Rollstuhl (1), umfassend eine Antriebseinheit (7), wobei die Antriebseinheit (7) mindestens ein Paar Antriebsräder (8) umfasst, wobei der Rollstuhl (1) mit großen hinteren Haupträdern (2) und mit kleinen schwenkbaren Vorderrädern (2) versehen ist, wobei die Antriebseinheit (7) zwischen den Haupträdern (2) montiert ist und wobei die Antriebsräder (8) der Antriebseinheit (7) mit der Basis an oder nahe der Verbindungslinie zwischen den Kontaktpunkten der Haupträder (2) mit der Basis in Kontakt stehen, wobei die Antriebseinheit (7) an einer Querstange (5), die quer unter dem Rollstuhl (1) an seinem Vorderende angeordnet ist, montiert ist, wobei an dieser Querstange (5) ein Kopplungselement (6) zum Kopeln der Antriebseinheit (7) und des Rollstuhls (1) miteinander angeordnet ist, und wobei die Antriebseinheit (7) ein entsprechendes Kopplungselement (10) umfasst, und wobei der Rollstuhl (1) und die

- Antriebseinheit (7) in der Weise miteinander gekoppelt sind, dass die Kopplungselemente (6, 10) in gegenseitigen Kontakt gebracht werden, **dadurch gekennzeichnet, dass** das Kopplungselement (10) an der Antriebseinheit (7) durch ein nach vorn gerichtetes, längliches Kopplungselement (10) gebildet wird, das der Aufnahme eines entsprechenden Kopplungselements (6) dient, das an dem Rollstuhl (1) montiert ist und ein nach hinten gerichtetes, längliches Kopplungselement (6) darstellt, wobei die Kopplungselemente (6, 10) ein längliches Rohr bzw. ein längliches, speerförmiges Kopplungselement (6, 10) sind, wobei die Kopplungselemente (6, 10) durch einen Verriegelungsmechanismus miteinander verriegelt werden.
2. Rollstuhl (1) und eine Antriebseinheit (7) nach Anspruch 1, **dadurch gekennzeichnet, dass** das Kopplungselement (10), das ein Rohr darstellt, eine trichterförmige Öffnung für ein einfaches Koppeln mit dem entsprechenden Kopplungselement (6) aufweist.
 3. Rollstuhl (1) und eine Antriebseinheit (7) nach einem der Ansprüche 1 oder 2, **dadurch gekennzeichnet, dass** der Verriegelungsmechanismus ein manuelles Verriegelungsmittel umfasst.
 4. Rollstuhl (1) und eine Antriebseinheit (7) nach einem der Ansprüche 1 oder 2, **dadurch gekennzeichnet, dass** der Verriegelungsmechanismus mindestens teilweise automatische Verriegelungsmittel umfasst.
 5. Rollstuhl (1) und eine Antriebseinheit (7) nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** die Antriebseinheit (7) einen Satz Batterien (11) umfasst.
 6. Rollstuhl (1) und eine Antriebseinheit (7) nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** die Antriebseinheit (7) mit einem Bediengriff zum Steuern des Vortriebs versehen ist, wobei der Bediengriff dazu geeignet ist, nahe einem Handgriff an einem Rollstuhl (1) montiert zu werden.
 7. Rollstuhl (1) und eine Antriebseinheit (7) nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** die Antriebseinheit (7) mit einem Zuggriff (12) ausgestattet ist, vorzugsweise einem Zuggriff (12), der in seiner Höhe verstellbar ist.

Revendications

1. Fauteuil roulant (1) comprenant une unité de propulsion (7), ladite unité de propulsion (7) comprenant au moins une paire de roues motrices (8), le fauteuil roulant (1) étant réalisé avec des grandes roues prin-

cipales arrière (2) et des petites roues pivotantes avant (2), l'unité de propulsion (7) étant montée entre les roues principales (2), et les roues motrices (8) de l'unité de propulsion (7) étant en contact avec la base à la ligne de raccordement, ou près de celle-ci, entre les points de contact des roues principales (2) avec la base, l'unité de propulsion (7) étant montée sur une barre transversale (5) disposée transversalement sous le fauteuil roulant (1) à l'extrémité avant, un élément d'accouplement (6) étant prévu sur cette barre transversale (5) pour accoupler l'unité de propulsion (7) au fauteuil roulant (1), et l'unité de propulsion (7) comprenant un élément d'accouplement correspondant (10), et le fauteuil roulant (1) et l'unité de propulsion (7) étant accouplés de façon à ce que les éléments d'accouplement (6, 10) étant mis en contact mutuel, **caractérisé en ce que** l'élément d'accouplement (10) sur l'unité de propulsion (7) est composé d'un élément d'accouplement allongé (10) dirigé vers l'avant pour recevoir un élément d'accouplement correspondant (6) monté sur le fauteuil roulant (1) et constituant un élément d'accouplement allongé (6) dirigé vers l'arrière, lesdits éléments d'accouplement (6, 10) étant respectivement un tuyau allongé et un élément d'accouplement en forme de lance (6, 10), les éléments d'accouplement (6, 10) sont verrouillés ensemble par un mécanisme de verrouillage.

2. Fauteuil roulant (1) et une unité de propulsion (7) selon la revendication 1, **caractérisés en ce que** l'élément d'accouplement (10) constituant un tuyau comprend une ouverture en forme d'entonnoir pour un accouplement facile à l'élément d'accouplement correspondant (6).
3. Fauteuil roulant (1) et une unité de propulsion (7) selon l'une quelconque des revendications 1 ou 2, **caractérisés en ce que** le mécanisme de verrouillage comprend des moyens de verrouillage manuels.
4. Fauteuil roulant (1) et une unité de propulsion (7) selon les revendications 1 ou 2, **caractérisés en ce que** le mécanisme de verrouillage comprend des moyens de verrouillage qui est, en partie au moins, automatique.
5. Fauteuil roulant (1) et une unité de propulsion (7) selon l'une quelconque des revendications 1 à 4, **caractérisés en ce que** l'unité de propulsion (7) comprend un jeu de piles (11).
6. Fauteuil roulant (1) et une unité de propulsion (7) selon l'une quelconque des revendications 1 à 5, **caractérisés en ce que** l'unité de propulsion (7) est pourvue d'une poignée de manoeuvre pour contrôler la propulsion, la poignée de manoeuvre est adaptée pour un montage près d'une poignée sur un fauteuil

roulant (1).

7. Fauteuil roulant (1) et une unité de propulsion (7) selon l'une quelconque des revendications 1 à 6, **caractérisés en ce que** l'unité de propulsion (7) est 5
pourvue d'une poignée de tiroir (12), de préférence une poignée de tiroir (12) réglable en hauteur.

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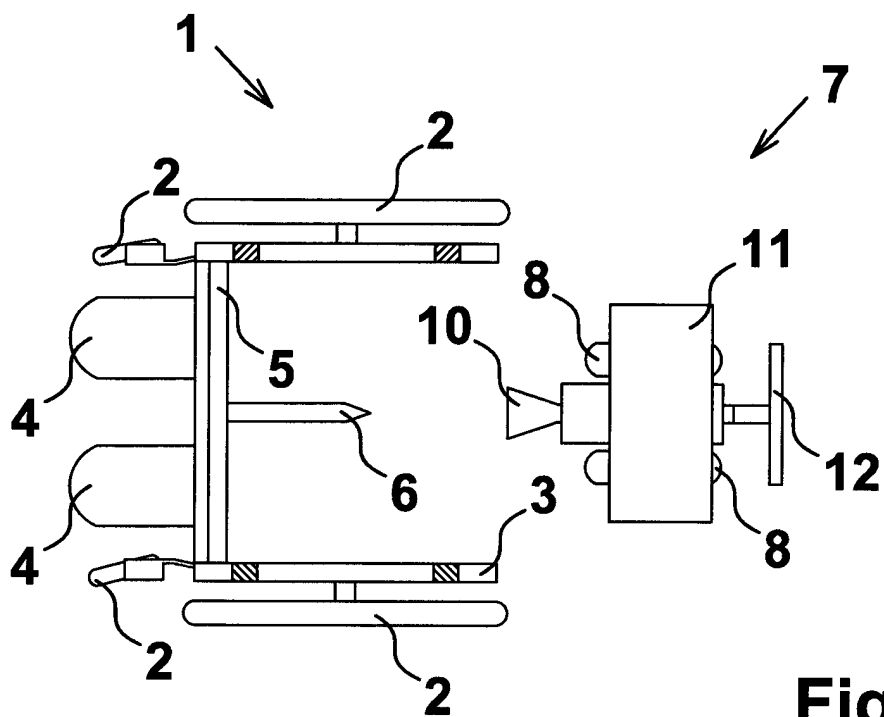


Fig. 1

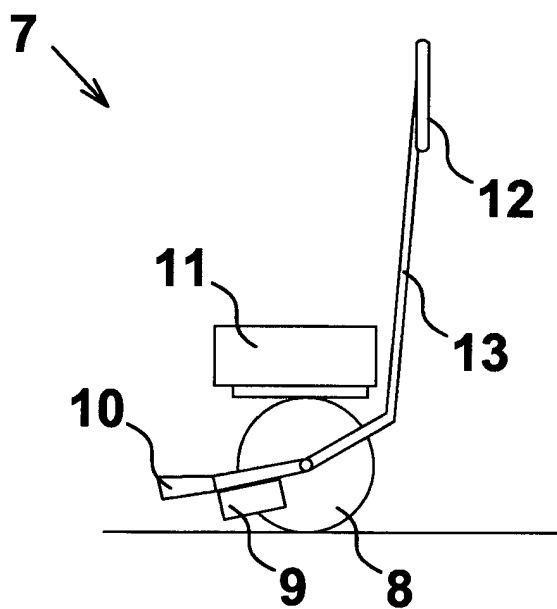


Fig. 2

REFERENCES CITED IN THE DESCRIPTION

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