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(54) **Test bench for bicycles**

(57) Test bench for bicycles, with means for supporting a bicycle; comprising: - a supporting bedplate (1) provided with adjustable pawls (11) for attaching a bicycle (B) in an adjustable position; - a motorised transmission (2) associated with bedplate (1) and provided with means for transmitting an adjustable rotary movement to the pedals (P) of a bicycle (B) positioned on bedplate (1); -

an actuator arm (3) associated with the bedplate and conditioned to transmit a compression force and a friction force to one of the wheels of bicycle (B) positioned on bedplate (1); - a control unit (4) provided with switches suitable for controlling the movements of the motorised transmission (2) and actuator arm (3); and a computer (5) provided with sensors for capturing physical magnitudes.

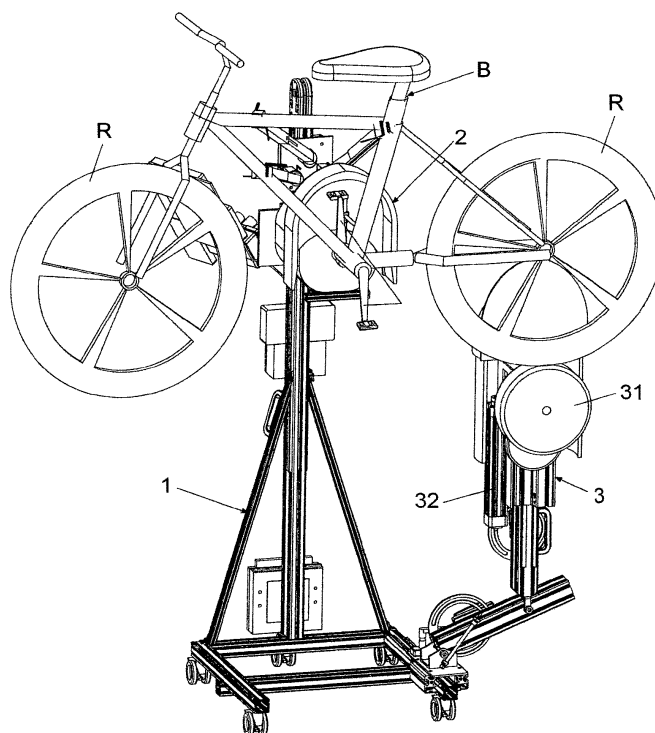


Fig. 3

Description

Description of the invention

[0001] The invention relates to a test bench for bicycles, suitable for subjecting the bicycle to stresses that simulate real operating conditions, and obtaining operating parameters of different bicycle components, in order to make the necessary adjustments and improve the bicycle's performance during its usual use.

Technical sector

[0002] Said invention falls within the testing of bicycle mechanics. This invention will be aimed at the technicians and mechanics associated with the world of the bicycle.

State of the art

[0003] At present, it is sought to optimise resources and time when checking and adjusting bicycle mechanics. The teams dedicated to high competition cycling spend considerable time and money on adjusting their bicycles. This philosophy is also applicable to the usual bicycle mechanics who provide a service for individuals.

[0004] The most analysed components correspond to speed change, the trajectory and hardness of the suspensions and the braking time.

[0005] At present a multitude of supports exist on the market, mainly wall supports, whose sole function is to hold a bicycle when said bicycle is not in use.

[0006] However the applicant of the invention is unaware of the existence of test benches that perform other functions aimed at knowing the condition of the bicycle and the adjustments to be made to it to improve its operation.

Detailed description of the invention

[0007] The test bench for bicycles that is the object of this invention as well as supporting the bicycle and providing suitable means for interacting with the bicycle, reproduces real operating conditions, and allows the operating parameters to be collected and analysed in order to make the adjustments necessary for optimising the bicycle's maximum performance and operation during its normal use.

[0008] Said test bench allows subjecting the bicycle to various stresses similar to those that it may receive during its normal use by a user.

[0009] According to the invention this test bench for bicycles comprises, at least:

- a supporting bedplate provided with adjustable pawls for attaching a bicycle in an adjustable position;

- a motorised transmission associated with the bedplate and provided with means for transmitting an adjustable rotary movement to the pedals of a bicycle positioned on the bedplate;

- an actuator arm associated with the bedplate and conditioned to transmit to one of the bicycle wheels, individually or simultaneously, and by means of a contact wheel: a compression force, a friction force, and/or an alternative linear movement in a direction perpendicular to the wheel axis; and

- a control unit provided with switches suitable for controlling the movements of the motorised transmission of the brake arm.

[0010] The supporting bedplate constitutes an essential element since it is responsible for supporting the rest of the test bench components; it is also said bedplate that supports the bicycle while various stresses and movements are applied to said bicycle in order to observe the performance of the various different mobile parts of the bicycle.

[0011] In an embodiment of the invention the bedplate is provided with wheels to facilitate its transport.

[0012] According to the invention both the motorised transmission and the actuator arm are mounted on the bedplate with the possibility of being regulated by adjusting their position and that of the bicycle with respect to the bedplate.

[0013] The adjustable bedplate pawls are made up of manually driven clamps for attaching the bicycle in the most suitable position so that the motorised transmission and the actuator arm can act upon it.

[0014] Said motorised transmission comprises an electric motor and a connecting rod that is coupled to the electric motor, with said connecting rod being responsible for transmitting a rotary movement by the electric motor to the pedals of the bicycle positioned on the bedplate.

[0015] This motorised transmission allows acting directly with the connecting rod on the pedals of the bicycle to provide traction to the driving sprocket without the need to dismantle the pedals; said traction is particularly indicated when checking the bicycle gear changes.

[0016] This actuator arm is adjustable and makes it possible to apply a compression force to the wheel, simply by moving the contact wheel via the linear actuator against the wheel of the bicycle. This compression stress allows simulating the pressure applied to the wheel against the ground during the bicycle's real use by a user.

[0017] This invention has also envisaged that the said actuator arm comprises an electromagnetic brake suitable for transmitting a braking force to the friction wheel that remains in contact with one wheel of the bicycle, emulating the friction force to which the bicycle wheel will be subject during its real use.

[0018] The said actuator arm also has means that are suitable for transmitting to the bicycle wheel, via the con-

tact wheel, an alternative linear movement in a radial direction or perpendicular to the axis of the bicycle wheel.

[0019] Applying this alternative longitudinal movement to the bicycle wheel makes it possible to simulate the running conditions on an irregular surface (stone paths, paths with potholes, etc.); this movement is particularly indicated for checking the bicycle suspension.

[0020] This test bench makes it possible to apply the indicated stresses to the rear wheel or the front wheel of the bicycle, since this only depends on the position in which the bicycle is attached to the supporting bedplate.

[0021] This test bench for bicycles comprises a computer provided with sensors for capturing different physical magnitudes during the analysis of the bicycle's performance; and specific software for registering and analysing the parameters captured by said sensors.

[0022] Said sensors can be of different types, and comprise, for example: pressure sensors, temperature sensors, rotation speed sensors, length and/or extension sensors, or any others that are considered relevant according to the parameters to be analysed in each case.

Description of the figures

[0023] To complement the description that is provided and in order to facilitate the understanding of the characteristics of the present invention, this specification is accompanied by a set of drawings which, in an illustrative, nonlimiting manner, represent the following:

- Figure 1 shows a front perspective diagrammatic view of an embodiment of the test bench for bicycles according to the invention.
- Figure 2 shows a rear perspective view of the test bench of the preceding figure and an enlarged detail of the console with the control unit and the computer for capturing, registering and analysing physical parameters.
- Figure 3 shows a front perspective view of the test bench of the preceding figures in a position of use and with a bicycle attached on top of it.
- Figure 4 shows an enlarged detail in perspective of a part of the motorised transmission acting on a pedal of the bicycle attached on top of the supporting bedplate.
- Figure 5 shows a detail in perspective of a part of the actuator arm in its position of use acting on a bicycle wheel by means of the contact wheel.
- Figure 6 shows a detail in rear perspective of an upper part of the actuator arm wherein one can observe the contact wheel and the electromagnetic brake arranged on a support platform mounted on the linear actuator by means of elastic struts, with the eccentric

rotating mechanism being partially visible in this figure, which is responsible for transmitting an alternative longitudinal movement to the contact wheel.

- Figure 7 shows a front perspective view of an upper part of the actuator arm wherein the contact wheel has been dismantled so as to allow the observation of the eccentric rotating mechanism responsible for transmitting to said contact wheel an alternative longitudinal movement.

Preferred embodiment of the invention

[0024] As described in the embodiment example in the attached figures, the test bench for bicycles comprises a supporting bedplate (1) with adjustable pawls (11) for attaching a bicycle (B) as can be seen in Figure 3.

[0025] A motorised transmission (2) is mounted on said bedplate (1) and it is provided with means for transmitting an adjustable rotary movement to the pedals (P) of a bicycle (B) attached to the bedplate (1).

[0026] In the example shown, this motorised transmission (2) comprises an electric motor (21) and a connecting rod (22) of adjustable length which is responsible for transmitting the rotary movement of the motor to a pedal (P) of bicycle (B) as can be seen for example in Figures (3, 4).

[0027] On bedplate (1) an actuator arm referenced as a whole as (3) is mounted also with the possibility of adjustment and it is responsible for transmitting different stresses to one of wheels (R) of bicycle (B) positioned on the bedplate by means of a contact wheel (31).

[0028] Said actuator arm comprises a linear actuator (32) which is responsible for the linear movement of contact wheel (31) together with a series of elements associated thereto and which will be detailed below so that said contact wheel acts against wheel (R) of the bicycle applying a compression force to it as shown in Figures 3 and 5.

[0029] As shown in Figures 6 and 7, contact wheel (31) is coupled to an electromagnetic brake (33) attached on top of a support platform (34), with said electromagnetic magnet (33) being responsible for transmitting a braking force to contact wheel (31) so as to apply to wheel (R) of bicycle (B) a friction force, or rotary resistance, similar to the friction force to which the wheel will be subject during the real use of the bicycle due to its contact with the ground.

[0030] As can be seen in greater detail in Figure 6, the support platform (34), on which contact wheel (31) and electromagnetic brake (33) are arranged, is mounted on linear actuator (32) by means of elastic struts (35), made up in this case of traction springs, which keep platform (34) at a lower level, and consequently contact wheel (31) and electromagnetic brake (33) mounted on said platform (34).

[0031] As can be observed in Figures 6 and 7, under platform (34), and integral with linear actuator (32), there

is an eccentric rotating mechanism (36) responsible for transmitting an alternative linear movement in the vertical direction to the unit made up of contact wheel (31), electromagnetic brake (33) and platform (34), when contact wheel (31) acts on wheel (R) of the bicycle.

[0032] This alternative linear movement is that which produces on wheel (R) of the bicycle a similar effect to that of circulating on uneven, potholed ground; this alternative linear movement is particularly indicated for checking the suspension elements of bicycle (B).

[0033] In the example shown, eccentric rotating mechanism (36) is made up of a motor (37) which communicates a rotary movement to an eccentric wheel (38) with adjustable eccentricity. This eccentric wheel (38) acts on platform (34) in an upward direction, that is, in a direction contrary to the action of elastic struts (35) on support platform (34).

[0034] As can be observed in greater detail in Figure 2 the present test bench comprises a control unit (4) provided with controls (41) that are suitable and necessary for controlling the various movable elements of motorised transmission (2) and actuator arm (3); whereby it is envisaged that all these elements are only activated electrically.

[0035] The test bench has a computer (5) provided with sensors - not shown - for capturing different physical magnitudes during the analysis of the performance of bicycle (B), and with specific software for registering and analysing the parameters captured by said sensors.

[0036] Once the nature of the present invention has been described sufficiently, and also a preferred embodiment, it is noted for all relevant purposes that the materials, shape, size and arrangement of the elements described could be modified, providing that this does not imply altering the essential characteristics of the invention that are claimed below.

Claims

1. Test bench for bicycles, provided with means for supporting a bicycle; **characterised in that** it comprises:

- a supporting bedplate (1) provided with adjustable pawls (11) for attaching a bicycle (B) in an adjustable position;
- a motorised transmission (2) associated with bedplate (1) and provided with means for transmitting a rotary movement to pedals (P) of a bicycle (B) positioned on bedplate (1);
- an actuator arm (3) associated with the bedplate and conditioned to transmit a compression force and a friction force to one of the wheels of bicycle (B) positioned on bedplate (1);
- a control unit (4) provided with switches suitable for controlling the movements of motorised transmission (2) and of actuator arm (3);

2. Test bench, according to claim 1, **characterised in that** the motorised transmission (2) comprises an electric motor (21) and a connecting rod (22) coupled to electric motor (21) and responsible for transmitting a rotary movement of said electric motor (21) to pedals (P) of bicycle (B) positioned on the bedplate.

3. Test bench, according to claim 1, **characterised in that** actuator arm (3) comprises: a friction wheel (31) and an extensible linear actuator (32), suitable for moving said friction wheel in the radial direction and pressing it against a wheel (R) of bicycle (B) attached to the bedplate, applying a compression force to it.

4. Test bench, according to claim 3, **characterised in that** actuator arm (3) comprises an electromagnetic brake (33) coupled to the friction wheel and suitable for transmitting a braking force to said friction wheel (31).

5. Test bench, according to claims 3 and 4, **characterised in that** friction wheel (31) and electromagnetic brake (33) are arranged on a support platform (34) mounted on linear actuator (32) via elastic struts (35).

6. Test bench, according to claim 5, **characterised in that** actuator arm (3) comprises an eccentric rotating mechanism (36) mounted on linear actuator (32), and is suitable for activating support platform (34) with an alternative longitudinal movement while friction wheel (31) remains in contact with one wheel of the bicycle.

7. Test bench, according to claim 1, **characterised in that** it comprises a computer (5) provided with sensors for capturing different physical magnitudes during the analysis of the bicycle performance; and with specific software for registering and analysing the parameters captured by said sensors.

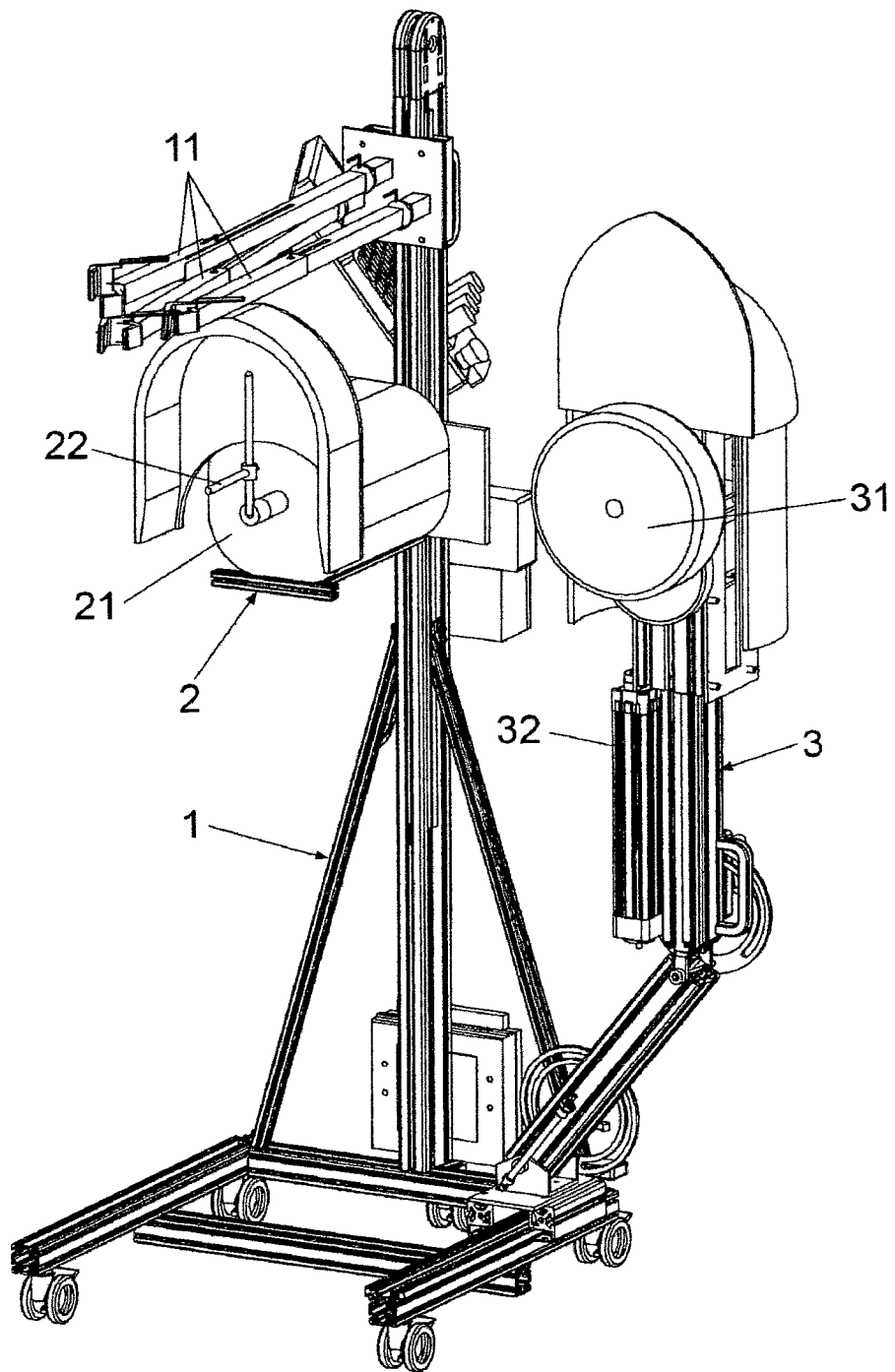


Fig. 1

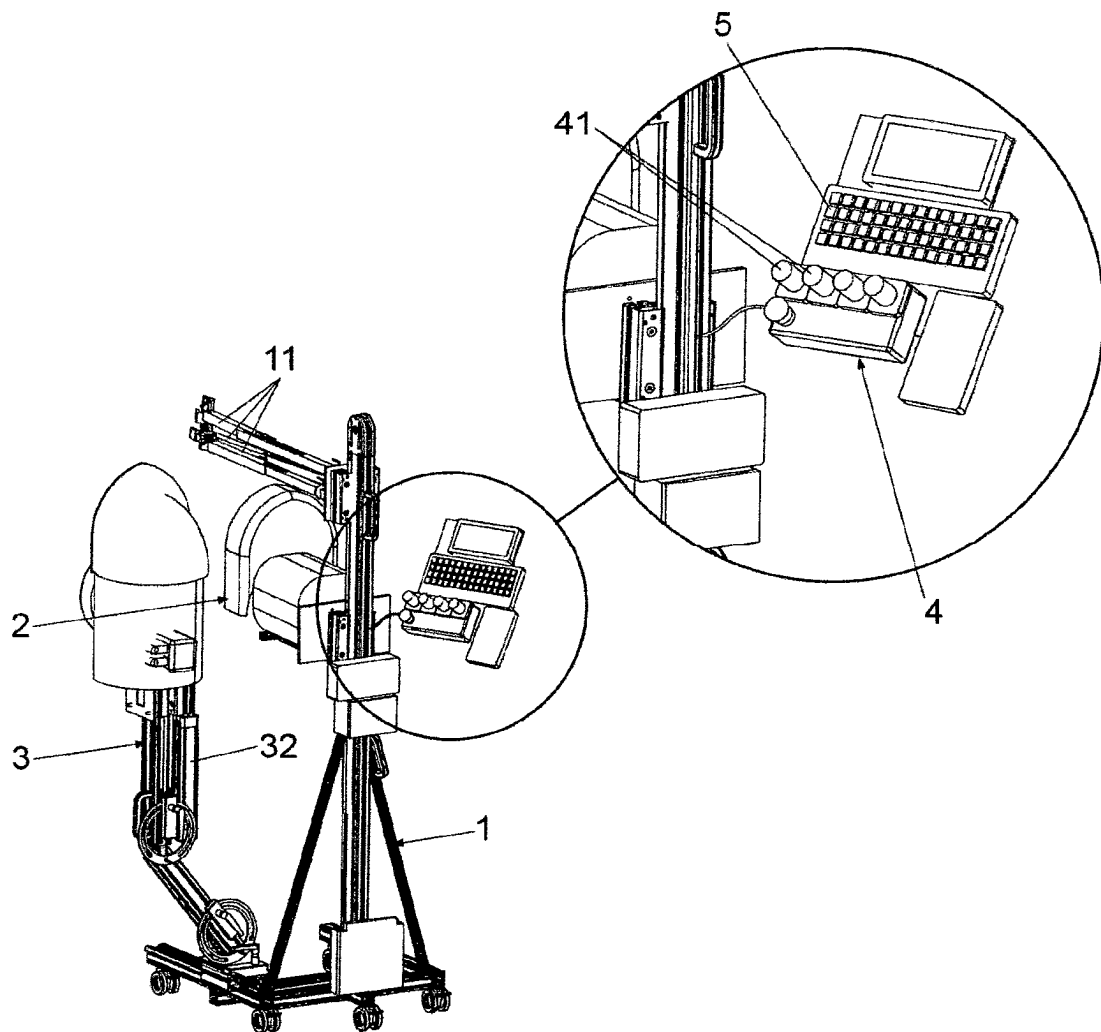


Fig. 2

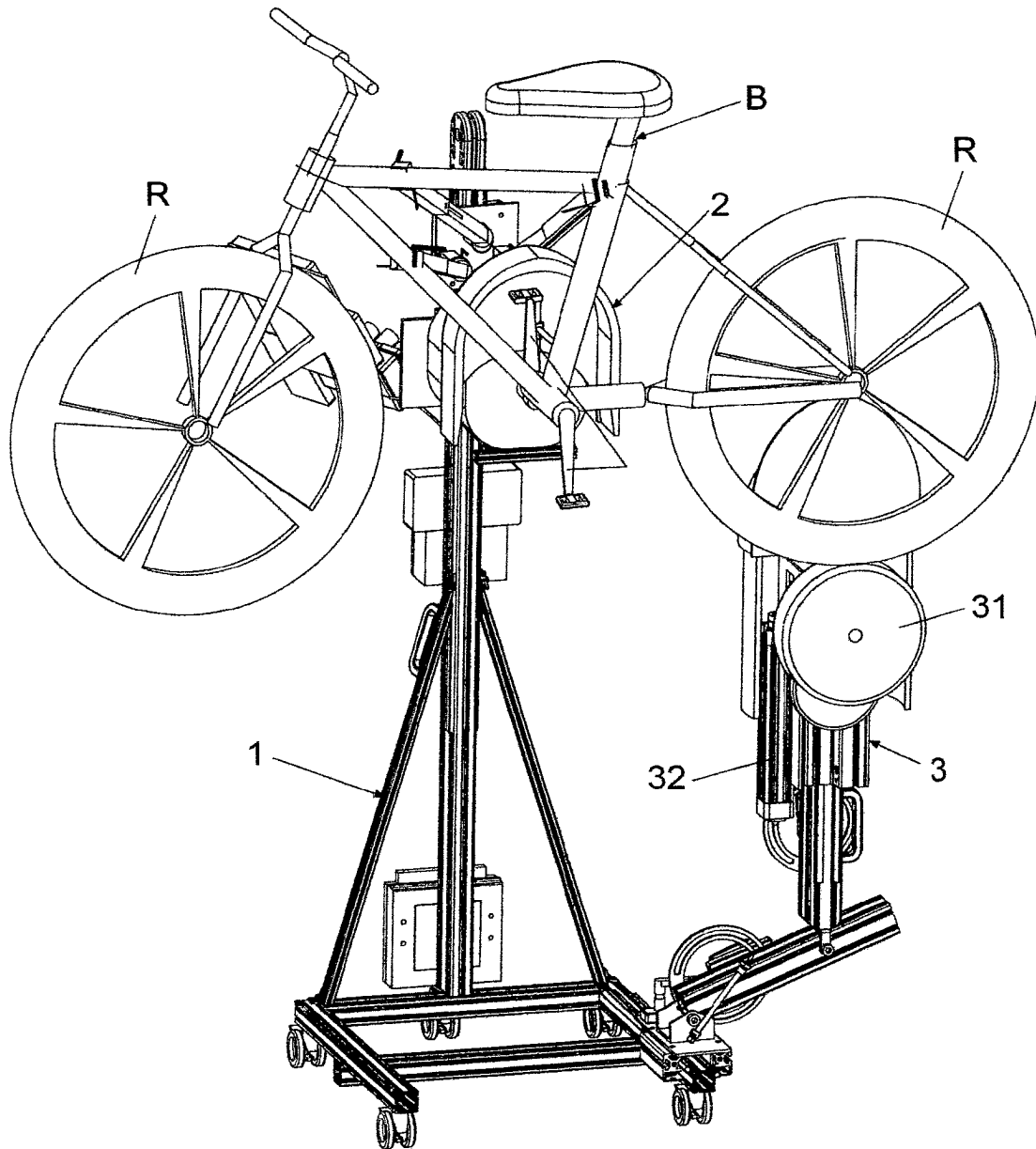


Fig. 3

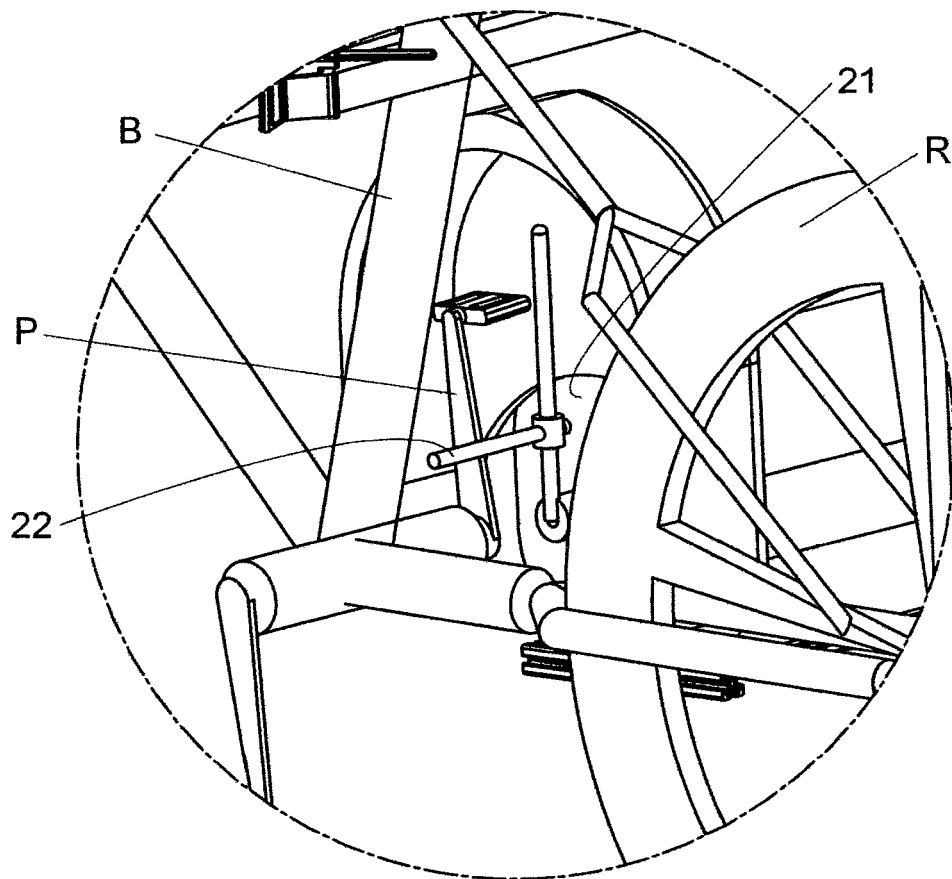


Fig. 4

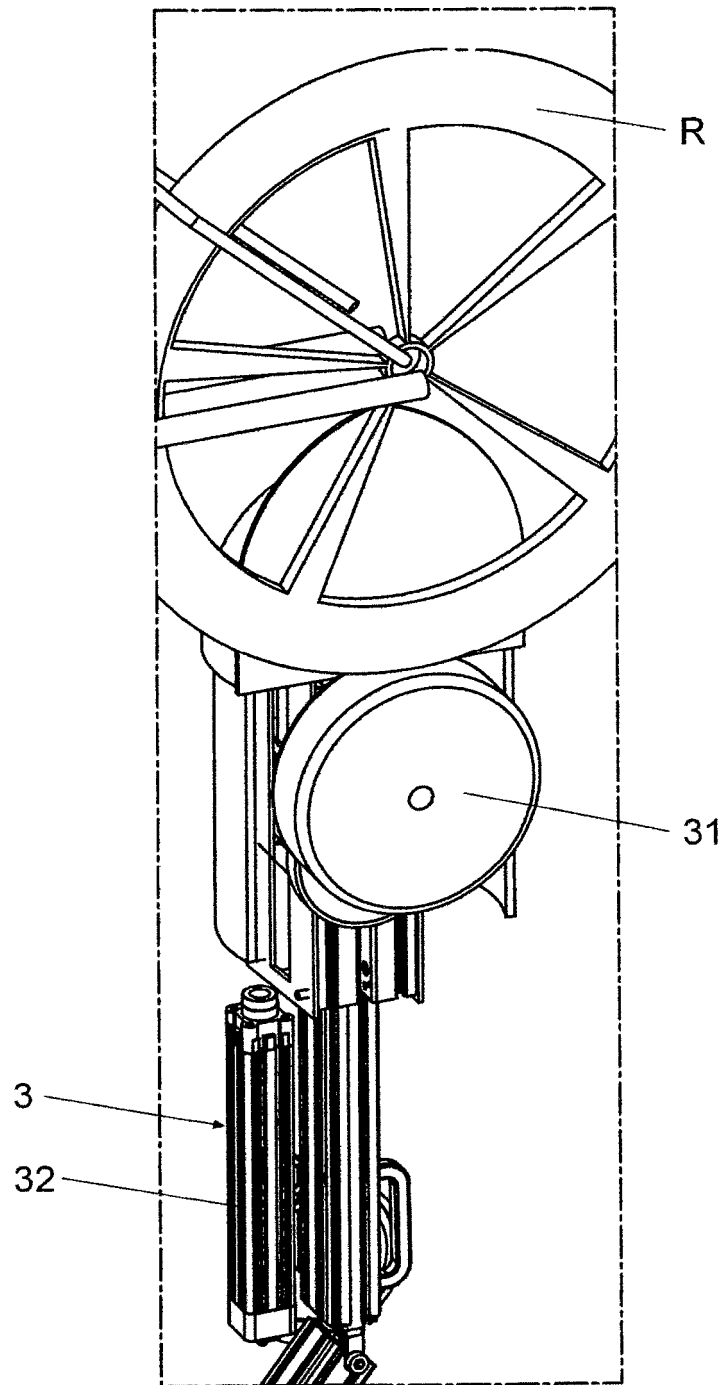


Fig. 5

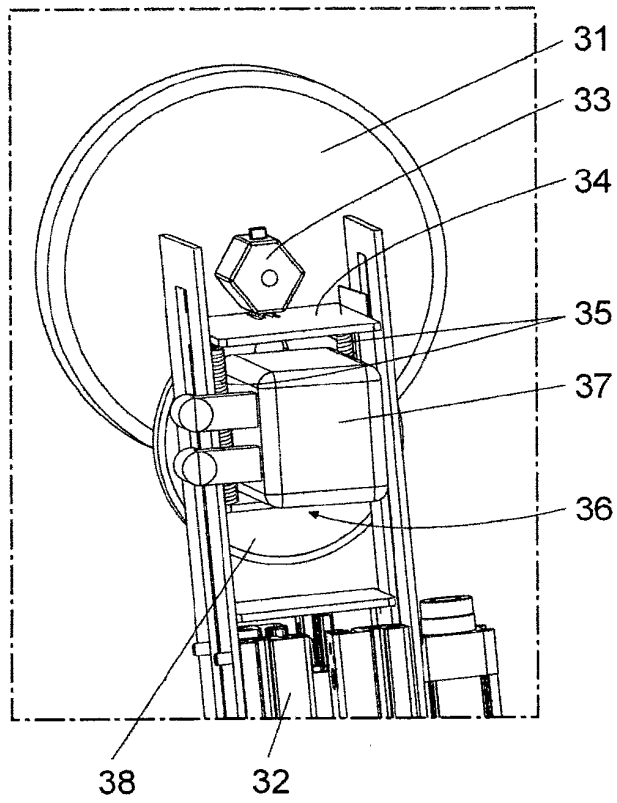


Fig. 6

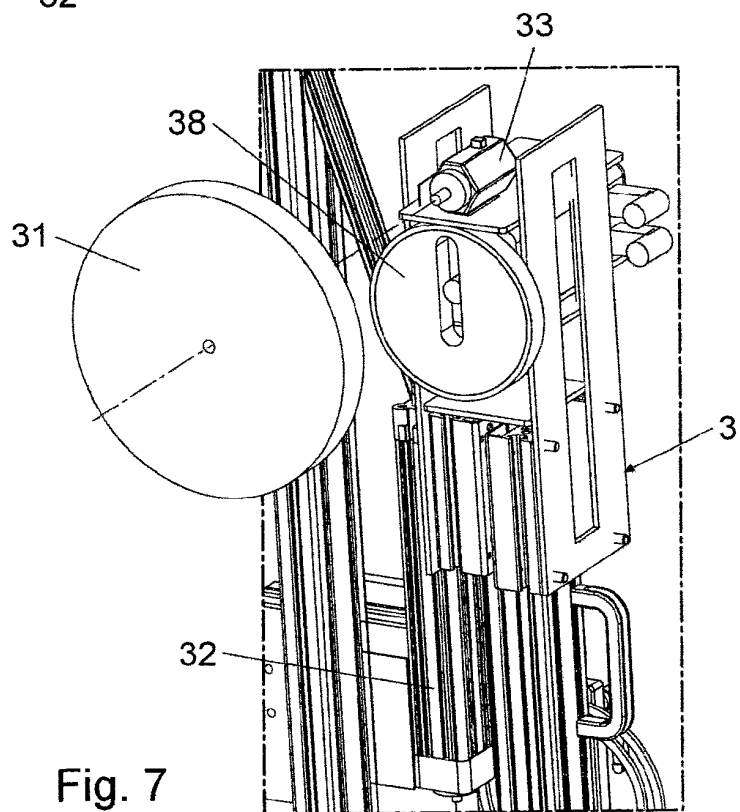


Fig. 7



EUROPEAN SEARCH REPORT

Application Number
EP 12 38 2440

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	SU 1 437 724 A1 (SKVORTSOV VLADIMIR S [SU]) 15 November 1988 (1988-11-15) * the whole document *	1	INV. B25H1/00
A	US 3 903 613 A (BISBERG AARON M) 9 September 1975 (1975-09-09) * column 3, line 32 - column 4, line 35 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			B25H G09B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 April 2013	Examiner Gerard, Olivier
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 38 2440

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The members are as contained in the European Patent Office EDP file on
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18-04-2013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
SU 1437724	A1	15-11-1988	NONE

US 3903613	A	09-09-1975	NONE

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82