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(54) **Stabilizing device for radio-controlled motorcycles**

(57) A stabilizing device for radio-controlled motorcycles comprises a wheel of a motorcycle which is mounted so that it can rotate on a wheel rotation pivot (3) and a flywheel (4) which is also mounted so that it can rotate on the wheel rotation pivot (3). The device comprises an electric motor which has a rotor (5) which is rigidly coupled to the flywheel (4) and a stator (6) which is rigidly coupled to the wheel rotation pivot. The device further comprises a speed regulator (7) for the electric motor which can be radio-controlled.

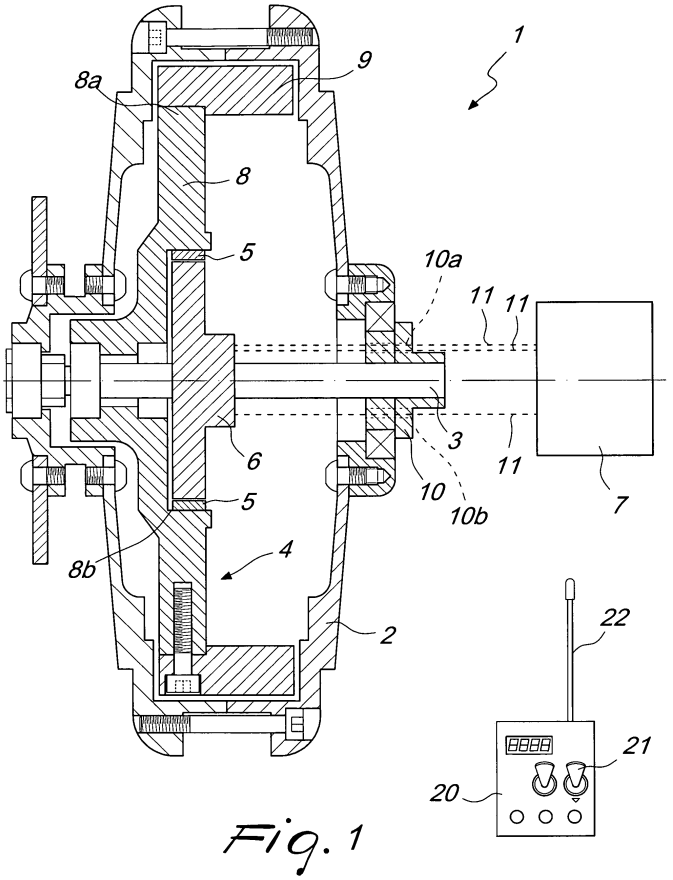


Fig. 1

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Description

[0001] The present invention relates to a stabilizing device for radio-controlled motorcycles, particularly for motorcycles used in the field of modeling and hobbies.

[0002] Hobby and/or model motorcycles are typically provided with stabilizing devices which allow the motorcycle-like vehicle to remain balanced on its two wheels without tipping.

[0003] In particular, it is known to use a flywheel which is mounted inside at least one wheel and allows to maintain the balance of the motorcycle by way of the gyroscopic effect produced by the rotation of said flywheel.

[0004] In practice, in known devices the flywheel turns faster than the wheel in which it is fitted and keeps its rotation rate substantially unchanged when the wheel slows down.

[0005] However, known flywheel-based stabilizing devices are adapted for toy motorcycles, i.e., for motorcycles that travel at low speeds and are unsuitable to remain balanced on rough terrain.

[0006] Some devices, for example the one disclosed in Italian patent application no. MI 2006A02239, can however comprise mechanisms which allow the transfer of kinetic energy between the wheel and the flywheel.

[0007] More precisely, by means of these mechanisms and in particular thanks to clutches of the centrifugal type which are interposed between the flywheel and the wheel, when the wheel turns at high speeds, i.e., when the gyroscopic effect of the wheel on its own is sufficient to keep the motorcycle-like vehicle balanced, the wheel transmits to the flywheel part of its kinetic energy, which is thus stored.

[0008] When the wheel slows down, the rotations of the wheel and of the flywheel are uncoupled, so that the flywheel can turn freely, thanks to the accumulated energy, keeping the motor vehicle balanced by way of the gyroscopic effect produced by the flywheel.

[0009] Flywheel-based stabilizing devices which use mechanisms such as the one described above, though allowing motorcycle-like vehicles to travel at high speeds while remaining balanced even on rough terrains, suffer the drawback that it is not possible to control in any way the rotation of the flywheel during use of the motorcycle.

[0010] Another drawback consists in that the balanced condition of the motorcycle-like vehicle produced by the gyroscopic effect of the flywheel, when the wheel of the motor vehicle motorcycle is stationary, is a temporary condition; in fact since the kinetic energy accumulated by the flywheel can be depleted, the motorcycle-like vehicle tips once a time period long enough to allow the flywheel to stop has elapsed.

[0011] The aim of the present invention is to eliminate the drawbacks cited above by providing a stabilizing device for radio-controlled motorcycles in the field of hobbies and/or modeling, typically in a reduced scale, which allows the motorcycle-like vehicle to travel on two wheels at speeds on the order of even 80 km/h on any type of terrain, even on rough terrains.

[0012] Within this aim, an object of the present invention is to provide a stabilizing device for radio-controlled motorcycles which allows maximum control over the balanced condition of the motorcycle.

[0013] Another object of the present invention is to provide a stabilizing device for radio-controlled motorcycles which allows the motorcycle-like vehicle to maintain the balanced condition on its wheels without tipping for long periods of time even when the motorcycle is substantially stationary.

[0014] Another object of the present invention is to provide a stabilizing device for radio-controlled motorcycles which allows the motorcycle, if it tips, to return to the condition of balance on two wheels.

[0015] Still another object of the present invention is to provide a stabilizing device for radio-controlled motorcycles which is highly reliable, relatively easy to provide and at low cost.

[0016] This aim and these and other objects, which will become better apparent hereinafter, are achieved by a stabilizing device for radio-controlled motorcycles, comprising a wheel of a motorcycle which is mounted so that it can rotate on a wheel rotation pivot and a flywheel which is mounted so that it can rotate on said wheel rotation pivot, characterized in that it comprises an electric motor which has a rotor which is rigidly coupled to said flywheel and a stator which is rigidly coupled to said wheel rotation pivot, said device further comprising a speed regulator for said electric motor which can be radio-controlled.

[0017] Further characteristics and advantages of the present invention will become apparent from the description of a preferred but not exclusive embodiment of a stabilizing device for radio-controlled motorcycles according to the invention, illustrated by way of non-limiting example in the accompanying Figure 1, which is an axial sectional view of the mechanism according to the invention.

[0018] With reference to the figure, the stabilizing device for radio-controlled motorcycles according to the invention, generally designated by the reference numeral 1, comprises a wheel of a motorcycle (for example the rear wheel) which is provided with a wheel supporting structure 2 which is mounted so that it can rotate on a rotation pivot 3 and contains a flywheel 4, which also can rotate with respect to the pivot 3, said pivot 3 passing transversely through the flywheel substantially at the center.

[0019] The device 1 comprises an electric motor, preferably of the three-phase or rotary-casing type, provided with a rotor which is rigidly coupled to the flywheel 4 and with a stator 6 which is rigidly coupled to the pivot 3 and carries windings which are capable of inducing a rotation of the rotor if they are powered appropriately.

[0020] Preferably, the rotor consists of at least one permanent magnet 5 or preferably a plurality of permanent magnets 5 which are fixed to the flywheel 4.

[0021] Structurally, the flywheel 4 comprises a sup-

porting element 8 which is substantially circular and is mounted so that it can rotate on the pivot 3 at the center of the circular supporting element 8.

[0022] A substantially annular flywheel mass 9 is rigidly coupled to the supporting element 8 and coaxial thereto and is fixed at the peripheral region 8a of the supporting element 8.

[0023] The supporting element 8 further comprises a substantially cylindrical recess 8b, which is coaxial to the pivot 3 and which partially accommodates, without direct contact, the stator 6 which is fixed to the pivot 3.

[0024] The recess 8b defines a cylindrical lateral surface 8c, on which the permanent magnet or magnets 5 are fixed for example by adhesive bonding.

[0025] The device 1 is electrically powered by at least one battery, not shown, and comprises a speed regulator 7 for the electric motor, which can be radio-controlled, for example by means of an optionally programmable radio control 20.

[0026] The speed regulator 7 is an electronic circuit which, for example by means of a microcontroller of the circuit, can be configured only to supply power to the windings or switch them off, i.e., to turn the flywheel 4 only at a maximum speed or to deactivate it. As an alternative, or in addition, the speed regulator 7 can also be configured to power the windings appropriately so as to obtain a plurality of speed levels at which the flywheel 4 is to turn about the pivot 3 of the wheel.

[0027] For this purpose, advantageously, the device 1 can comprise a signal inverter, not shown, for generating an acceleration of the flywheel 4 which is of opposite sign with respect to the acceleration of the wheel by controlling the speed regulator 7.

[0028] This signal inverter, which can be easily implemented electronically by the person skilled in the art, can be installed in an ordinary radio control 20, so that it receives the acceleration signal of the motorcycle imparted by the user by means of an adapted control lever 21, which is notoriously provided in known types of radio control, and transmits by means of the antenna 22 of the radio control a corresponding radio signal for accelerating the flywheel which is of opposite sign with respect to the motorcycle acceleration signal, using another channel which is different from the one of the acceleration signal.

[0029] As an alternative, it is possible to use a known type of multiple-channel programmable radio control, in which one channel is programmed appropriately in order to generate a radio signal for accelerating the flywheel which is of opposite sign with respect to the motorcycle acceleration signal.

[0030] In another embodiment, the signal inverter can be mounted directly within the regulator 7 or in any case on the motorcycle, so that it can receive the radio signal for acceleration/deceleration transmitted by the radio control 20 and generate the corresponding signal for deceleration/acceleration of the flywheel 4, respectively.

[0031] A central flange 10 can be provided and keyed rigidly on the pivot 3 and has at least one through seat 10a, 10b for cables 11 for supplying the windings of the stator 6 which are connected to the speed regulator 7.

[0032] Advantageously, the rotating components of the device according to the invention, particularly the circular supporting element 8 and the supporting structure 2, are provided with internal bearings, so as to withstand high angular velocities.

[0033] Operation of the stabilizing device for radio-controlled motorcycles according to the invention is as follows.

[0034] Regardless of the type of mathematical rule between the angular velocity of the wheel and the angular velocity of the flywheel 4, as long as a relationship of opposite sign between the derivatives of the two velocities is ensured when the wheel turns at a rate which is high enough to ensure the balance of the motorcycle even in the absence of the gyroscopic effect of the flywheel 4, the signal inverter does not send any acceleration/deceleration signal to the regulator 7, thus deactivating the electric motor.

[0035] During acceleration or deceleration, i.e., when the wheel has to pass from a nil or low speed to a higher speed and vice versa, the user acts on the control lever 21 of the radio control in order to send a suitable radio signal to the motor of the motorcycle.

[0036] The signal generated on the basis of the movement of the control lever 21 is acquired by the signal inverter, which determines whether the received signal is related to acceleration or deceleration. Accordingly, the signal inverter generates and sends to the speed regulator, by means of the antenna 22, a radio signal respectively for deceleration or acceleration of the flywheel. The deceleration signal can optionally be only a radio command to no longer supply power to the windings of the stator, so as to make the flywheel idle.

[0037] In this manner, by way of the slowing of the motorcycle, the flywheel 4 is turned until it reaches its maximum angular velocity when the wheel is substantially motionless.

[0038] Vice versa, as the motorcycle accelerates, the flywheel 4 is idled or is gradually decelerated until it reaches a much lower speed.

[0039] In practice, by means of the signal inverter it is possible to switch the throttle signal of the radio control so that when the user sends a command to accelerate the wheel, the flywheel 4 decelerates, and vice versa.

[0040] In practice it has been found that the stabilizing device for radio-controlled motorcycles according to the present invention fully achieves the intended aim and objects, since it allows to ensure a condition of stable equilibrium even on very rough terrains, allowing maximum control over the speed of the flywheel.

[0041] The stabilizing device for radio-controlled motorcycles thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may furthermore be replaced with other technically equivalent

elements.

[0042] In practice, the materials used, so long as they are compatible with the specific use, as well as the contingent shapes and dimensions, may be any according to requirements and to the state of the art.

[0043] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A stabilizing device for radio-controlled motorcycles, comprising a wheel of a motorcycle which is mounted so that it can rotate on a wheel rotation pivot and a flywheel which is mounted so that it can rotate on said wheel rotation pivot, **characterized in that** it comprises an electric motor which has a rotor which is rigidly coupled to said flywheel and a stator which is rigidly coupled to said wheel rotation pivot, said device further comprising a speed regulator for said electric motor which can be radio-controlled.

2. The stabilizing device according to claim 1, **characterized in that** said stator comprises electric windings for moving the rotor and said rotor comprises at least one permanent magnet, said speed regulator being an electronic circuit which is configured to power or switch off the windings of said stator.

3. The stabilizing device according to claim 2, **characterized in that** it comprises a signal inverter which is associated with said speed regulator and is configured to generate an acceleration of said flywheel which is substantially of the opposite sign with respect to the acceleration of said wheel and to control said speed regulator.

4. The stabilizing device according to claim 3, further comprising a radio control, said signal inverter being installed in the radio control and being configured to receive directly a signal for the acceleration/deceleration of said wheel and for generating a corresponding radio signal for the deceleration/acceleration of said flywheel, respectively, said speed regulator being configured to receive said radio signal for the deceleration/acceleration of said flywheel and to supply power to the windings of the stator according to said deceleration/acceleration signal of said flywheel.

5. The stabilizing device according to claim 3, **characterized in that** said signal inverter is integrated in said speed regulator and is configured to receive by radio a radio signal for the acceleration/deceleration of said wheel and to generate an electrical signal for the deceleration/acceleration of said flywheel, said speed regulator being configured to power the windings of the stator on the basis of said electrical signal for the deceleration/acceleration of said flywheel.

6. The stabilizing device in according to one or more of claims 2 to 5, **characterized in that** said flywheel comprises a substantially circular supporting element, which is mounted so that it can rotate on said rotation pivot, and at least one substantially annular flywheel mass which is coaxially rigidly coupled to said supporting element at the peripheral region of said supporting element, said supporting element comprising a substantially cylindrical recess which is coaxial to said rotation pivot, said recess forming a cylindrical lateral surface on which said at least one permanent magnet of the rotor is fixed.

7. The stabilizing device according to one or more of claims 2 to 6, **characterized in that** it comprises a central flange which is keyed rigidly to said rotation pivot and has at least one through seat for the passage of power supply cables for said windings of said electric motor.

8. The stabilizing device according to one or more of the preceding claims, **characterized in that** it comprises a radio control for the remote control of said electric motor.

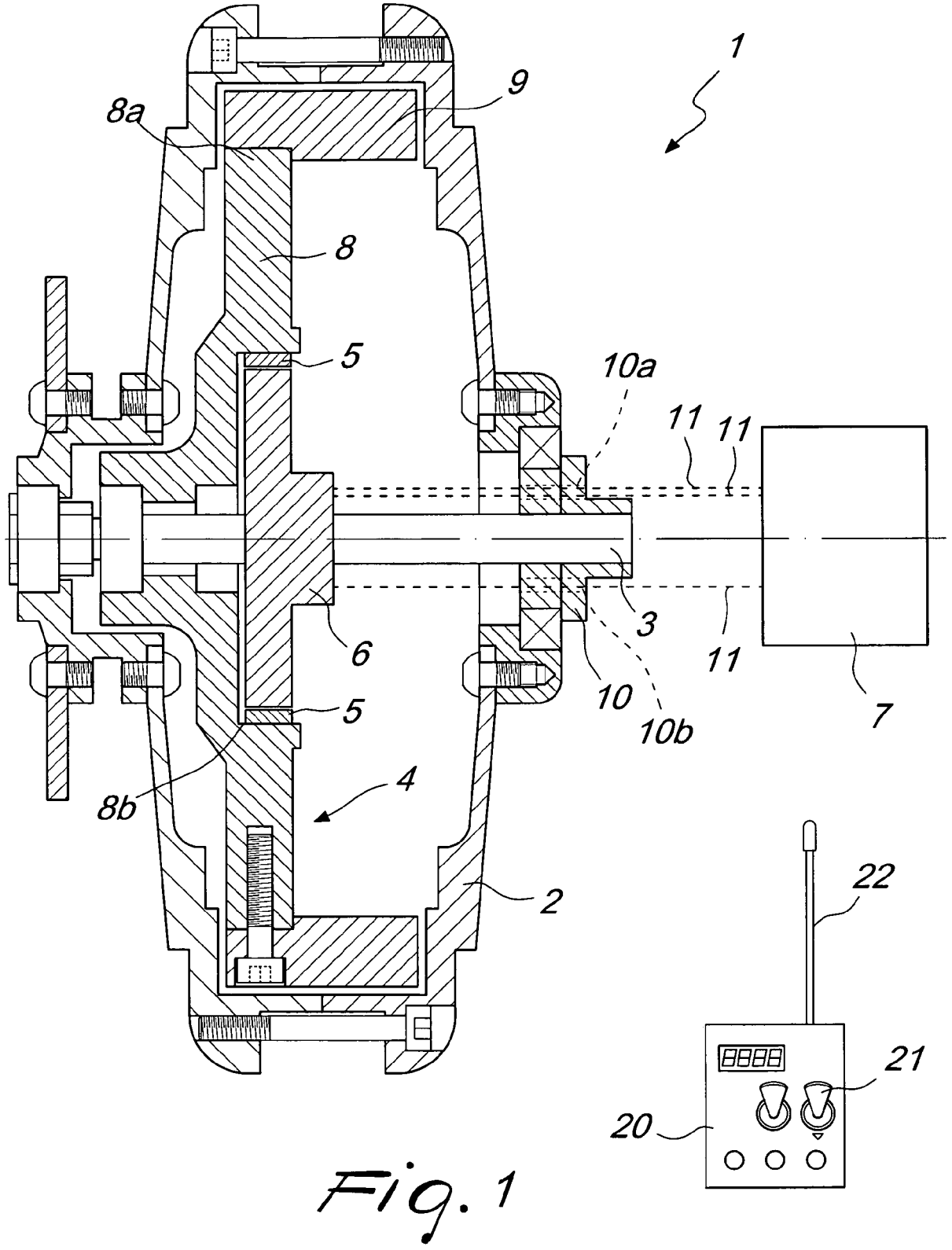


Fig. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 07 42 5707

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2006/009119 A1 (HOETING MICHAEL G [US] ET AL) 12 January 2006 (2006-01-12) * claim 1; figures *	1	INV. A63H17/16 A63H29/20 A63H30/04
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TECHNICAL FIELDS SEARCHED (IPC)

A63H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 April 2008	Shmonin, Vladimir

CATEGORY OF CITED DOCUMENTS

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02-04-2008

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