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(72) Inventor; and

(71) Applicant: PAPADOPOULOS, Larry, C. [US/US]; PO Box 1207, North Plains, OR 97133 (US).

(74) Agent: SIEGEL, Timothy, E.; Timothy E. Siegel Patent Law, PLLC, 777 108th Ave. NE, Suite 2240, Bellevue, WA 98004 (US).

MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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(54) Title: BICYCLE TRAINER PERMITTING STEERING AND TILTING MOTION

(57) Abstract: A bicycle rollers assembly (10) having a rear and a front and further having a rear pair of parallel rollers (12) each having an axis of rotation, and adapted to support a rear bicycle wheel having an axle parallel to the axes of rotation. The rollers (12) are spaced so as to support the rear bicycle wheel with the lowest part of the bicycle wheel positioned between the rollers. Also, a front support structure (18) supports a front bicycle fork support element (24) so as to permit horizontal rotation, and this support element includes a support (26) for each arm of a bicycle fork (29).

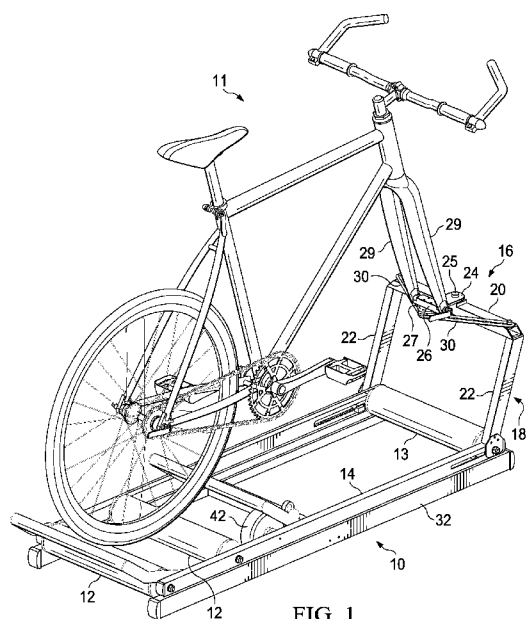


FIG. 1



WO 2018/027216 A1

BICYCLE TRAINER PERMITTING STEERING AND TILTING MOTION

Technical Field

The present invention is in the field of bicycle trainers that accept a bicycle and wherein a
5 user rides the bicycle on the bicycle trainer and can move the handlebars.

Background Art

Although to the casual observer it might appear that a person bicycling along a straight
road is progressing at an even speed and in a straight line, a closer examination reveals that this
is not the case. Rather, there is a subtle side to side movement caused by a shifting of the rider's
10 weight as he peddles. Although he may be unaware of this, the rider must counter this movement
by maintaining a good grip on the handle bars, and resisting the tendency of the bicycle to turn,
in response to this weight shifting. Also, the speed of the cyclist undergoes a subtle variation
over the peddling cycle.

Many exercise devices, such as stationary bikes, that attempt to mimic the feel of riding a
15 bicycle provide an unsatisfactory feel for the rider, particularly if the rider is a frequent bicyclist.
Part of the reason for this is the lack of sideways motion permitted by these devices, so that the
rider does not move in the same way as he does on an actual bicycle ride.

Summary

20 In a first separate aspect, the present invention may take the form of a bicycle rollers
assembly having a rear and a front and further having a rear pair of parallel rollers each having
an axis of rotation, and adapted to support a rear bicycle wheel having an axle parallel to the axes
of rotation. The rollers are spaced so as to support the rear bicycle wheel with the lowest part of
the bicycle wheel positioned between the rollers. Also, a front support structure supports a front
25 bicycle fork support element so as to permit horizontal rotation, and this support element
includes a support for each arm of a bicycle fork.

In a second separate aspect, the present invention may take the form of a method of retrofitting a bicycle rollers assembly having a front roller, to permit the assembly to accept a bicycle having a handle bar and with its front wheel removed, the retrofit permitting a user to turn the handle bar, the method making use of a retrofit assembly that has a U-frame having arms and a center bar, connecting the arms, and sized to extend over the width of the bicycle rollers assembly. Also, a front bicycle fork support assembly has a support for each arm of a bicycle fork, and is rotatably mounted on the center bar of the U-frame, so as to permit horizontal rotation. The retrofit assembly is attached to the bicycle rollers assembly, directly above the front roller.

In a third separate invention, the present invention may take the form of a retrofit assembly for a bicycle rollers assembly that includes a U-frame having arms and a center bar, connecting the arms, and sized to extend over the width of the bicycle rollers assembly. Also included is a front bicycle fork support assembly that has a support for each arm of a bicycle fork, and is rotatably mounted on the center bar of the U-frame, so as to permit horizontal rotation.

Brief Description of the Drawings

FIG. 1 is a top side rear isometric view of a bicycle rollers assembly, according to the present invention, hosting a bicycle, with the handlebars straight.

FIG. 2 is the same view as FIG. 1, but with the bicycle handlebars turned slightly to the right.

FIG. 3 is a top view of the assembly of FIG. 1

FIG. 4 is a top side rear view of the front of the assembly of FIG. 1, with no bicycle hosted on it.

FIG. 5 is a top view of an alternative embodiment of a bicycle rollers assembly.

Best Modes of Carrying Out the Invention

For the purpose of promoting an understanding of the principles of the invention, reference will now be made to the embodiments illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended. Any alterations and further modifications in the described embodiments, and any further applications of the principles of the invention as described herein are contemplated as would normally occur to one skilled in the art to which the invention relates.

Referring to FIGS. 1 and 4, a modified bicycle rollers assembly 10, shown hosting a bicycle 11 (in FIGS. 1-3), includes a rear pair of rollers 12, and a front roller 13, mounted on a frame 14 and a front bicycle fork supporting assembly 16, including a U-frame 18, having a center bar 20 and two side supports 22, which are attached to the front part of the frame 14. At the center of the center bar 20 is a front fork support 24 that is rotatably mounted at a pivot point 25. Support 24 includes a rear projection 27 that includes a support 26 for each of the arms 29 of a bicycle fork. A pair of springs, in the form of rubber bands, 30, one in either sideways direction, are each mounted between a post (not shown) extending downwardly from fork support 24 and a side support 22. These rubber bands 30 resist side-to-side turning, as shown in FIGS. 2 and 3.

As fork support 26 and the attached fork rotate off of center, the rotated bicycle fork generates an off-vertical tilt to the bicycle frame. Inversely, pedaling forces create a tilt to the bike frame that will result in a steering action. Thus, the rider is able to modulate tilt by controlling the steering. Additionally, the resistance of rubber bands 30 to the rotation of fork support 26 play a role in stabilizing the bicycle on assembly 10 and preventing excessive tilt, while also, to some degree, mimicking the resistance to steering encountered by friction between the bicycle wheel and the road surface.

This configuration may be originated by retrofitting an existing bicycle rollers assembly, by providing a front bicycle fork supporting assembly 16 that bolts onto the frame 14 at the location of the front roller 13. Stabilizing plates 40, a part of assembly 16, help to stabilize U-frame 18. In one preferred embodiment, frame 14 is an inner frame, which is set into an outer

or bottom frame 32 in a manner that permits resisted movement between frame 14 and frame 32, to more effectively mimic the feel of actual bicycling.

Similar to other bicycle rollers assemblies, assembly 10 includes a subassembly 42 to provide resistance to the turning of the front rear roller, to provide a more realistic feel and different exertion levels. Frames 14 and 32 are made of aluminum and separated by wheels or
5 rollers to permit movement of top frame 14. The motion is gently resisted by a bungee or other form of spring (not shown).

Referring to FIG. 5, in an alternative preferred embodiment, a bicycle rollers assembly 110, similar to assembly 10, may be especially purpose-built. In this assembly, there would
10 typically not be a front roller 13 (FIG. 1), but only the front bicycle fork supporting assembly 116 at the front. Also, although in a conventional bicycle rollers assembly some width is needed to permit side-to-side wandering in the steering, when the front fork is bolted in place this width is no longer needed and the entire assembly can be made substantially narrower, with the width of the rear rollers 112 and the bridge 130 connecting front assembly 116 to rear rollers 112,
15 being as little as 15 cm (6 in) or less. This embodiment permits a substantial savings in materials and in the weight of the full assembly, thereby permitting easier portability for a user.

Assemblies 10 and 110, each has a more realistic feel to the rider, as the natural side-to-side motion of the handlebars, imparted by peddling, is resisted by the rider. Although the rider may be unaware that he is even making this effort as part of the exercise of riding a
20 bicycle, he or she may notice a subtle difference between the bicycle riding experience and the experience of riding a bicycle mounted on a frame. The assembly may be made lighter and narrower, however, greatly facilitating transportability and easy storage. Similar to assembly 10, assembly 110 includes a rear roller resistance mechanism and can be set into an outer frame, so that it can move slightly forward and backward.

Industrial Applicability

The present invention finds industrial applicability in the manufacture of bicycle training devices and retrofit kits for bicycle training devices.

While a number of exemplary aspects and embodiments have been discussed above, those possessed of skill in the art will recognize certain modifications, permutations, additions and sub-combinations thereof. It is therefore intended that the following appended claims and claims hereafter introduced are interpreted to include all such modifications, permutations, additions and sub-combinations as are within their true spirit and scope.

Claims

1. A bicycle rollers assembly having a rear and a front and comprising:
 - (a) a rear pair of parallel rollers each having an axis of rotation, and adapted to support a rear bicycle wheel having an axle parallel to said axes of rotation, said rollers spaced so as to support said bicycle wheel with the lowest part of said bicycle wheel positioned between said rollers;
 - (b) a front support structure; and
 - (c) a front bicycle fork support element mounted on said front support structure so as to permit horizontal rotation, and that includes a support for each arm of a bicycle fork.
2. The bicycle rollers assembly of claim 1, wherein said front bicycle fork support element is rotatably attached to a support at a hinge point, and wherein said supports for said arms of a bicycle fork are displaced from said hinge point, so that as said support element rotates said supports revolve about said hinge point.
3. The bicycle rollers assembly of claim 1, wherein said rear pair of rollers and said front bicycle fork support element are joined together in spaced relationship to form a top assembly, and wherein said top assembly is supported by a fore and aft movement permitting bottom assembly.
4. The bicycle rollers assembly of claim 1, wherein said fore and aft movement permitting bottom assembly includes a bottom frame, which supports a set of base rollers that permits said top assembly to move back and forth on said bottom frame.
5. The bicycle rollers assembly of claim 1, further including a front roller underneath said front bicycle fork support assembly, and wherein said front bicycle fork support assembly is removable, thereby permitting use of said front roller.
6. The bicycle rollers assembly of claim 1, wherein said rear rollers are no more than 30 cm wide.
7. The bicycle rollers assembly of claim 1, wherein said wherein said rear rollers are no more than 20 cm wide.
8. The bicycle rollers assembly of claim 1, further including a front roller, and where said front bicycle support element is removable to permit access to and use of said front roller.
9. The bicycle rollers assembly of claim 1, wherein said rotation of said front bicycle fork support assembly is resisted.

10. The bicycle rollers assembly of claim 9, wherein said rotation of said front bicycle fork support assembly is resisted by springs, connected between said front bicycle fork support element, and said front support structure.

11. The bicycle rollers assembly of claim 10, wherein said springs are elastomeric bands.

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12. A method of retrofitting a bicycle rollers assembly having a front roller, to permit the assembly to accept a bicycle having a handle bar and with its front wheel removed, the retrofit permitting a user to turn the handle bar, the method comprising:

(a) providing a retrofit assembly, including:

10 (i) a U-frame having arms and a center bar, connecting said arms, and sized to extend over the width of said bicycle rollers assembly;

(ii) a front bicycle fork support assembly that has a support for each arm of a bicycle fork, and is rotatably mounted on said center bar of said U-frame, so as to permit horizontal rotation;

15 (b) attaching said retrofit assembly to said bicycle rollers assembly, directly above said front roller.

13. The method of claim 12, wherein said front bicycle fork support element is rotatably attached to a support at a hinge point, and wherein said supports for said arms of a bicycle fork are displaced from said hinge point, so that as said support element rotates, said supports revolve
20 about said hinge point.

14. The method of claim 12, wherein said rotation of said front bicycle fork support assembly is resisted.

15. The method of claim 12, wherein said rotation of said front bicycle fork support assembly is resisted by springs, connected between said front bicycle fork support element, and said
25 U-frame.

16. The method of claim 15, wherein said springs are elastomeric bands.

17. A retrofit assembly for a bicycle rollers assembly, comprising:

(a) a U-frame having arms and a center bar, connecting said arms, and sized to extend over the width of the bicycle rollers assembly; and

(b) a front bicycle fork support assembly that has a support for each arm of a bicycle fork, and is rotatably mounted on said center bar of said U-frame, so as to permit horizontal rotation.

18. The retrofit assembly of claim 17, wherein said front bicycle fork support element is

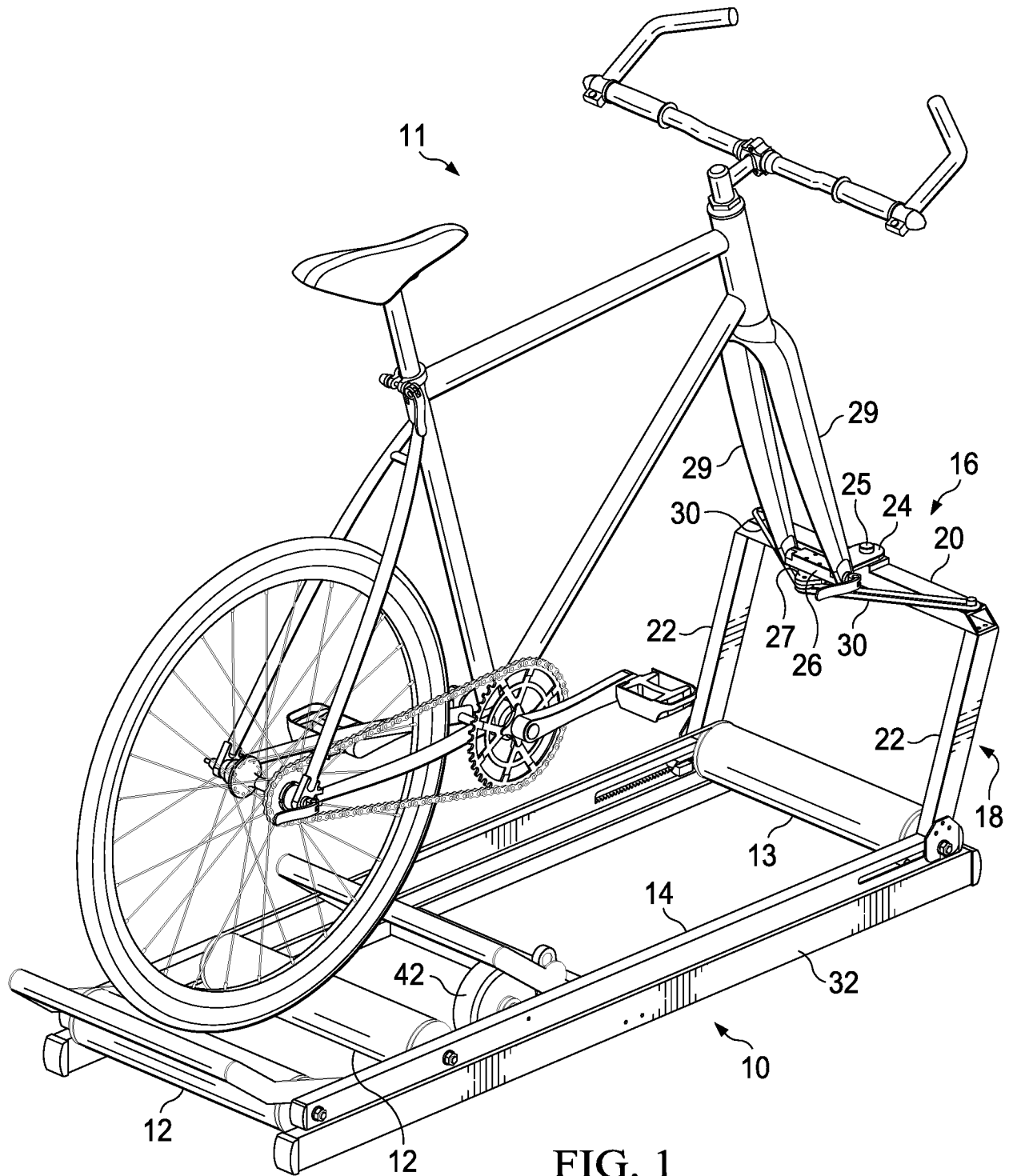
5 rotatably attached to a support at a hinge point, and wherein said supports for said arms of a bicycle fork are displaced from said hinge point, so that as said support element rotates said supports revolve about said hinge point.

19. The retrofit assembly of claim 17, wherein said rotation of said front bicycle fork support assembly is resisted by springs, connected between said front bicycle fork support element, and said U-frame.

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20. The retrofit assembly of claim 19, wherein said springs are elastomeric bands.

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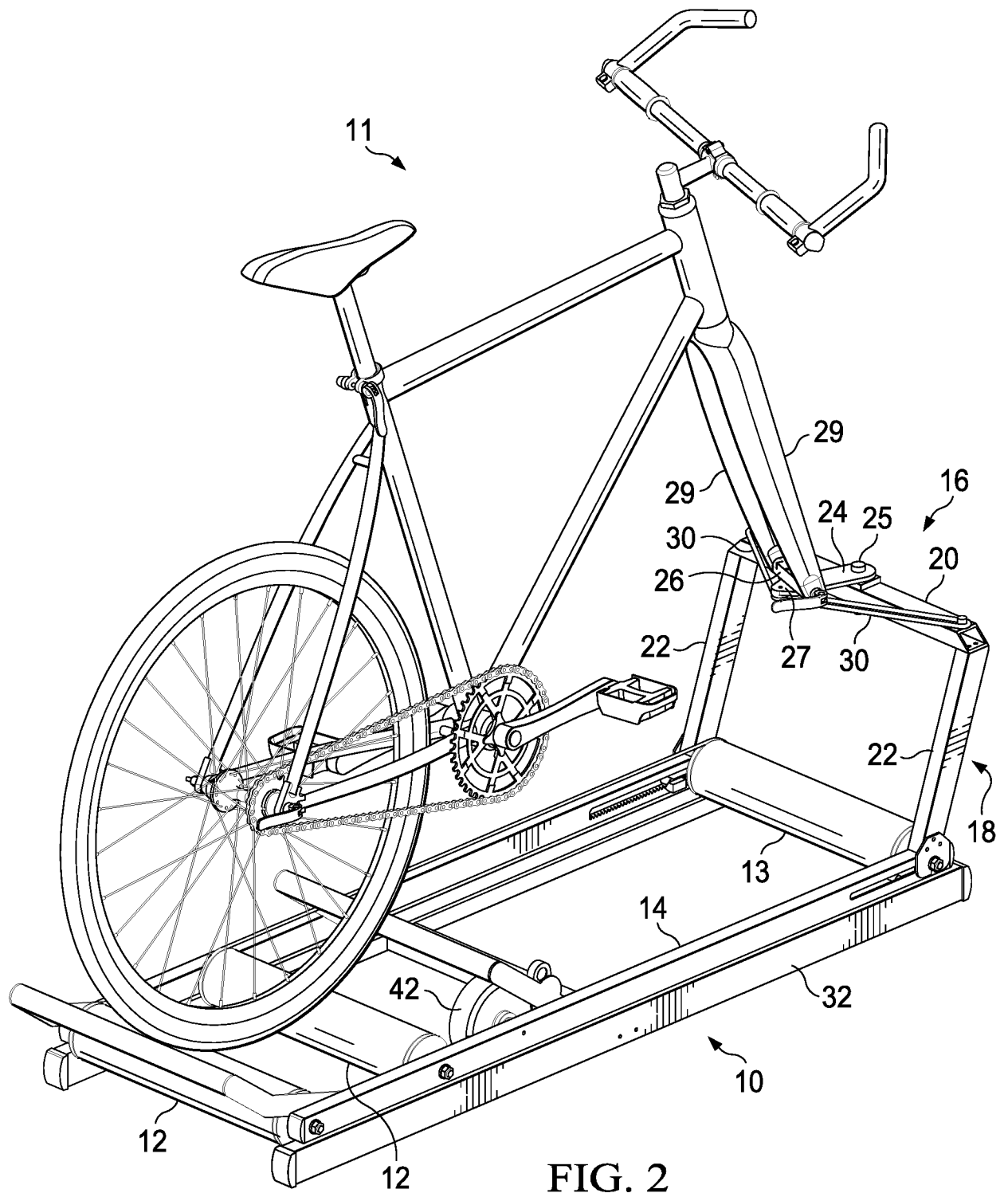


FIG. 2

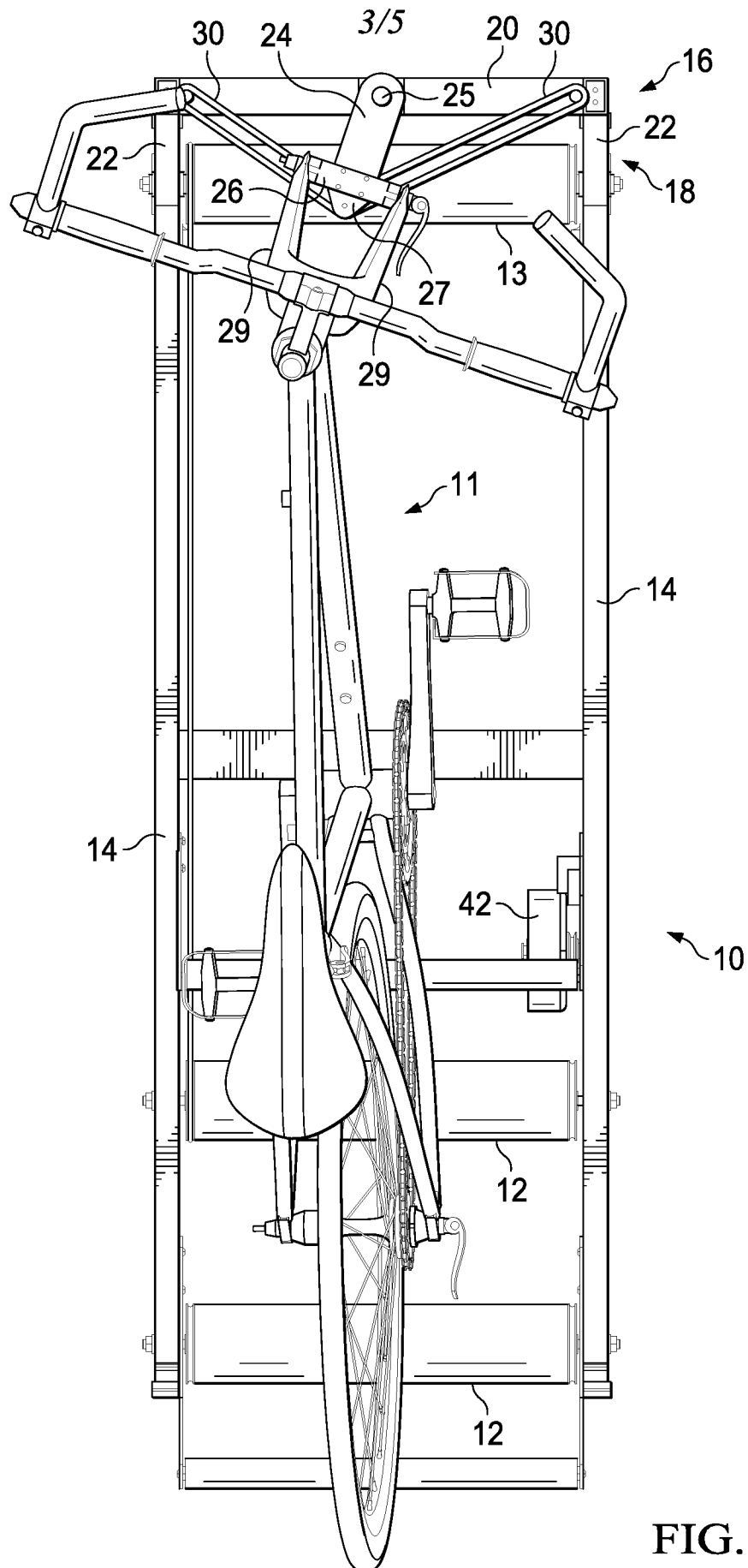


FIG. 3

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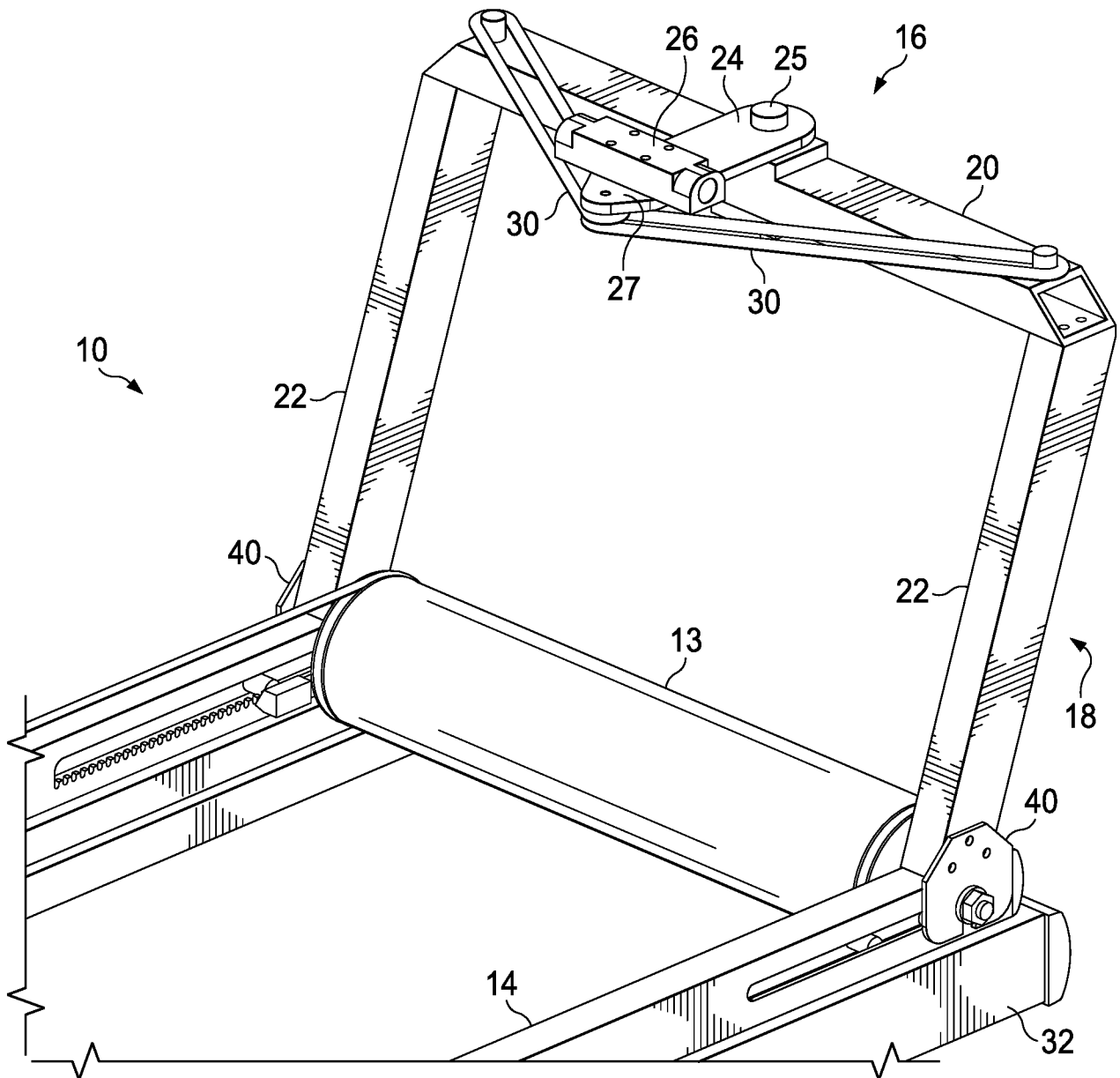
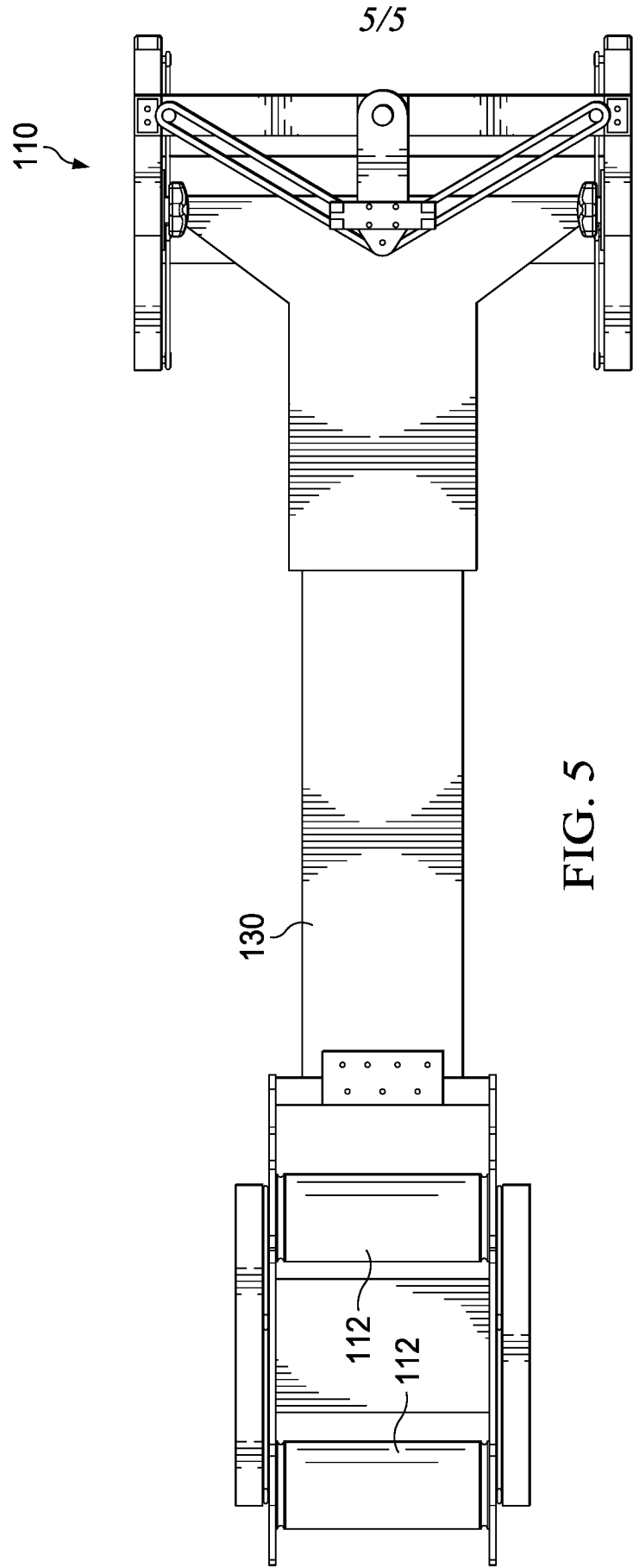


FIG. 4



A. CLASSIFICATION OF SUBJECT MATTER**A63B 22/06(2006.01)i, A63B 21/00(2006.01)i**

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)

A63B 22/06; A63B 22/08; A63B 69/16; B62M 1/08; A63B 21/00

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: bicycle, roller, wheel, support, rotation, bicycle fork

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	MINOURA CO., LTD. 'Action Bridge'. Retrieved from the Internet: <URL: https://web.archive.org/web/20150524200628/http://www.minoura.jp/english/trainer-e/option-e/bridge-e.html> 24 May 2015 See the entire document.	1-20
Y	US 2008-0269025 A1 (ZIAD BADARNEH et al.) 30 October 2008 See paragraphs [0039]-[0040]; claim 28; and figures 6-15.	1-20
A	US 2015-0217158 A1 (SPORTCRAFTERS, INC.) 06 August 2015 See paragraph [0007]; and figure 1.	1-20
A	US 2005-0209064 A1 (LEWIS DALE PETERSON et al.) 22 September 2005 See paragraph [0014]; and figure 3.	1-20
A	US 6857992 B1 (CLINT D. KOLDA et al.) 22 February 2005 See column 3, lines 20-60; and figure 1.	1-20



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

17 November 2017 (17.11.2017)

Date of mailing of the international search report

17 November 2017 (17.11.2017)

Name and mailing address of the ISA/KR

International Application Division

Korean Intellectual Property Office

189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea

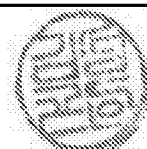


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Authorized officer

KIM, Sung Gon

Telephone No. +82-42-481-8746



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2017/045730

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 6857992 B1	22/02/2005	None	