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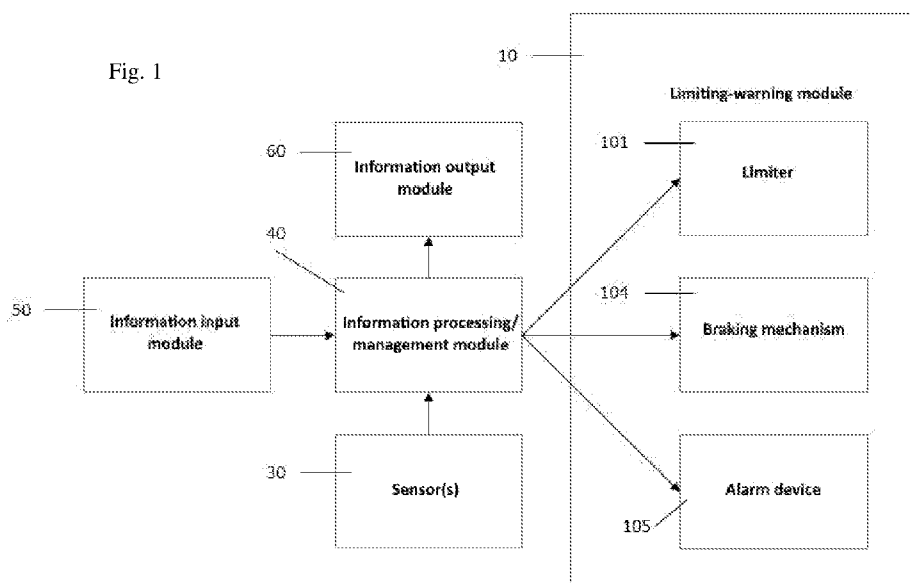
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(54) Title: DEVICE ENCOURAGING SCOOTER RIDER TO CHANGE FOOT



(57) **Abstract:** The invention is related to the vehicles powered only by feet or both by feet and electric power (scooters), or otherwise assisted vehicle's devices, specifically to the devices designed for encouraging regular change of foot while riding a scooter. The invention presents the device for scooters, which includes at least one limiting-warning module that prevents from proper use of a foot, when it's time to change it, and/or signals to the rider that it is time to change the pushing foot. The limiting-warning module is a limiter and/or a braking mechanism, and/or an alarm device. Depending on the implementation, the limiter can function independently or in combination with other modules. The device further comprises the following modules: at least one sensor and an information processing/management module. The said device further comprises an information input module and an information output module. The limiter includes at least one protruding element that prevents from pushing by foot on the respective side of the scooter, when it's time change the foot. The braking mechanism includes at least one wheel, which is subject to braking and is being decelerated upon determining that it's time to change the foot. The alarm device is a device emitting light and/or sound, and/or vibration, and/or other alarms, when it's time to change the foot.

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Device Encouraging Scooter Rider to Change Foot

Field of the Invention

The invention is related to the vehicles powered only by feet or both by feet and electric power, or otherwise assisted vehicle's devices, specifically to the devices designed for encouraging regular change of foot while riding a scooter.

State of Art

Scooters have recently become extremely popular. Parents have started buying scooters for especially young children who are not yet sensible. Products for the children of this age are subject to especially stringent requirements, as the children are not yet able to comply with discipline, however one important aspect still remains unresolved. Usually, children ride scooters by using only one particular foot, left or right. Few parents know that constantly applying load to one part of the body can lead to skeletal distortions and irregular muscle formation. The younger the age of children, the greater is the risk of forming the irregular body structure as children's bones, muscles and body tissues develop actively. Parents have no means to force or encourage their children to change their feet regularly while riding the scooter.

In current scooter designs, the rider's support foot or both feet are placed on a support surface. The patent documents CN211252885U (published on 14/08/2020), CN204915945U (published on 30/12/2015), CN202966562U (published on 5/5/2013) and WO2009141819A1 (published on 26/11/2019) cover the scooter designs that include feet placement or fastening devices. The presented designs do not provide a control system for or device for choosing of the scooter's rider's pushing foot, so the rider uses the same pushing foot continuously.

The patent document CN206068069U (published on 5/4/2017) covers scooter speed management and control system comprising a gyroscope, which measures the tilt angle of the scooter and determines the scooter's frame inclination, and a main control unit that receives the signal of the scooter engine control unit based on the scooter's inclination and velocity amplitude, thereby enabling to control the power of engine. The patent document US20200223406A1 (published on 16/7/2020) covers a scooter braking system comprising front and rear wheels, a footrest platform, a steering mechanism, a motor for turning the rear wheel, a battery placed under the platform intended to supply power to the engine, an electromagnetic brake for decelerating the rear wheel, a first sensor for detecting an obstacle on the road and a second sensor for detecting the

vibration of the scooter while riding on the road. The above control systems are not adapted to control the selection of the scooter rider's pushing foot. The aforementioned systems also do not include the devices enabling to change the pushing foot regularly, therefore the rider can use the same foot continuously.

The technical solutions presented in the description of the invention ensure that the scooter rider is encouraged to change the pushing foot regularly.

Summary of the Invention

In further description of the invention, the term "scooter" includes all vehicles that move or are assisted to move by pushing with one or another foot, including scooters of all types, as well as electrically or otherwise assisted vehicles that are propelled by pushing with one or another foot. The described invention can also be applied to the vehicles that move or are assisted to move by the movements of one or the other hand, as well as by the movements of both hands and feet.

The term "time to change foot" used in this description is used to determine the moment when a rider should or is advised to change the pushing foot. Such moment of foot change can be determined on the basis of various indicators – the duration of ride by using one foot, the distance of ride by using one foot, the number of strokes by one foot and/or other relevant indicators. The moment of foot change is determined by repeated equal cycles, for example, after riding a certain distance with one foot, the rider is encouraged to change it in order to travel the same distance with another foot. However, depending on the goal, it is possible to set a higher load on one foot and a lower load on the other or a variable foot change cycle time (e.g. the first three cycles are longer, the other three cycles are shorter or similar).

The term "limiter" used in the description refers to a mechanical device which, by its construction, prevents the rider from using a particular foot properly for pushing the scooter to move.

This description provides a technical solution: a universal device mounted on or installed in the process of manufacture of any type of scooters, which encourages the person riding the scooter to change his/her foot regularly or at another specified time set as the *time to change foot*.

The device designed for scooters includes at least one limiting-warning module that prevents proper use of the foot, which should be changed, and/or signals that it is time to change the pushing foot. The limiting-warning module is a limiter and/or a braking mechanism, and/or an alarm device. Depending on the implementation, the device further comprises the following modules: at least one

sensor, an information processing-control module, an information input module, and an information output module.

The limiter includes at least one protruding element that prevents from pushing by foot on the respective side of the scooter. The braking mechanism includes at least one wheel subject to braking, which is started to decelerate upon determining that it is time to change foot. The alarm device refers to a device emitting light and/or sound, and/or vibration, and/or other signals, when it's time to change the foot.

Brief Description of Drawings

Fig. 1 shows the components and the operation scheme of the device.

Fig. 2 shows the principle diagram of the device attached under the footrest platform.

Fig.3 shows the principle diagram of the limiter attached in the front part of the scooter.

Fig 4 shows the principle diagram of the foot change device, which is a braking mechanism with an additional audible alarm device.

Description of the Preferred Embodiments

The description covers the foot change device, which by special means encourages the rider of the scooter to change his/her pushing foot, when the time comes. The aforementioned device comprises at least one limiting-warning module (10) that prevents from proper use of the foot, which should be changed, and/or signals that it is time to change the foot. This module (10) is a limiter (101) and/or a braking mechanism (104), and/or an alarm device (105).

One of the implementation options is the installation of a stand-alone limiter (101) on a scooter. Other variants of implementation include the installation of other devices of the limiting-warning module (10) along with the following modules:

- at least one sensor (30) for detecting which foot is the pushing one and the number of its strokes. It is also possible to use different sensors for detecting of travelled distance and other relevant indices;
- an information processing/management module (40) for processing of the information received from the sensor(s) (30) and determining of the foot change moment as well as activating of at least one limiting-warning module based on the time set as the *time to change foot* and the information received from the sensor(s) (30). The information

processing/management module may also perform other calculations and provide the information to the information output device (60).

In addition to the items listed above, the device may include:

- an information input module (50) for determining or adjusting the desired foot change time and/or the algorithm of the foot change moment, and/or other relevant parameters;
- an information output module (60) providing various information to the rider of the scooter (20). For example, the information about the algorithm that determines the time of the foot change, the time remaining until the moment of the foot change, the number of strokes by one foot and the other.

The operation of the device includes the following steps (Fig. 1):

- based on the information received from the at least one sensor (30) and the pre-set or entered desired time to change the foot through the information input module (50), the information processing/management module (40) determines the time for the rider to change the pushing foot. The moment at which the foot must be changed may be calculated and/or otherwise determined by a mechanical and/or electronic device, or a system of such devices. For example, the moment of foot change can be set on a smart phone by means of a designated application and transferred through a wireless connection to the information processing/management module. When determining the moment, at which the rider has to change the foot, the following parameters are measured: a pushing foot and the duration and/or the number of strokes when pushing with it, and/or the duration of using the scooter (20), and/or the distance travelled by the scooter (20), and/or other parameters relevant to the user. The moment of foot change is determined by repeated equal cycles, for example, after riding a certain distance with one foot, the rider is encouraged to change it in order to travel the same distance with another foot. However, depending on the goal, it is possible to set a higher load on one foot and a lower load on the other or a variable foot change cycle time (e.g. the first three cycles are longer, the other three cycles are shorter or similar).
- When the moment to change the foot comes, the information processing/management module (40) activates the limiting-warning module (10) and further measures the indicators for determining the next moment to change the foot.

- The limiting-warning module (10) signals to the scooter rider that it is time to change the pushing foot by means of the limiter (101) preventing from proper pushing with the foot, which has to be changed, and/or the braking mechanism (104) preventing from further movement, and/or the alarm device (105) emitting sound (106) and/or vibration, and/or light, and/or other alarms (105) to warn the rider and/or the person supervising him/her (e.g. father or mother caring for the child) that the time has come to change the foot. When the rider changes the pushing foot, the alarms of the limiting-warning module (10) are deactivated until the next moment to change the pushing foot.

One or more functions of the device can also be performed by a person (e.g. father or mother caring for a small child) based on their senses/abilities or additional means (such as a clock that helps determining the time to change the foot).

The relevant components of the device (e.g. the information processing/management module (40) and/or the information input module (50), and/or the information output module (60), and/or the alarm device (105, 106)) may be not installed on the scooter (20). They can be far away from the scooter (20), and the information is transmitted between the devices remotely (for example, by radio, WiFi, Bluetooth). The function of such devices can also be performed by smart devices (for example, smart phones) through special applications. The function of the sensor(s) (30) can also be performed by the smart device (for example a smart phone) carried by the rider of the scooter (20) (e.g. in the pocket of his/her clothes). This allows using of the device by means of a stand-alone smart phone with the application.

In one of the implementation options, the mentioned limiter (101) comprises at least one protruding element (102) which prevents from pushing with the foot on the respective side of the scooter. The limiter (101) is mounted on the scooter. The mounting location depends on the specific design of the device – it can be attached in the front part to the frame (201) (Fig. 3) or to the fixed part of a steering column (203), or to the frame (201) in the rear part of the scooter, or on any side of the frame (201), or on the footrest platform (202) or under the footrest platform (202) (Fig. 2). The protruding element (102) is fixed to the housing of the limiter (101) either by means of a flexible connection or a sliding connection, or a resilient assembly (103), or other connections.

To ensure safe riding of the scooter (20) rider without injuries caused by the protruding element (102) or in case of hitting any object in the road by the protruding element, the aforementioned

protruding element (102) is made flexible, thus ensuring its flexibility and low resistance to obstacles.

The position of the protruding element (101) of the limiter (102) can be changed:

- manually, when the scooter (20) rider or another person, such as the parents of a child, change the position of the protruding element (102) of the limiter (101) to another side;
- automatically, when the limiter (101), which is connected to the information processing/management module (40), receives a command from the module and changes the side of the protruding element (102) by means of a designated mechanism.

In another option of implementation, the functions of the limiter (101) and the alarm are performed by the braking mechanism (104) of the scooter (20) that comprises at least one wheel, which is subject to braking (Fig. 4), where the braking mechanism is connected to the information processing/management module (40). When the information processing/management module (40) determines that the moment to change the foot has come, it activates the braking mechanism (104), which starts braking at least one wheel of the scooter (20), thus preventing from further proper use of the scooter.

The limiting or braking function described above can be replaced or supplemented by the modules connected to the information processing/management module (40) emitting light and/or sound (106), and/or vibration and other alarms (105) when the time to change the foot comes. The above alarm devices are mounted on the scooter (20) or the alarms can be emitted by other devices receiving the signal from the information processing/management module (40), such as a smart phone, a smart bracelet, a special device in the rider's helmet and other similar devices.

As an additional function, a lock can be attached to the foot change device of the scooter (20), which prevents from switching off of the foot change device of the scooter (20) or changing its parameters without the knowledge of a caregiver. This is relevant in situations where, for example, the parents who are caregivers forbid young children who are riders of the scooter (20) to disconnect the device and use the scooter (20) with only one foot.

In order to illustrate and describe the present invention, the description of the best options of implementation is provided above. It is not an exhaustive or restrictive description intended to determine the exact form or the option of implementation. Obviously, many modifications and variations may be evident to those skilled in the art. The option of implementation has been chosen and described in order to help those skilled in the art to understand better the principles of the present invention and find the best practical fit for various options of implementation with different

modifications to suit a particular use or implementation. It is provided that the scope of the invention is defined by the claims and its equivalents appended thereto, where all the above terms have the broadest meaning, unless indicated otherwise.

The options of implementation described by those skilled in the art may include modifications without departing from the scope of the present invention, as defined in the claims below.

Claims

1. A device intended for vehicles that move by pushing with foot, characterized in that it comprises at least one limiting-warning module (10), which encourages the rider of the vehicle (20) to change his/her pushing foot.
2. The device according to claim 1, characterized in that the at least one limiting-warning module (10) is a limiter (101) and/or a braking mechanism (104), and/or an alarm device (105).
3. The device according to any of the above claims, characterized in that it further comprises the following elements:
 - at least one sensor (30) for determining which foot is the pushing one and the number of its strokes and other sensors for detecting the distance travelled, as well as other relevant indicators;
 - an information processing/management device (40) for processing of the information received from the sensor(s) (30) and determining the foot change moment based on the time set as the *time to change foot* and the information received from the sensor(s) (30), as well as activating of at least one limiting-warning module (10).
4. The device according to any of the above claims, characterized in that the limiter (101) comprises at least one protruding element (102) connected to the body of the limiter (101) preventing from proper pushing with a foot on the respective side of the vehicle (20).
5. The device according to any of the above claims, characterized in that the limiter (101) is mounted on the frame (201) in the front part of the vehicle (20) or on the fixed part of the steering column (203), or on the frame (201) in the rear part, or on any side of the frame (201), or on the footrest platform (202), or under the footrest platform (202).
6. The device according to any of the above claims, characterized in that the position of the protruding element (102) of the foot change device/limiter (101) is changed manually, where the rider of the vehicle (20) or another person changes the side of the protruding element (102) of the limiter (101), or automatically, where the limiter (101) is connected to the information

processing/management device (40) and the side of the protruding element (102) of the limiter (101) is changed by means of a mechanism.

7. The device according to any of the above claims, characterized in that the braking mechanism (104) comprises at least one wheel, which is subject to braking, where the braking mechanism (104) is connected to the information processing device (40) and, when the latter determines that it is time to change the foot, the said braking mechanism (104) is activated and starts decelerating at least one wheel of the vehicle (20), thereby preventing from further proper use of the vehicle (20).

8. The device according to any of the above claims, characterized in that its alarm device (105) is a device emitting light and/or sound (106), and/or vibration and other alarms, when it is time to change the foot, and the said device (105) is connected to the information processing device (40).

9. The device according to any of the above claims, characterized in that it further comprises an information input device (50) for determining or adjusting the desired time to change the foot and/or the algorithm of the foot change moment, and/or other relevant parameters.

10. The device according to any of the above claims, characterized in that it further comprises an information output device (60) for providing information to the rider of the vehicle (20).

11. The device according to any of the above claims, characterized in that the said device measures and evaluates indicators including: the pushing foot and the duration of the foot strokes, and/or the number of the foot strokes, and/or the duration of use of the vehicle (20), and/or the distance travelled by the vehicle (20), and/or other indicators relevant to the user.

12. The device according to any of the above claims, characterized in that the foot change moment is determined by repetitive equal and/or variable cycles, where the said foot change moment is calculated and/or otherwise determined by means of a mechanical and/or electronic device, or a system of such devices.

13. The device according to any of the above claims, characterized in that the said device further comprises a lock preventing from unauthorized deactivation or modification of the rider's foot change device of the vehicle (20) without the knowledge of a caregiver.

14. The device under any of the above items, characterized in that the vehicle (20) is a scooter.

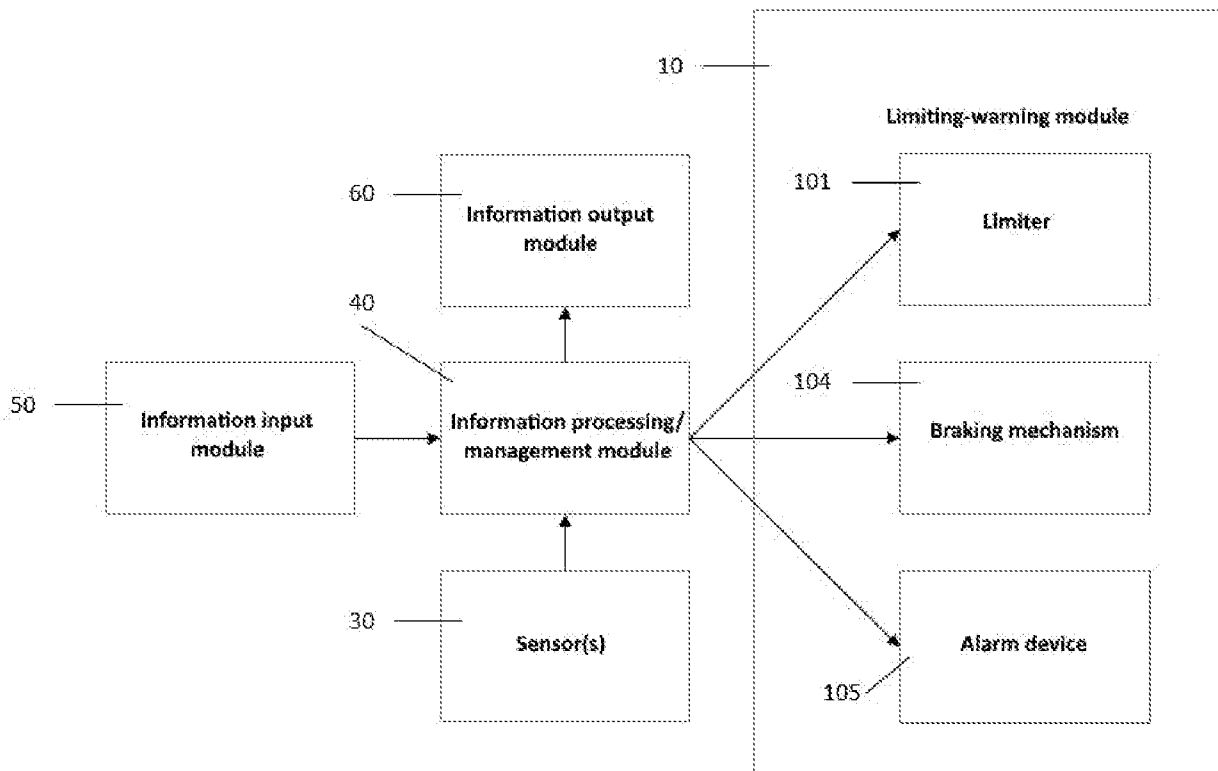


Fig. 1

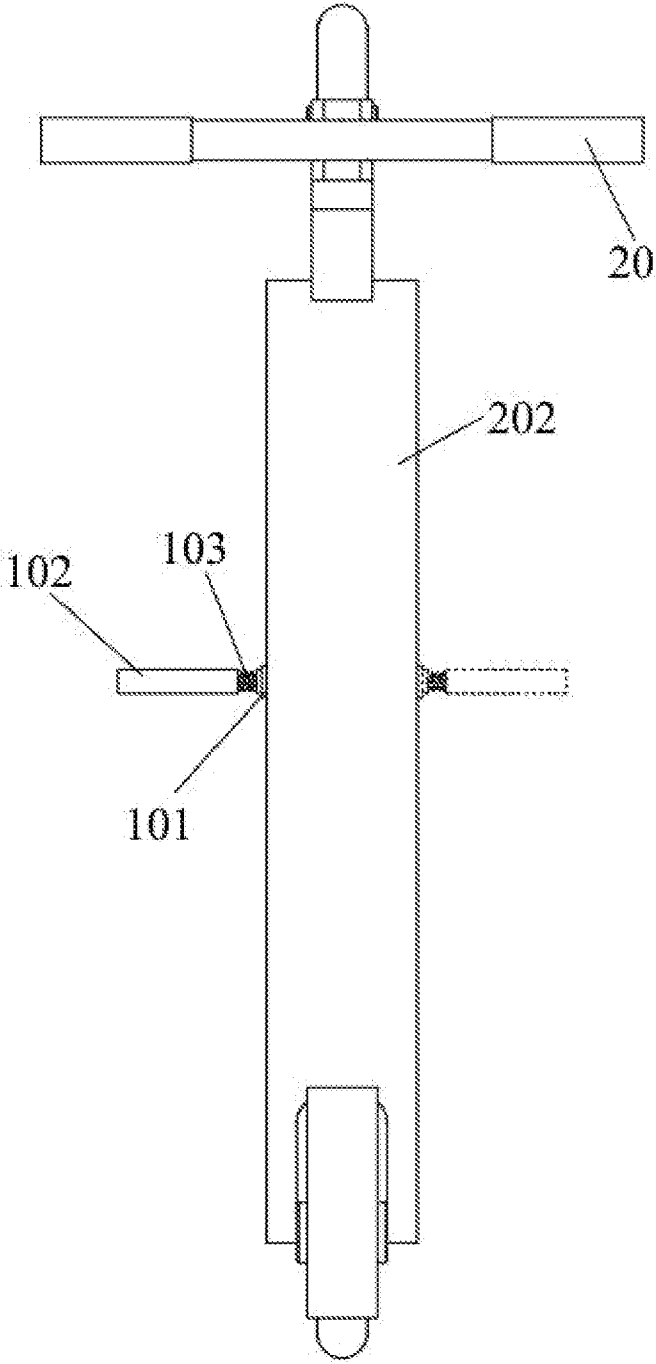


Fig. 2

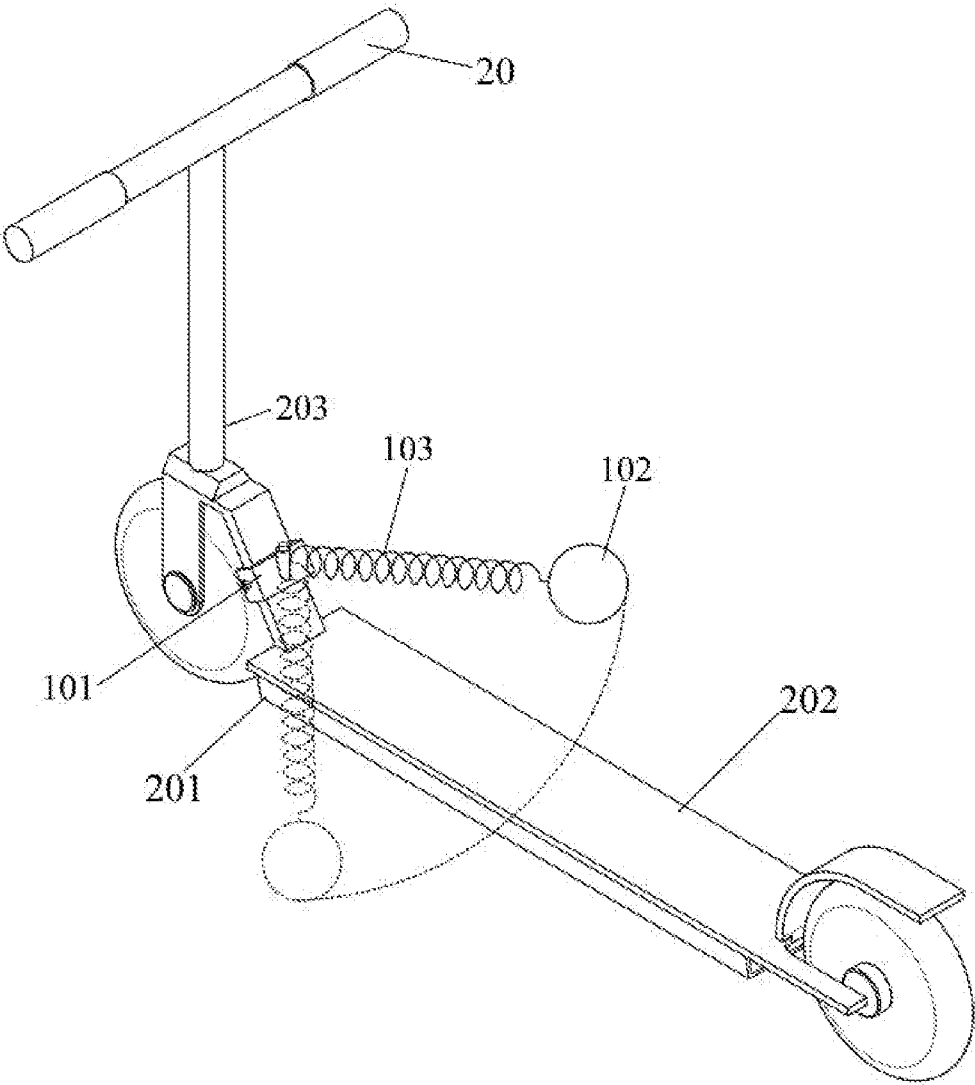


Fig. 3

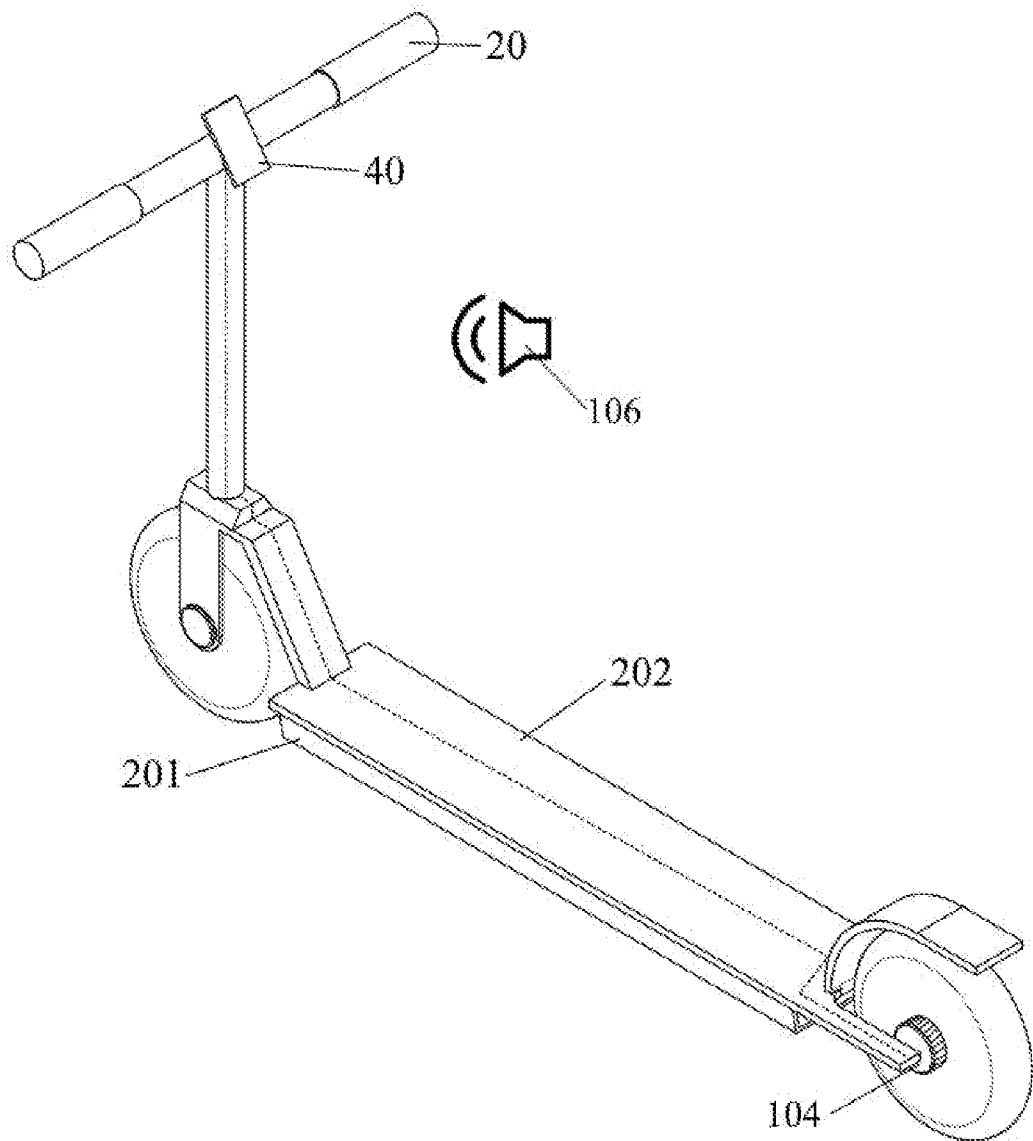


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2021/054411

A. CLASSIFICATION OF SUBJECT MATTER INV. B62K3/00 B62J50/21 B62J3/00 ADD.		
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) B62J 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 practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
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Date of the actual completion of the international search 20 January 2022		Date of mailing of the international search report 31/01/2022
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Baeza Félez, Lluís

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2021/054411

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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