



- (51) **International Patent Classification:**
B62M 6/85 (2010.01) *H01L 31/02* (2006.01)
- (21) **International Application Number:**
PCT/NL2015/050554
- (22) **International Filing Date:**
29 July 2015 (29.07.2015)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
2013273 29 July 2014 (29.07.2014) NL
- (71) **Applicant:** PIP CAPITAL B.V. [NL/NL]; Spoorstraat 112, 7551 CA Hengelo (Ov.) (NL).
- (72) **Inventors:** PETERS, Marc; Pitruslaan 21, NL-7534 JB Enschede (NL). FAES, Guus; Munteltuinen 34, NL-5212 PL 's-Hertogenbosch (NL). PETERS, Callistus Franciscus Antonius; Pitruslaan 21, NL-7534 JB Enschede (NL). JANSEN, Johan; Herculesstraat 100, NL-7521 DK Enschede (NL).
- (74) **Agent:** VOGELS, Leonard Johan Paul; Weteringschans 96, 1017 XS Amsterdam (NL).
- (81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- with amended claims (Art. 19(1))

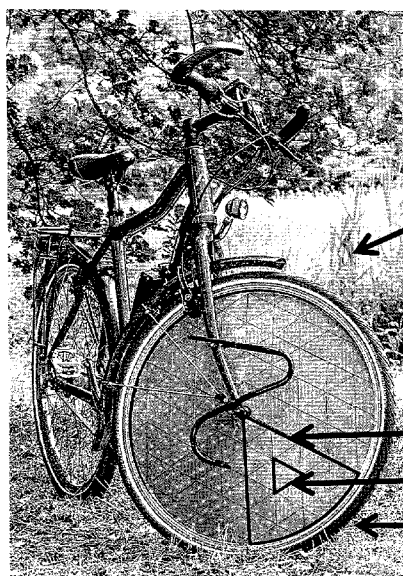
Date of publication of the amended claims: 21 April 2016(54) **Title:** PV-WHEEL

Fig. 4

(57) **Abstract:** The present invention is in the field of an electric bicycle, also known as an e-bike or booster bike. The present e- bike relates to a bicycle with an integrated electric motor which can if required be used for propulsion. A variety of types of e-bikes exist, from e-bikes that only assist a rider to more powerful e-bikes which may fully support motion. The present e- bike, comprising a PV-elements is also referred to as an s-bike.

AMENDED CLAIMS**received by the International Bureau on 03 March 2016 (03.03.2016)**

1. E-bike comprising at least one wheel (200), the wheel (200) for generating a power of 75-100 W comprising on each side

5 (a) at least one PV-element, the PV-element comprising

at least two voltaic units (VU1, VU2), the voltaic units being electrically coupled, each VU comprising at least one cell, wherein each voltaic unit is capable of operating at
10 one first voltage and at one or more first currents, and

an ultra-low voltage harvester capable of operating or functioning on an individual cell basis for optimizing output in terms of electrical energy,

wherein the ultra-low voltage harvester comprises at least one
15 Intelligent cell current converter circuit (50), the circuit multiplying the first voltage by a first factor and dividing the one or more first currents by the first factor, and one or more of a wireless power transmitter (WiPoT) (60) and an electrical accumulator (A3), preferably at least one circuit and at least
20 one wireless transmitter per unit,

the Intelligent cell current converter circuits comprising

(i) one or more (n) voltage adders (V1, V2) and optionally one or more current adders (C3), the one or more current adders
25 being adapted to be in electrical connection to the one or more voltage adders,

(ii) two or more first charge siphon devices (72) per voltage adder, preferably 2-100 siphon devices per voltage adder, such as 4-50 siphon devices per voltage adder, wherein the two
30 or more first siphon devices are electrically connected in series to one and another, wherein the two or more first charge siphon devices are adapted to be in electrical connection with the one or more voltage adders, wherein the one or more charge siphon devices comprise one or more capacitors,

35 (iii) one or more switches for electrically connecting or disconnecting components of the voltaic system, and

(iv) a comparator (U4),

the wireless power transmitter (60) comprising

a primary winding (Tr1), a secondary winding (Tr2), and

optionally a generator/oscillator (U6),

wherein the primary winding is adapted to be electrically coupled to the one or more voltaic units,

wherein the secondary winding is adapted to be electrically coupled to one or more of a load device and power grid,
5 and

wherein the one or more voltaic units, the at least one Intelligent cell current converter circuit, and wireless power transmitter are adapted to be in electrical contact with one and
10 another,

(b) an electrical power connection for connecting the at least one PV-element to a charge storing device and/or to an electrical motor, and

(c) a rigid support for the at least one PV-element.

15 2. E-bike according to claim 1, further comprising an electrical motor.

3. E-bike according to any of the preceding claims, wherein a material of the support is selected from carbon, a light weight metal, such as aluminium, titanium, a polymer, and
20 combinations thereof, and
wherein the support is curved, such as forming a section of a sphere, or of a rounded object.

4. E-bike according to any of the preceding claims, further comprising at least one of a charge storing device, such
25 as a battery, a string inverter, a micro inverter, and a high efficiency solar battery charger.

5. E-bike according to any of the preceding claims, further comprising one or more of

30 a cooling element, such as a passive cooling element,
such as a grid,

a wireless power transferor,

a carbon based power transferor, such as carbon brushes,
es, and

a metal slip power contact, such as metal brushes.

35 6. E-bike according to any of the preceding claims, wherein the at least one PV-element is selected from back-side contacted PV-elements, III-V PV-cells, Si-based PV-cells, preferably having a bottom reflective layer, and combinations thereof.

40 7. E-bike according to any of the preceding claims, wherein the PV-elements form sections of a wheel, such as trian-

gular sections (220), and/or wherein PV-elements are triangular shaped (210).

8. E-bike according to any of the preceding claims, wherein the ultra-low voltage harvester and/or optional motor are located in an axis of the wheel, or wherein each individual PV-cell, or a group of cells comprising 2-4 cells, comprises an ultra-low voltage harvester.

9. E-bike according to any of the preceding claims, wherein the PV-elements are covered with an optically transparent coating.

10. E-bike according to any of the preceding claims, wherein the PV-cell and ultra-low voltage harvester are integrated.

11. E-bike according to any of the preceding claims, further comprising one or more of a power supply, such as a USB-port, a battery, such as a Li-ion battery, and a (mains) power grid inlet.