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(54) Benævnelse: **Drejningsmoment-støtteindretning til montering af et drivhjul, som er forsynet med en navmotor, til en kørestol**

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Description

The invention relates to a torque bracing device for mounting a drive wheel having a hub motor to a wheel chair.

A typical example of a wheel chair for a diseased person or a person having mobility problems is shown in Fig. 5. Such a well-known wheel chair 400 has two large running wheels 200 each having a grip ring 220 by means of which the running wheels may be driven by hand, i. e. they may be driven manually. At the front potion of the wheel chair 400, seen in the travelling direction, moreover two clearly smaller running wheels 230 are typically attached to freely pivoting casters.

In order to facilitate transport of such a wheel chair 400, in particular the large running wheels 200 are often designed to be easily removable. For assembling such a running wheel such that it may be easily removed, as is shown in Fig. 6, plug-in axles 240 and corresponding assembly means 250 are provided by means of which the running wheels 200 may be easily secured to the frame 410 of the wheel chair and removed again.

It is moreover known to design electrically driven running wheels of a wheel chair as removable plug-in wheels, too. Such an electrically driven drive wheel for a wheel chair is known, for example, from DE 41 27 257 A1.

It is furthermore known to design such electric drive wheels for a wheel chair as so-called auxiliary drive devices. Such an auxiliary drive device, as it is shown in Figures 7 to 10, is known, for example, from DE 198 57 786 C1. Such auxiliary drive devices, designed as running wheels 300 with a hub motor 330, typically also include a grip ring 320 via which the person sitting in the wheel chair can rotate the wheel by his/her hands. In response to the torque introduced into the grip ring 320 by hand, the electric hub motor 330 of the auxiliary drive device is activated so as to output a supplementary electrically created torque, i. e. a supporting torque. To this end, the torque introduced into the grip ring 320 by hand is detected by sensors, for example those disclosed in DE 198 57 786 C1, which are, however, not shown in Figures 7 to 10, and supplied to an electronic control which, in response, activates the hub motor 330 designed as electric motor such that it outputs an electrically created torque.

The auxiliary drive device known from DE 198 57 786 C1 is designed as an independent unit in which in the drive unit, which includes a corresponding stator and a rotor of the electric motor, the power supply, which is provided in the form of corresponding rechargeable batteries, and the electronic control are all provided in the wheel hub.

If such an electrically driven running wheel is secured to a wheel chair with a hub motor, it is necessary to provide a so-called torque bracket or torque bracing device which provides that the stator of the electric motor is fixedly connected to the frame of the wheel chair so that it cannot rotate with respect to the frame. In this manner, by rotating the rotor of the electric motor with respect to the stator of the electric motor, a rotation of the drive wheel can be effected. In the electric drive device known from DE 41 27 257 A1, a plug-in tube is provided for this purpose which can be plugged into an adapter sleeve fixed to the frame of the wheel chair.

Another form of a torque bracing of a hub motor in an electrically driven wheel of a wheel chair is known from DE 199 49 405 C1. In this well-known type of torque bracing, a torque bracket is arranged at the wheel chair on which three webs are formed. The back of the stator of the electric motor of the electric drive device is provided with a plurality of grooves. In a state wherein the electrically driven drive wheel is mounted ready for operation, the webs of the torque bracket provided at the wheel chair engage the grooves on the back of the stator and thus constitute a torque bracing.

DE 197 08 058 A1 discloses a hub motor with torque bracing for the drive wheel of a wheel chair and can be considered as the closest prior art.

In all known types of torque bracing, it is naturally necessary to provide the two engaging elements, i. e. the element arranged at the stator of the drive device and the element arranged at the frame of the wheel chair, in such a way that they can actually engage. It is thus not only necessary that the respective forms and dimensions exactly match. Rather, it is also necessary to have an exact arrangement as to the position which allows the element arranged at the stator of the drive device to engage with the element arranged at the frame of the wheel chair in the state when the drive wheel is secured to the wheel chair.

For economic reasons, auxiliary drive devices and electrically driven running wheels for wheel chairs of the kind illustrated above are products which are configured such that they can be used with a plurality of different kinds of wheel chair frames. For this reason, it had been necessary in the past that for a given auxiliary drive device in the form of a running wheel with an electric hub motor, a separate and special torque bracing had to be developed for each kind of wheel chair frame. This requires a considerable amount of time and costs. The market for manually driven wheel chairs comprises several hundreds of different models in Germany alone.

The use of an electric auxiliary drive device for a wheel chair user will often become necessary or make sense for therapeutic reasons only after the wheel chair user had used an initially only manually driven wheel chair for a long time already. A typical example of this scenario is the decreasing strength of wheel chair users when they get older which makes it necessary or at least desirable at some time to support the merely manual force by an electrical supporting force. Naturally, it would be desirable in such case for a wheel chair user who has to make a decision whether to use such an electric auxiliary drive to test it in advance. Due to the practically unimaginable diversity and number of different wheel chairs, however, this is normally not possible because an auxiliary drive device available on the market cannot be mounted to any wheel chair frame without a plug-in axle especially configured for this purpose. The wheel chair user who has to make such decision therefore has to test the auxiliary drive device in a test wheel chair which he is not used to, which is in general gives an uneasy feeling to him or her.

The object underlying the invention therefore is to improve the situation as illustrated above and to provide a technical option permitting a wheel chair user to test drive wheels provided with a hub motor with his/her own wheel chair.

The solution to this problem is defined in claim 1. Advantageous embodiments are specified in the subclaims.

The inventive solution is based on the concept of providing a torque bracing device for mounting a drive wheel provided with a hub motor at a wheel chair permitting to ensure, in a simple and quick manner, to at least temporarily fix an electric auxiliary drive device of the kind under discussion here to a wheel chair to which only manually driven

wheels had been mounted up to this time. For this reason, the torque bracing device according to the invention is configured to permit fixing with corresponding torque bracing to practically all wheel chairs available on the market, in a quick and simple manner.

The torque bracing device according to the invention for mounting a drive wheel provided with a hub motor to a wheel chair having a frame comprises an assembly element connected to a stator part of the hub motor in a torque-proof manner and comprising at least one oblong hole, and two pins fixable along said at least one oblong hole at such a position with respect to the assembly element that they rest against the frame of the wheel chair and prevent a rotation of the stator part of the hub motor of the drive wheel in a forward direction of the wheel chair as well as in a rearward direction thereof by a form-fit. The assembly element is preferably designed as a circular flange disc preferably comprising a plurality of oblong holes.

Advantageous embodiments of the invention will be illustrated below with reference to the enclosed drawings. In the drawings

Fig. 1 shows a side view of an embodiment of a torque bracing device according to the invention in a radial direction,

Fig. 2 shows a plan view of the torque bracing device according to Fig. 1 in the direction of the arrow A in Fig. 1,

Fig. 3 shows a plan view of the torque bracing device according to Fig. 1 opposite to the direction of the arrow A in Fig. 1,

Fig. 4 shows a side view of a centrically sectioned wheel chair to which an electrically driven drive wheel is mounted ready for operation by means of the torque bracing device according to Fig. 1,

Fig. 5 shows a perspective representation of a wheel chair with manually driven running wheels,

Fig. 6 shows an exploded perspective representation of a manually driven running wheel with a plug-in axle and an adapter sleeve,

Fig. 7 shows a perspective representation of a wheel chair according to Fig. 5 to which an electrically driven drive wheel is fixed, and a further electrically driven drive wheel is shown in an exploded view, together with corresponding attachments including a plug-in axle,

Fig. 8 is a perspective representation of an electrically driven drive wheel, seen from a side facing away from the wheel chair in a state mounted ready for operation to a wheel chair,

Fig. 9 shows the electrically driven drive wheel according to Fig. 8, seen from a side facing the wheel chair in a state mounted ready for operation to a wheel chair, together with the plug-in axle inserted through the electrically driven drive wheel, and

Fig. 10 is an enlarged representation of the electrically driven drive wheel according to Fig. 9.

Fig. 1 shows, in a radial side view, an embodiment of a torque bracing device 1 according to the invention with a circular flange disc 10, a first circular cylindrical pin 20 and a second circular cylindrical pin 30. The flange disc 10 is an assembly element in the meaning of the present invention.

As is shown in Figures 2 and 3, the flange disc 10 preferably comprises a plurality of oblong holes 11 which have, in the shown embodiment, a curved extension. It is to be further noted that the oblong holes 11 may comprise a plurality of shapes, including a straight extension. It is to be further noted that, depending on the shape and extension, one single oblong hole 11 may also be sufficient.

The oblong holes 11 serve to variably fix the two pins 20 and 30 to the flange disc 10, wherein both pins 20, 30 comprise threaded pins 5 on their front sides facing the flange disc 10 in their mounted state. The pins 20, 30 are freely movable within the oblong holes 11.

The mounting of the pins 20, 30 to a desired position along the oblong holes 11 is accomplished via the threaded pins 5 which are each inserted through an oblong hole 11, and nuts 40 which are screwed onto the threaded pins 5 from the side of the flange disc 10 facing away from the pins 20, 30.

The flange disc 10 is connected, in a torque-proof manner, to a stator part (not shown) of a hub motor which serves as electric drive of an electrically driven drive wheel 300 of a wheel chair 400 in the meaning of the present invention, for example via cylinder pins 15. The mounting of the flange disc 10 to an electrically driven drive wheel 300, as it is shown in Figures 8 to 10 by way of example, may be accomplished via screws 16. It will be appreciated by a person skilled in the art that there are other mounting possibilities as an alternative. For example, the flange disc 10 may also be mounted via one or several magnets to a stator or a stator part of the hub motor of an electrically driven drive wheel 300. This has the advantage that the disc may be mounted, if necessary, without any tools.

Fig. 4 shows, in a lateral sectional view, a wheel chair 400 to which an electrically driven drive wheel 300 is mounted ready for operation by means of the torque bracing device according to Fig. 1. The support and axial fixing of the electrically driven drive wheel 300 to the frame 410 of the wheel chair 400 is effected via a plug-in axle 500. The torque-resistance of the stator part (not shown) and thus the torque bracing of the hub motor 330 with respect to the wheel chair frame 410 is accomplished via the above described torque bracing device 1 with the flange disc 10, the first pin 20 and the second pin 30. The pins 20, 30 are moved in the oblong holes 11 of the flange disc 10 and fixed to the desired positions via the threaded pins 5 and the nuts 40 in such a manner that they ensure, when they abut against points or positions 410a and 410b of the wheel chair frame, torque-resistance against rotation of the stator part of the hub motor 330 of the drive wheel 300 both in the forward direction of the wheel chair 400 and in the rearward direction thereof. Thus, in a simple and quick manner, a form-fit fixing between the pins 20, 30 and the wheel chair's frame 410 can be obtained. By respective arrangement of the nuts 40 in guides along the oblong holes 11, fixing may be effected by simply rotating the pins 20, 30.

An adaption of the type illustrated above is made specifically in cases when a wheel chair that was up to then provided with running wheels 200 that can only be manually

driven via a grip ring 220 is now to be equipped with electric auxiliary drive devices in the form of electrically driven running wheels 300. Such an electrically driven running wheel 300 is shown in Figs. 8 to 10. It also has a grip ring 320 via which a drive force can be introduced by hand and additionally is introduced via an electric hub motor 330. A sensor means known in the art is not shown in the figures. By said sensor means, the size and direction of the force manually introduced into the grip ring 320 can be measured. Also not shown in the figures is a controlling system which is also known in the art which controlling system processes the signal of the sensor means and activates the electric hub motor 330 such that it outputs an electrically generated torque according to a corresponding degree of support which supports the manually introduced force.

PATENTKRAV

1. Drejningsmoment-støtteindretning til montering af et drivhjul (300), som er forsynet med en navmotor (330), til en kørestol (400), som har en ramme (410),

kendetegnet ved

et monteringselement (10), som er forbundet drejeligt med en statordel af navmotoren (330) og har mindst ét langhul (11), og

to bolte (20, 30), som er fikserbare langs med det mindst ene langhul (11) i en sådan position i forhold til monteringselementet (10), at de ligger an mod rammen (410) af kørestolen (400) og ved fast tilslutning forhindrer en drejning af statordelen af navmotoren (330) af drivhjulet (300) i fremadgående retning af kørestolen (400) samt i dennes tilbagegående retning.

2. Drejningsmoment-støtteindretning ifølge krav 1, kendetegnet ved, at monteringselementet (10) er en cirkelformet flangeskive.

3. Drejningsmoment-støtteindretning ifølge krav 1 eller 2, kendetegnet ved, at der er tilvejebragt en flerhed af langhuller (11).

4. Drejningsmoment-støtteindretning ifølge krav 1, 2 eller 3, kendetegnet ved, at langhullet (11) eller langhullerne (11) er udformet buet.

5. Drejningsmoment-støtteindretning ifølge et hvilket som helst af de foregående krav, kendetegnet ved, at boltene (20, 30) er udformet cirkulært cylindriske.

6. Drejningsmoment-støtteindretning ifølge et hvilket som helst af de foregående krav, kendetegnet ved, at boltene (20, 30) har gevindstifter (5), ved hjælp af hvilke disse er fikserbare langs med et langhul (11).

7. Drejningsmoment-støtteindretning ifølge krav 6, kendetegnet ved, at boltene (20, 30) er fikserbare ved hjælp af møtrikker (40), som er skruet sammen med gevindstifterne (5).

8. Drejningsmoment-støtteindretning ifølge krav 7, kendetegnet ved, at møtrikkerne (40) føres i ledeskinner langs med langhullerne (11).

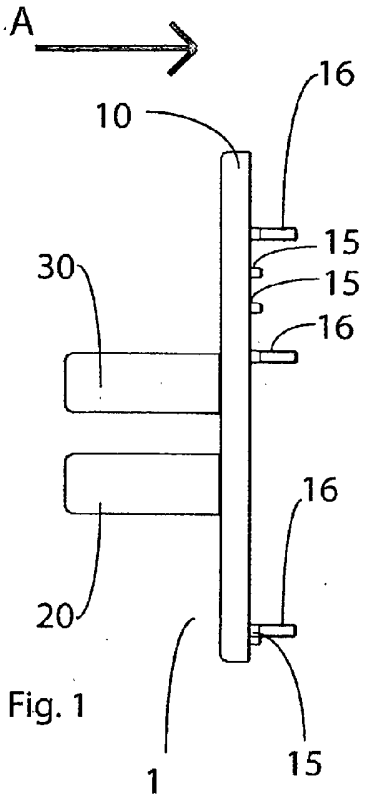

Fig. 1

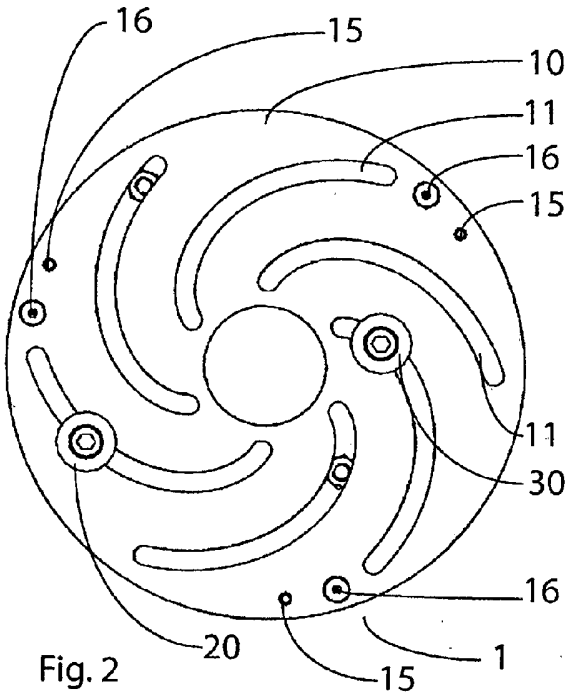

Fig. 2

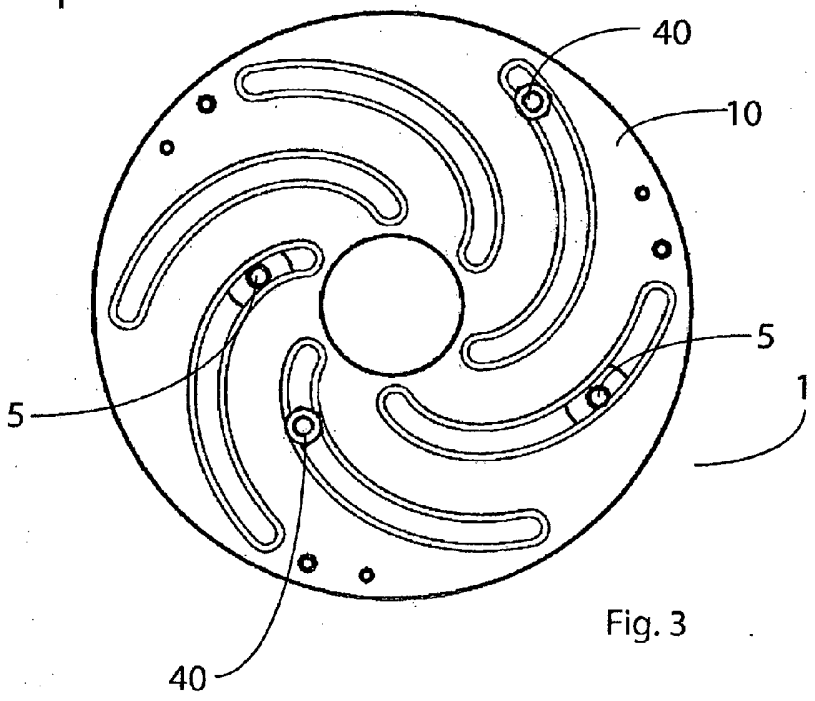

Fig. 3

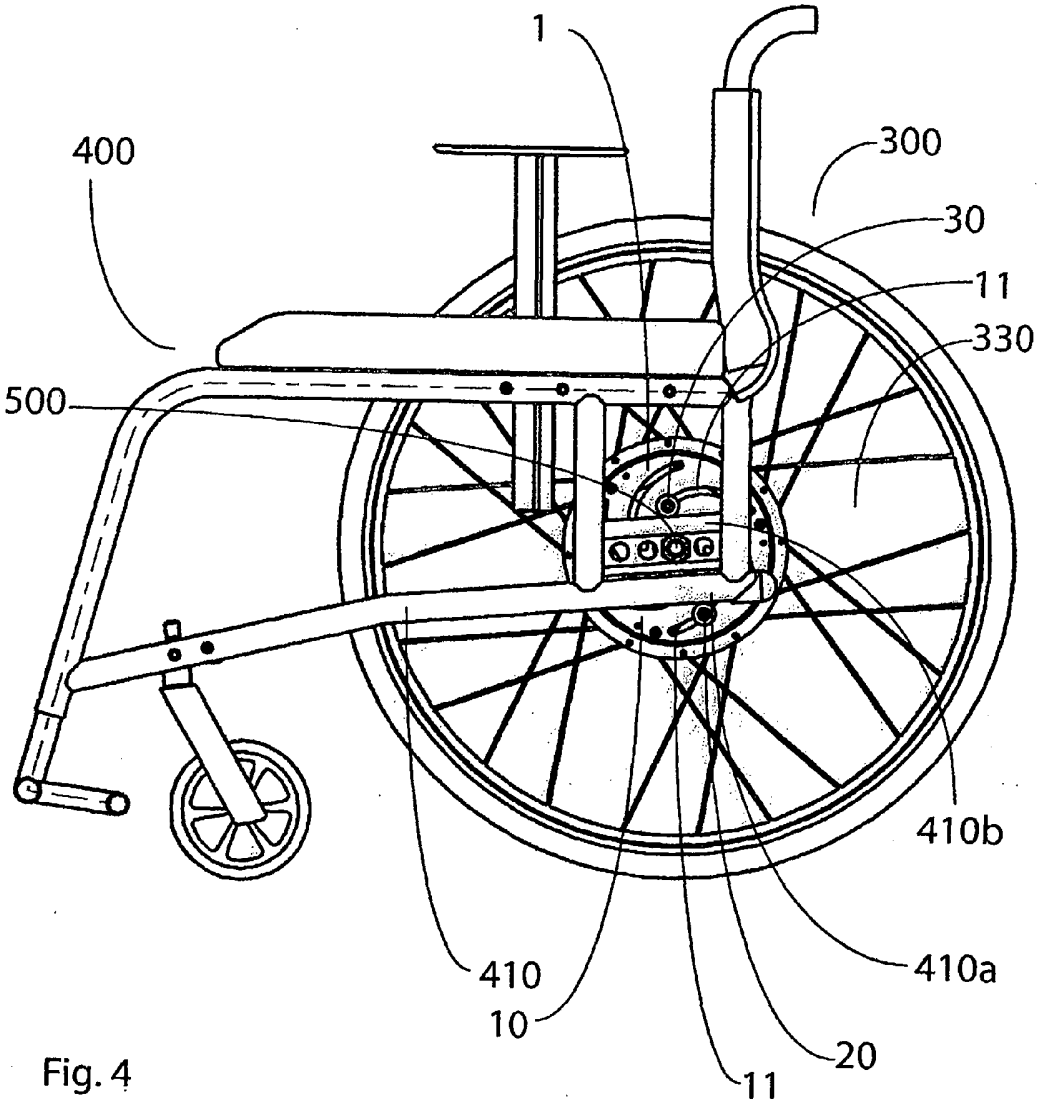

Fig. 4

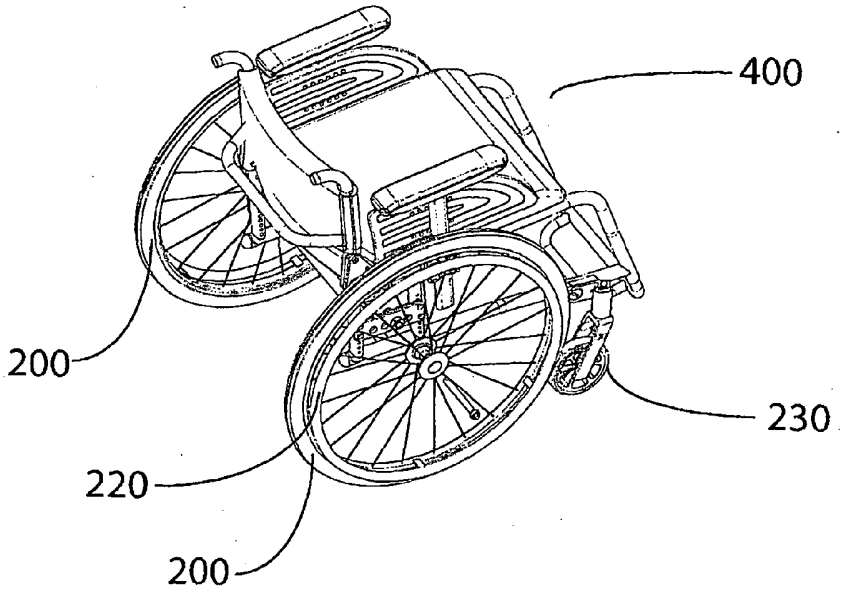

Fig. 5

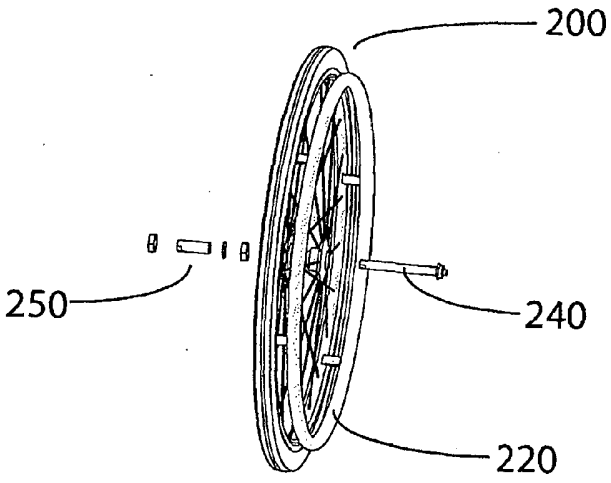

Fig. 6

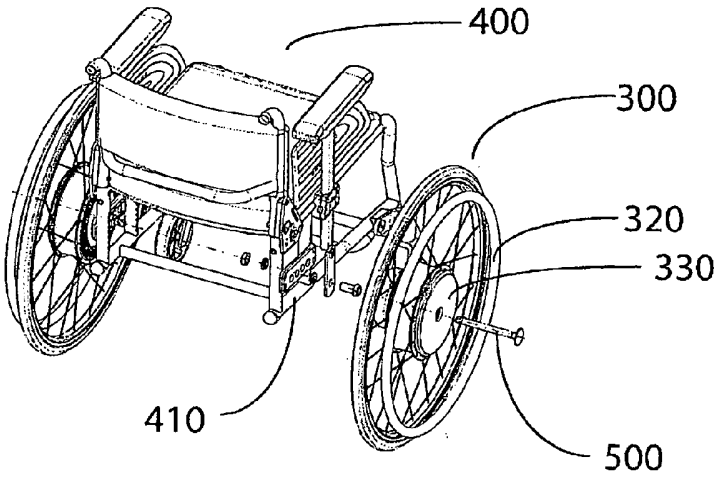

Fig. 7

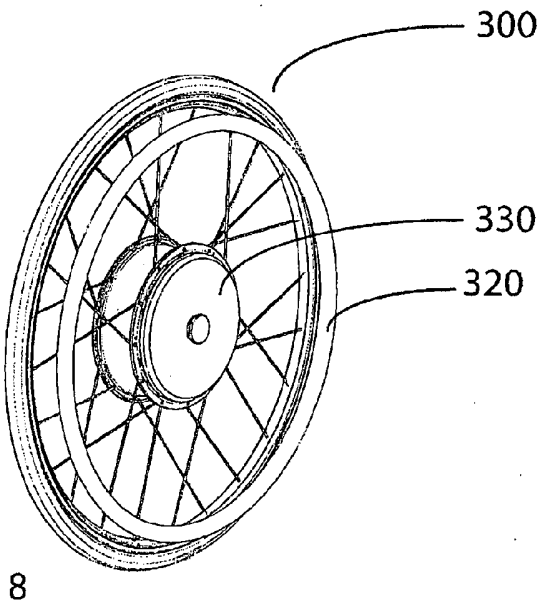

Fig. 8

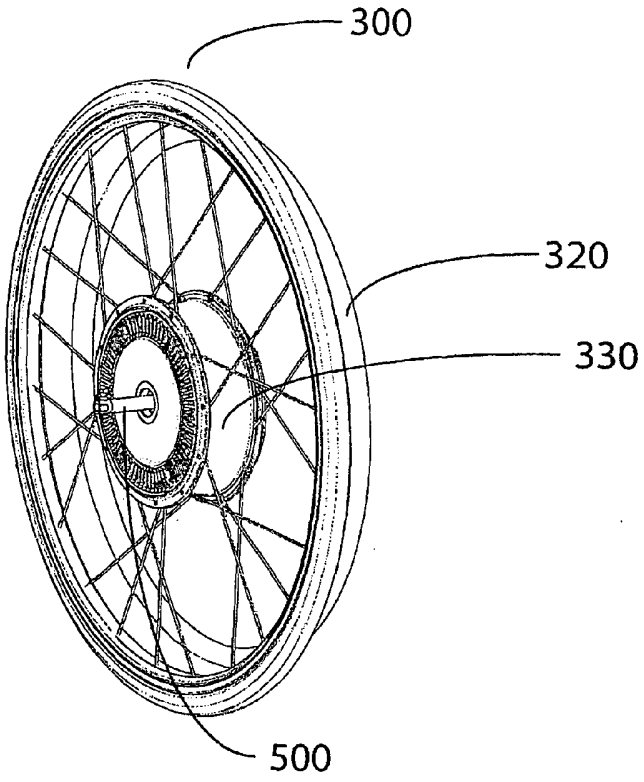

Fig. 9

Fig. 10