

(19)



(11)

EP 2 669 062 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:
19.08.2015 Bulletin 2015/34

(51) Int Cl.:
B25H 1/00 (2006.01)

(21) Application number: **12382440.1**

(22) Date of filing: **08.11.2012**

(54) **Test bench for bicycles**

Prüfbank für Fahrräder

Banc d'essai destiné à des bicyclettes

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(43) Date of publication of application:
04.12.2013 Bulletin 2013/49

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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. Such a test bench is known from SU 14 37724.

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.

- 5 - 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, 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 a rotary movement to pedals (P) of a bicycle (B) positioned on bedplate (1); **characterised in that** it comprises:
 - 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.

Patentansprüche

1. Prüfstand für Fahrräder, welcher mit Mitteln zum Tragen eines Fahrrads bereitgestellt ist, umfassend:
 - einen Grundtragesockel (1), welcher mit einstellbaren Klauen (11) zum Anbringen eines Fahrrads (B) in einer einstellbaren Position versehen ist; und
 - ein motorisiertes Getriebe (2), welches dem Grundtragesockel (1) hinzugefügt ist und mit Mitteln zum Übertragen einer Drehbewegung auf die Pedale (P) eines Fahrrads (B), das auf dem Grundtragesockel (1) positioniert ist, ausgestattet ist;

dadurch gekennzeichnet, dass er umfasst:

- einen Betätigungsarm (3), welcher dem Grundtragesockel beigefügt ist und welcher ausgelegt ist, um eine Druckkraft und eine Reibungskraft auf eines der Räder des Fahrrads (B), das auf dem Grundtragesockel (1) positioniert ist, zu übertragen;
 - eine Steuereinheit (4), welche mit Schaltern bereitgestellt ist, die geeignet sind, um die Bewegungen des motorisierten Getriebes (2) und des Betätigungsarms (3) zu steuern.
2. Prüfstand nach Anspruch 1, **dadurch gekennzeichnet, dass** das motorisierte Getriebe (2) einen Elektromotor (21) und eine Verbindungsstange (22) umfasst, welche mit dem Elektromotor (21) gekoppelt ist und für das Übertragen eine Drehbewegung des Elektromotors (21) auf die Pedale (P) des Fahrrads (B), das auf dem Grundtragesockel positioniert ist, verantwortlich ist.
 3. Prüfstand nach Anspruch 1, **dadurch gekennzeichnet, dass** der Betätigungsarm (3) umfasst: ein Reibungsrad (31) und einen ausfahrbaren linearen Stellantrieb (32), welcher zum Bewegen des Reibungsrades in der radialen Richtung und zum Drücken dieses gegen ein Rad (R) des Fahrrads (B), das auf dem Grundtragesockel angebracht ist, geeignet ist, um eine Druckkraft darauf auszuüben.
 4. Prüfstand nach Anspruch 3, **dadurch gekennzeichnet, dass** der Betätigungsarm (3) eine elektromagnetische Bremse (33) umfasst, welche mit dem Reibungsrad gekoppelt ist und zum Übertragen einer Bremskraft auf das Reibungsrad (31) geeignet ist.
 5. Prüfstand nach den Ansprüchen 3 und 4, **dadurch gekennzeichnet, dass** das Reibungsrad (31) und die elektromagnetische Bremse (33) auf einer Trageplattform (34) angeordnet sind, welche auf dem linearen Stellantrieb (32) über elastische Stützen (35) angebracht sind.
 6. Prüfstand nach Anspruch 5, **dadurch gekennzeichnet, dass** der Betätigungsarm (3) einen exzentrischen Drehmechanismus (36) umfasst, welcher auf dem linearen Stellantrieb (32) angebracht ist und zum Aktivieren der Trageplattform (34) mit einer alternativen Längsbewegung geeignet ist, während das Reibungsrad (31) in Kontakt mit einem Rad des Fahrrads bleibt.
 7. Prüfstand nach Anspruch 1, **dadurch gekennzeichnet, dass** er einen Computer (5) umfasst, welcher mit Sensoren zum Erfassen unterschiedlicher physikalischer Größen während der Analyse der Fahrradleistungsfähigkeit und mit besonderer Software

zum Registrieren und Analysieren der Parameter, die durch die Sensoren aufgenommen werden, bereitgestellt ist.

Revendications

1. Banc d'essai destiné à des bicyclettes, pourvu de moyens pour supporter une bicyclette, comprenant :
 - un plateau de support (1) pourvu de cliquets ajustables (11) pour attacher une bicyclette (B) à une position ajustable ;
 - une transmission motorisée (2) associée au plateau (1) et pourvue de moyens pour transmettre un mouvement rotatif à des pédales (P) d'une bicyclette (B) positionnée sur le plateau (1) :

caractérisé en ce qu'il comprend :

 - un bras actionneur (3) associé au plateau et conditionné pour transmettre une force de compression et une force de friction à l'une des roues de la bicyclette (B) positionnée sur le plateau (1) ;
 - une unité de commande (4) pourvue de commutateurs aptes à commander les mouvements de la transmission motorisée (2) et du bras actionneur (3).
2. Banc d'essai selon la revendication 1, **caractérisé en ce que** la transmission motorisée (2) comprend un moteur électrique (21) et une bielle (22) couplée au moteur électrique (21) et responsable de transmettre un mouvement rotatif dudit moteur électrique (21) aux pédales (P) de la bicyclette (B) positionnée sur le plateau.
3. Banc d'essai selon la revendication 1, **caractérisé en ce que** le bras actionneur (3) comprend : une roue de friction (31) et un actionneur linéaire extensible (32), apte à déplacer ladite roue de friction dans le sens radial et à la presser contre une roue (R) de la bicyclette (B) attachée au plateau, en appliquant une force de compression à celle-ci.
4. Banc d'essai selon la revendication 3, **caractérisé en ce que** le bras actionneur (3) comprend un frein électromagnétique (33) couplé à la roue de friction et apte à transmettre une force de freinage à ladite roue de friction (31).
5. Banc d'essai selon les revendications 3 et 4, **caractérisé en ce que** la roue de friction (31) et le frein électromagnétique (33) sont agencés sur une plateforme de support (34) montée sur l'actionneur linéaire (32) par l'intermédiaire de montants élastiques

(35).

6. Banc d'essai selon la revendication 5, **caractérisé en ce que** le bras actionneur (3) comprend un mécanisme de rotation excentrique (36) monté sur l'actionneur linéaire (32), et est apte à activer la plateforme de support (34) avec un mouvement longitudinal en va-et-vient pendant que la roue de fraction (31) reste en contact avec une roue de la bicyclette. 5 10
7. Banc d'essai selon la revendication 1, **caractérisé en ce qu'il** comprend un ordinateur (5) pourvu de capteurs pour acquérir différentes grandeurs physiques au cours de l'analyse des performances de la bicyclette, et d'un logiciel spécifique pour enregistrer et analyser les paramètres acquis par lesdits capteurs. 15 20 25 30 35 40 45 50 55

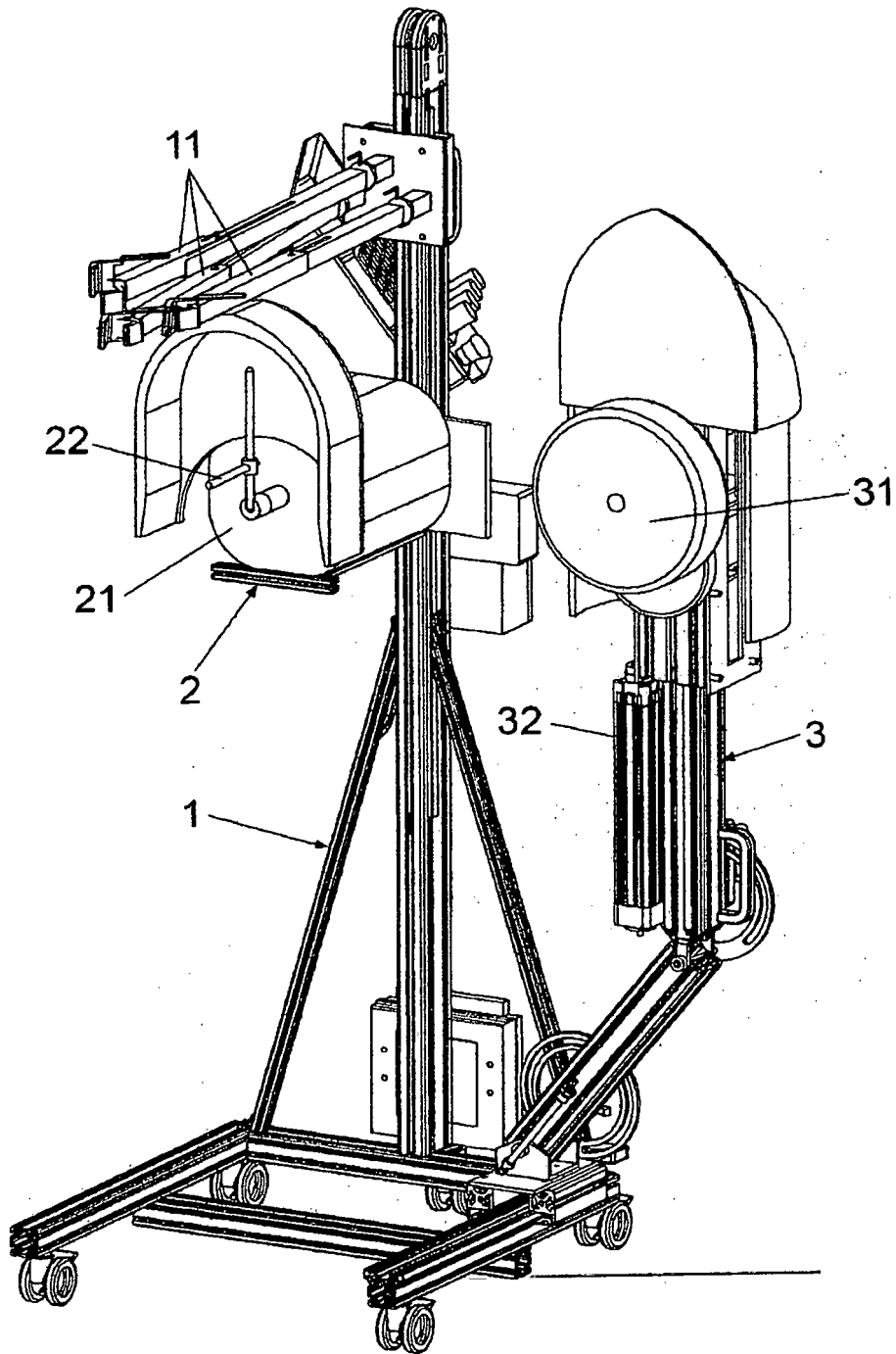


Fig. 1

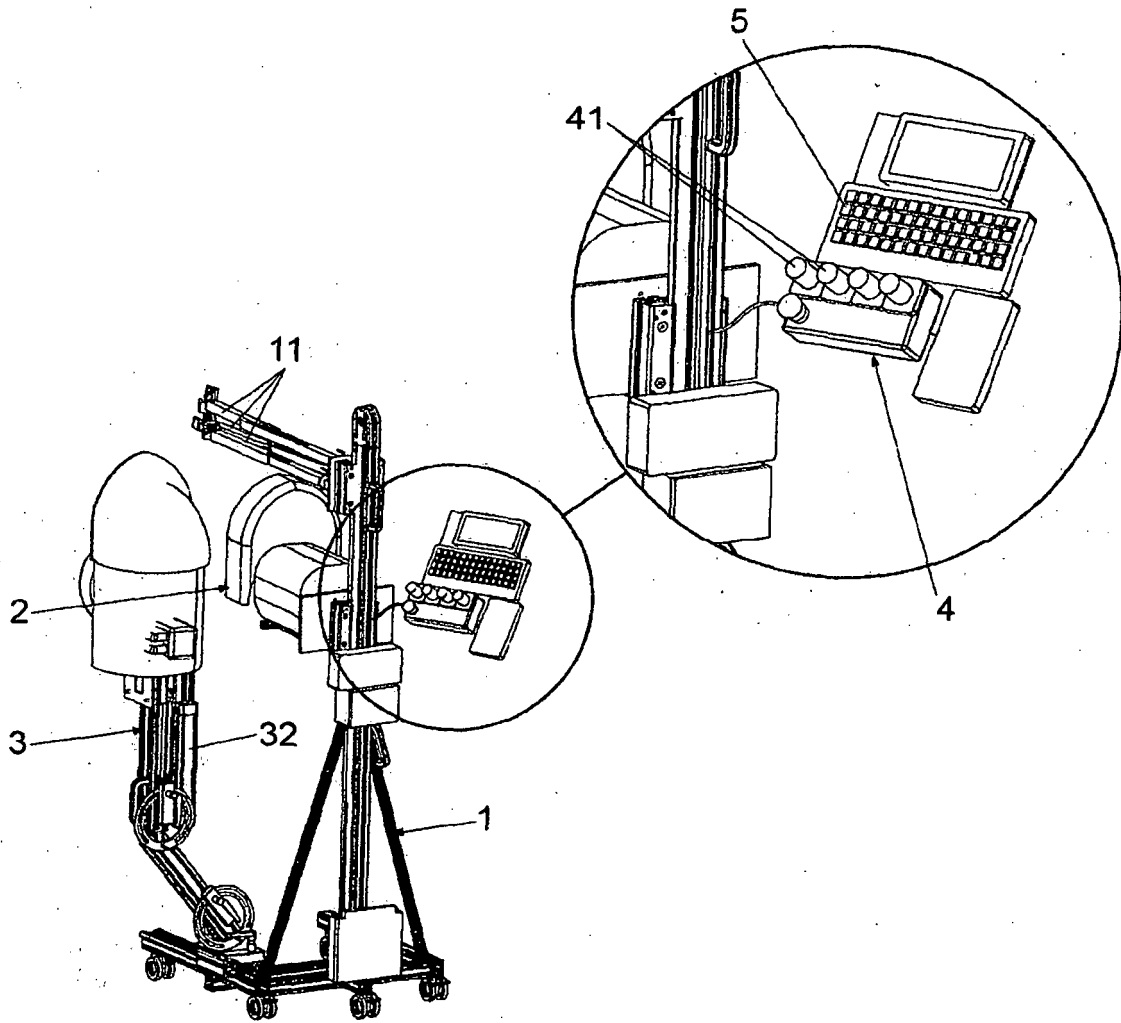


Fig. 2

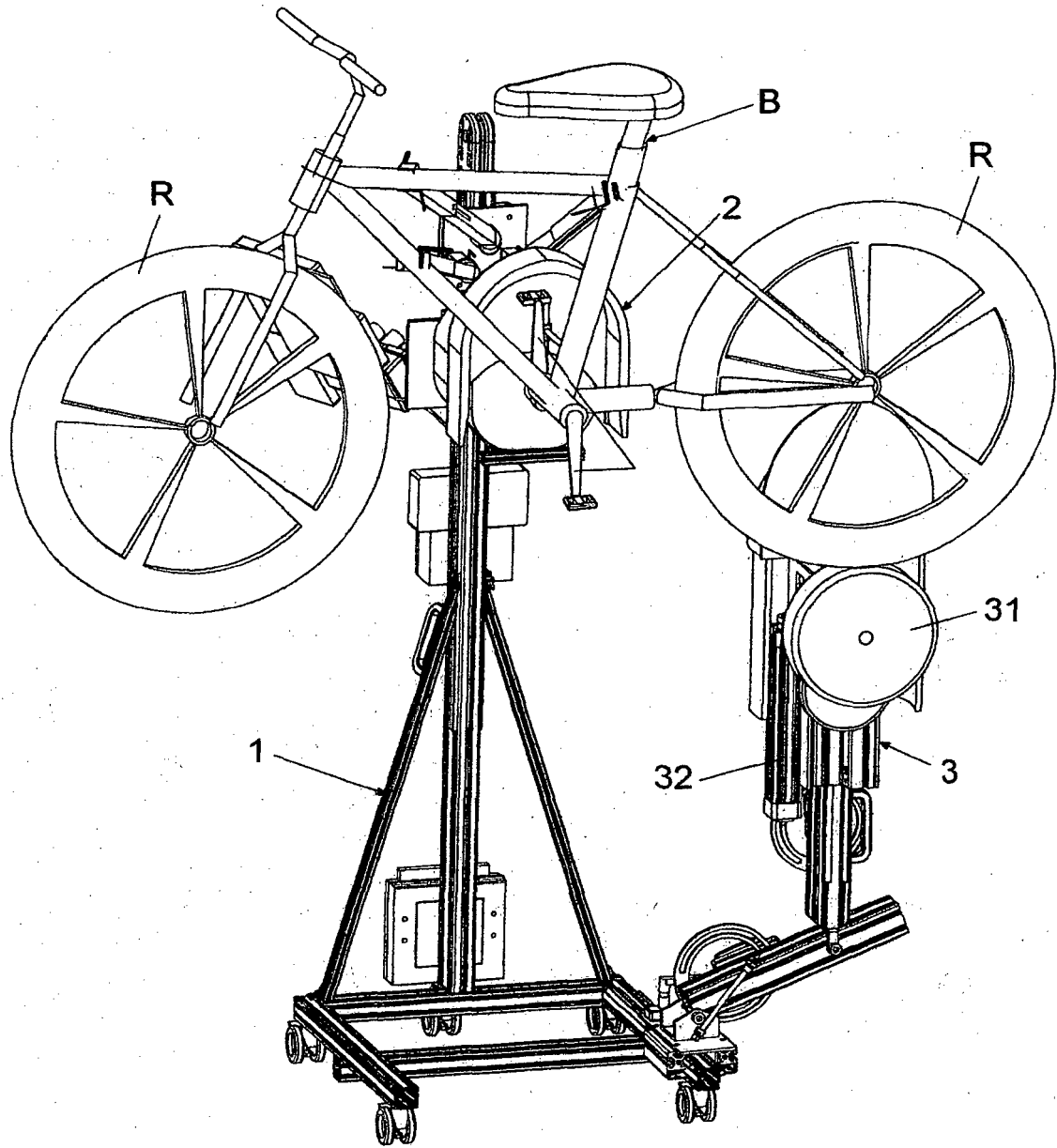


Fig. 3

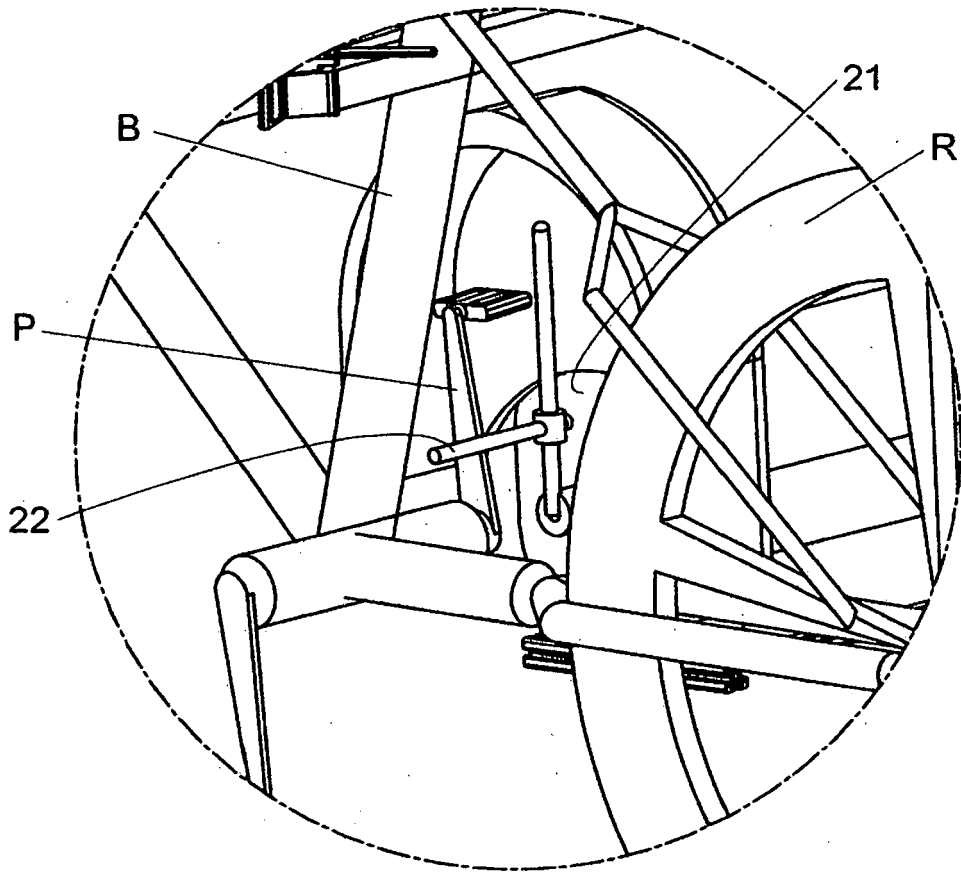


Fig. 4

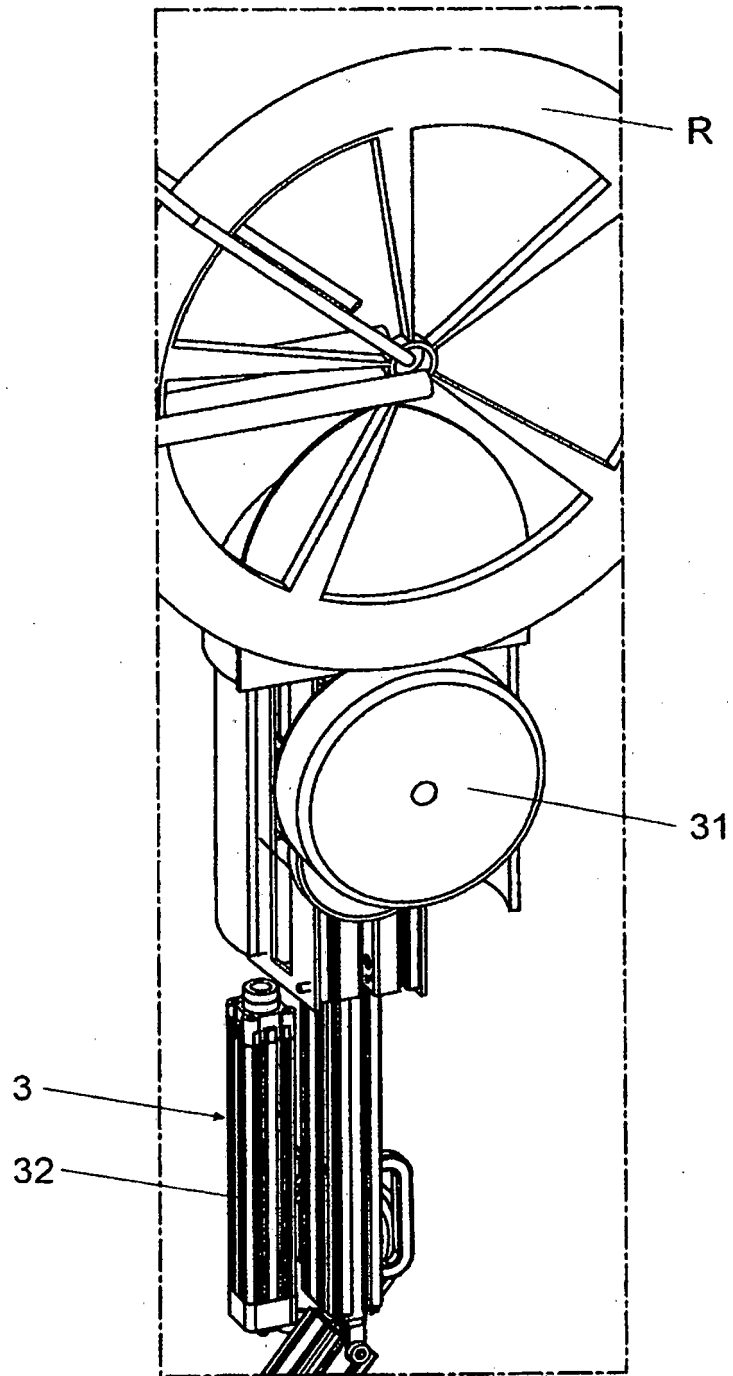
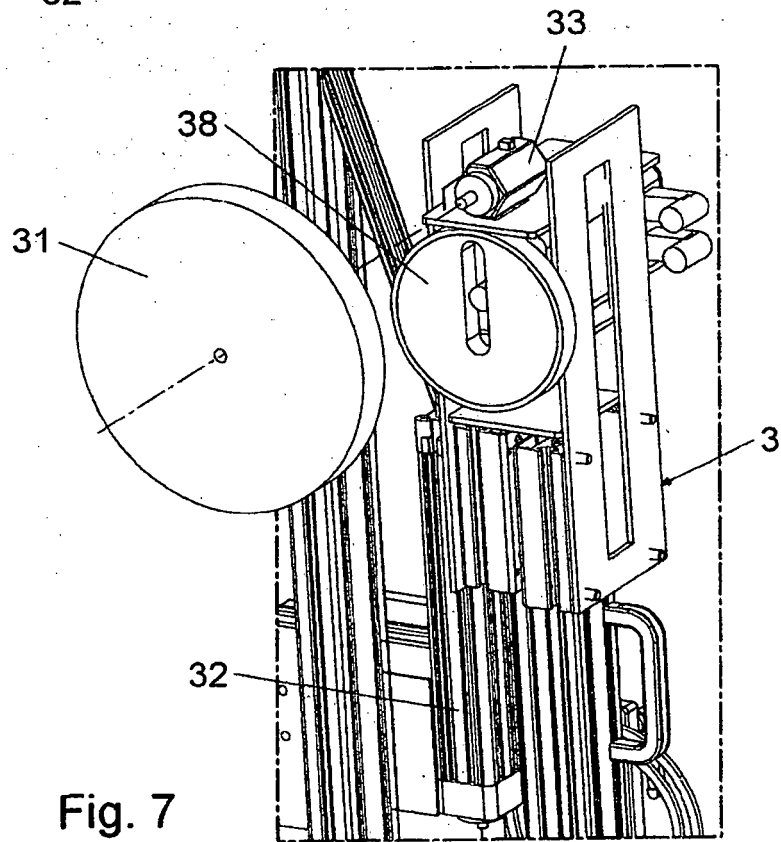
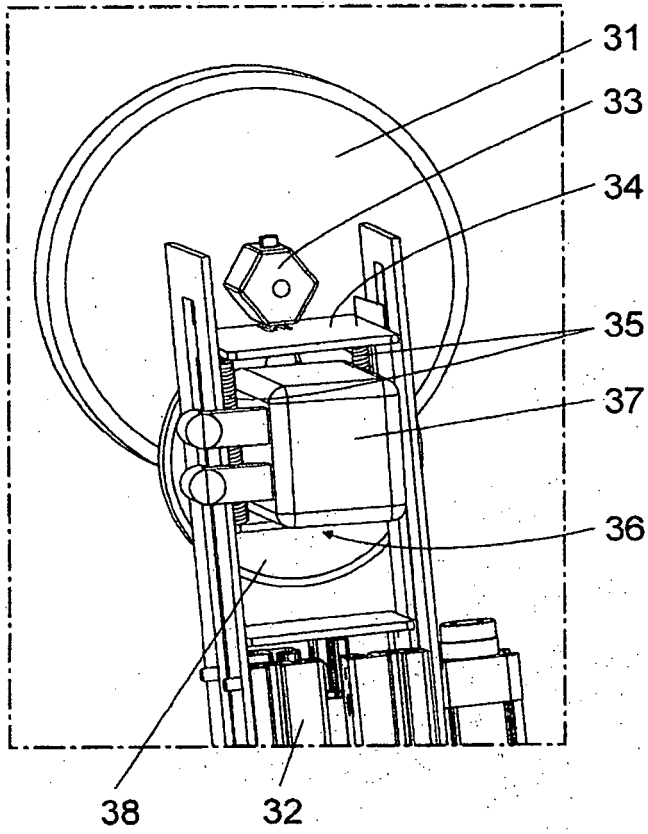


Fig. 5



REFERENCES CITED IN THE DESCRIPTION

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