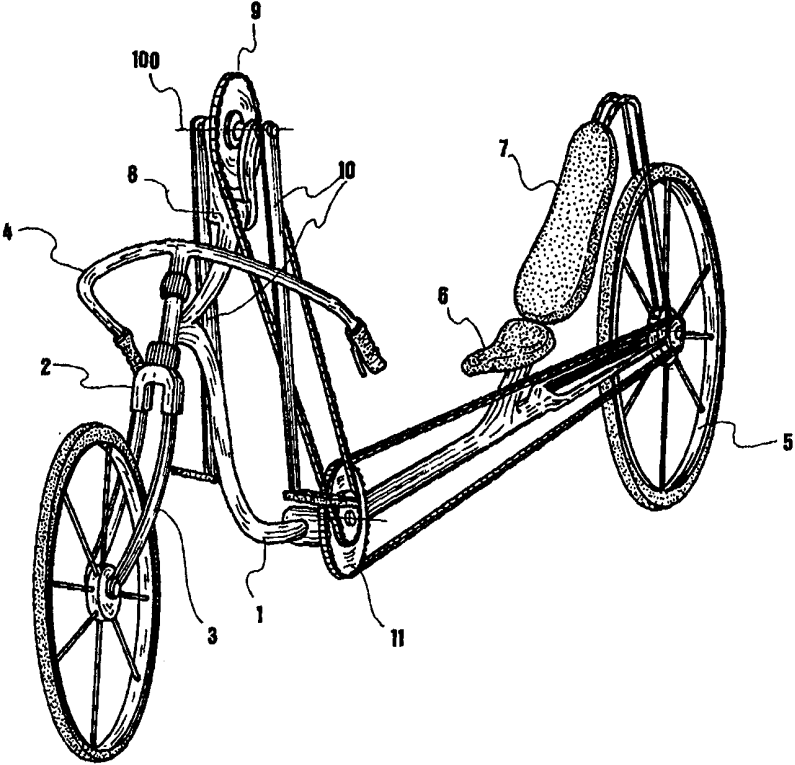




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| <p>(54) Title: HUMAN POWERED VEHICLE WITH AT LEAST TWO WHEELS</p> <p>(57) Abstract</p> <p>A human propulsion vehicle with at least two wheels (3, 5) comprising a first frame (1), handlebars (4) rotatably mounted onto the first frame (1) and connected to at least one wheel (3), a second frame (8) integrally connected to the first frame (1) at the front portion thereof and above said handlebars (4), and a seat (6) and a seat back (7) for the person is provided, the vehicle being characterised in that it further comprises a pair of cranks (10) for driving the propulsion energy with a swinging reciprocating motion around an axis of rotation (100), and a crown (9) connected thereto apt to convert the swinging reciprocating motion of the cranks (10) in a one-way rotary motion around said axis of rotation (100) and the seat back (7) being apt to provide a thrust reaction member for the person when forcing on the cranks (10).</p>  |                  |                                                                                                                                                                                                                                                                                                                                                                                                                           |

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## HUMAN POWERED VEHICLE WITH AT LEAST TWO WHEELS

DESCRIPTION

The present invention relates to a human propulsion vehicle with at least two wheels, as a bicycle, tricycle or the like.

Human propulsion vehicles as bicycles or the like are already known in the art, characterised in that they comprise a pedal drive system in which the energy from the legs is converted from a reciprocating into a circular motion by a so-called wheel and crank system.

Such wheel and crank system has a drawback in that, due to constructive and functional reasons, the crank is of a moderate size, i.e. during the reciprocating motion it has a reduced length equalling the leg swing. This entails a small torque value that can be driven to the wheel or crown.

Moreover, there is a further drawback due to the fact that the person assumes a posture that is such as to be able to exert on the pedals a force not greater than the weight thereof, thus entailing a reduced value of the torque to drive the wheel or crown.

Therefore, object of the present invention is that of solving the drawbacks of the state of the art by providing a human propulsion vehicle with at least two wheels having a crank-wheel drive system suitable for converting the driving torque into higher values, so as to ensure higher values for the driving torque and reduced stress for the person with respect to the state of the art.

Another object of the present invention is to provide a human propulsion vehicle with at least two wheels with a high efficiency crank-wheel driving system, of easy realisation, sturdy and, last but not least, of low cost.

Therefore, the present invention provides a human propulsion vehicle with at least two wheels comprising a first frame, an handlebars rotatably mounted onto the

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first frame and connected with at least one wheel, a second frame integrally connected to the first frame at the front portion thereof and above to said handlebars, and resting means for the person,

5       the vehicle being characterised in that it further comprises first driving means suitable for realizing a swinging reciprocating motion around an axis of rotation and second driving means apted to convert the swinging reciprocating motion of said first driving means in a  
10       rotary motion around said axis of rotation, said first means and said second means being rotatably mounted onto said second frame.

A detailed description of a preferred embodiment of the present invention will be disclosed hereinafter, given by way of example and not for limitative purposes,  
15       making reference to the annexed drawings, wherein:

figure 1 is a perspective view of the vehicle of the present invention; and

figure 2 is an elevational side view of the vehicle  
20       of the present invention.

With reference now to figures 1 and 2, the vehicle of the present invention comprises a frame 1 to which a front fork 2 is hinged, the latter is rotatably connected to a front wheel 3 and connected at the upper end thereof to an handlebars 4 in the already known manner. Likewise,  
25       a rear wheel 5 is rotatably connected to the frame 1 in the already known manner is provided.

At the central backward portion of the frame 1 a seat 6 for the resting of the person on the frame 1 is provided. Moreover, a seat back 7 for the resting of the  
30       back region of the person is provided.

At the front region of the frame 1, in an upper position and above the handlebars 4, a second frame 8 is provided integrally connected to the first frame 1. The  
35       second frame 8 has, at the upper end thereof, a crown 9 rotatably mounted onto the frame 8. The crown 9 is in turn coaxially connected with a pair of cranks 10, one on

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each side of the crown 9. It is to be noted that the cranks 10 are remarkably longer than those of the state of the art.

5 The connection of the cranks 10 with the crown 9 is of the freewheel or sprocket wheel type, so as to make the cranks 10 capable of performing a swinging reciprocating motion around the axis of rotation (100) of the crown 9, and driving the torque to the crown 9 only in a direction of rotation thereof, and being freely  
10 rotatable in the opposite direction of rotation.

On the other hand, the crown 9 is connected with a chain or the like to a second crown 11 rotatably and centrally mounted onto the frame 1 at the lower part thereof. The crown 11 is in turn connected to the hub of  
15 the wheel 5 with a chain or the like in the already known manner.

In the connection between crown 9 and crown 11, a torque conversion by a suitable reduction gear can be provided.

20 A first advantage of the invention is that the combination of the members of the invention is such that to drive the rear wheel 5 with a driving torque that is markedly higher than the state of the art, thus remarkably decreasing the stress of the person at same  
25 driving energy. In fact, at the same stress of the person, a torque which is remarkably higher than that of the state of the art is applied to the crown 9 by choosing a suitably length of the cranks 10.

Another advantage of the present invention derives  
30 from the fact that the person, once seated, can exert on the cranks 10 a thrust with his legs that is higher than the weight thereof, due to fact that the person when resting the back region thereof onto the seat back 7, the latter provides a reaction member to the leg thrust.

35 A further advantage of the present invention derives from the fact that, when seated, the person has a lesser wind resistance than that of the similar vehicles of the

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state of the art.

To the persons skilled in the art it will be  
apparent that the present invention is susceptible of  
several further modifications and embodiments without  
5 departing from the spirit of the invention and from the  
scope of the annexed claims.

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CLAIMS

1. A human propulsion vehicle with at least two wheels (3,5) comprising a first frame (1), an handlebars (4) rotatably mounted onto the first frame (1) and  
5 connected with at least one wheel (3), a second frame (8) integrally connected to the first frame (1) at the front portion thereof and above to said handlebars (4), and resting means (6,7) for the person,

the vehicle being characterised in that it further  
10 comprises first driving means (10) suitable for realizing a swinging reciprocating motion around an axis of rotation (100) and second driving means (9) apted to convert the swinging reciprocating motion of said first driving means (10) in a rotary motion around said axis of  
15 rotation (100), said first means (10) and said second means (9) being rotatably mounted onto said second frame (8).

2. The human propulsion vehicle with at least two wheels (3,5) according to claim 1, characterised in that  
20 it further comprises third driving means (11) for converting and driving the torque driven from said first driving means (10) to at least one rear wheel (5) of said at least two wheels (3,5).

3. The human propulsion vehicle with at least two  
25 wheels (3,5) according to claim 1 or 2, wherein said first driving means comprises two cranks (10) connected one facing the other and positioned above said handlebars (4).

4. The human propulsion vehicle with at least two  
30 wheels (3,5) according to claim 1 or 2 or 3, wherein said second driving means comprises a crown (9) rotatably mounted onto said second frame (8) and rotatably connected to said two cranks (10) by means of a freewheel or sprocket device, the arrangemet being suitable for  
35 converting the swinging motion of the cranks (10) into a one direction rotatory motion of the crown (9) and consequently driving the energy to one wheel (5) of said

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at least two wheels (3,5) of the vehicle by chain means or the like.

5        5. The human propulsion vehicle with at least two wheels (3,5) according to any one of the preceding claims, wherein said third driving means comprises a second crown (11) rotatably mounted at the lower portion of said frame (1) and connected to said first crown (9) and to said at least one rear wheel (5) of said at least two wheels (3,5) of the vehicle.

10        6. The human propulsion vehicle with at least two wheels (3,5) according to any one of the preceding claims, wherein said resting means comprise a seat (6) mounted in a central and lower position onto said first frame (1), and a seat back (7) placed in a backward  
15       position onto said first frame (1), the arrangement being such as to make said seat back (7) suitable for providing a thrust reaction member for the person seated therein, and suitable to give the person lesser wind resistance.

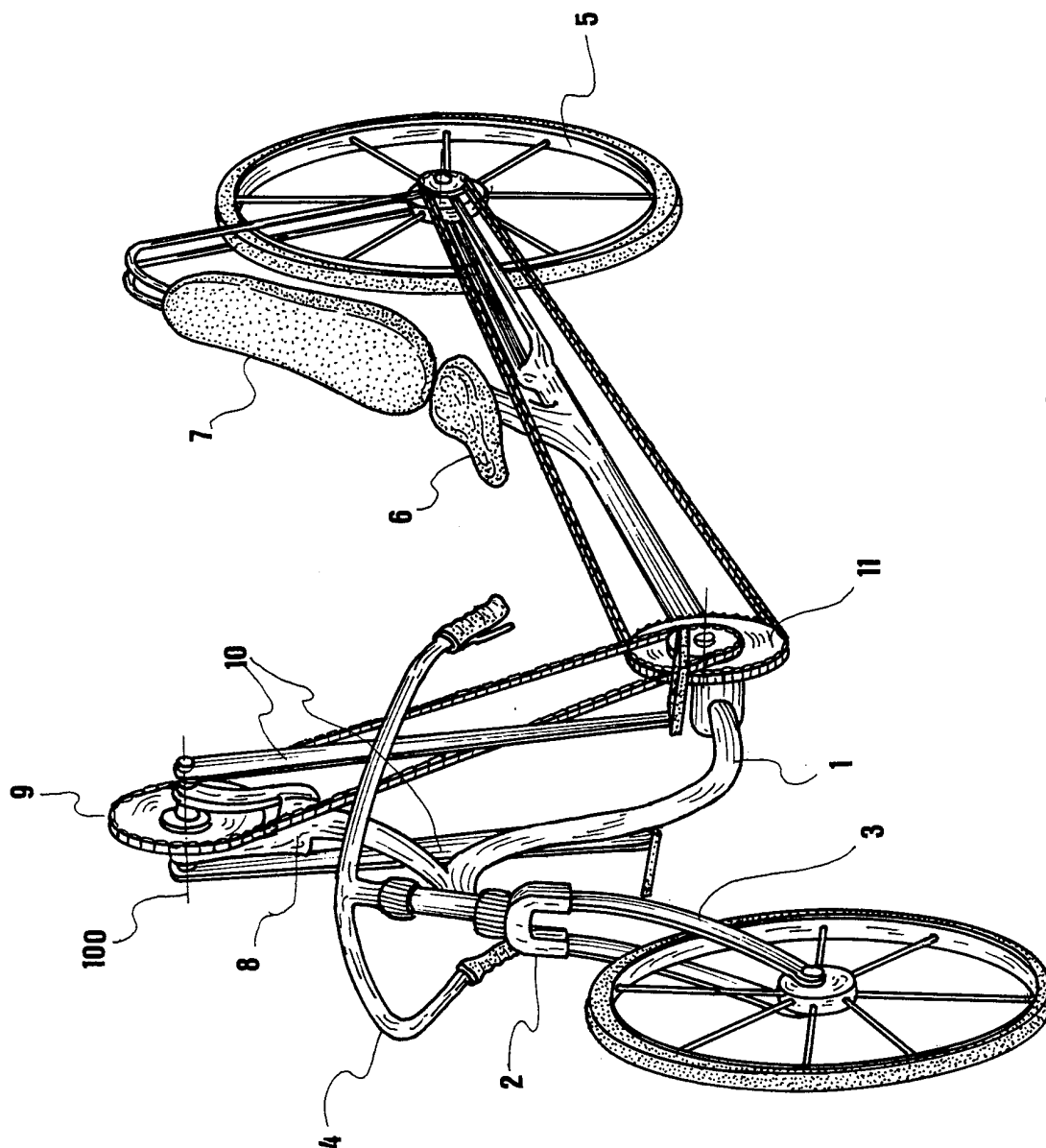


FIG.1



# INTERNATIONAL SEARCH REPORT

International Application No

PC/IT 99/00180

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 6 B62M1/04 B62K3/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B62M B62K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category | Citation of document, with indication, where appropriate, of the relevant passages                    | Relevant to claim No. |
|----------|-------------------------------------------------------------------------------------------------------|-----------------------|
| A        | US 4 717 164 A (LEVAVI)<br>5 January 1988 (1988-01-05)<br>column 3, line 49 -column 4, line 19<br>--- | 1-6                   |
| A        | US 5 272 928 A (DOUGLAS)<br>28 December 1993 (1993-12-28)<br>abstract; figure 1<br>---                | 1                     |
| A        | US 5 263 732 A (HARMEYER)<br>23 November 1993 (1993-11-23)<br>abstract<br>---                         | 1                     |
| A        | EP 0 765 799 A (CENCIGH)<br>2 April 1997 (1997-04-02)<br>abstract<br>---                              | 1                     |
|          | -/--                                                                                                  |                       |

☒ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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|   |                                                                       |   |
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| A | US 5 290 054 A (P0)<br>1 March 1994 (1994-03-01)<br>abstract<br>----- | 1 |
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Information on patent family members

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|-------------------------------------------|---|---------------------|---------------------------------------------|----------------------------------------|
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