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(54) Exercise device providing elliptical exercising paths

(57) An exercise device is provided with a reciprocal-movement mechanism and an angle-adjusting chassis comprising a frame, a guider, and a driving assembly. The reciprocal-movement mechanism is operable between at least a first position and a second position, the reciprocal-movement mechanism has a front portion and a rear portion. The angle-adjusting chassis is coupled with the reciprocal-movement mechanism, the angle-adjusting chassis configured to change at least one of a moving path of the reciprocal-movement mechanism, the first position, and the second position.

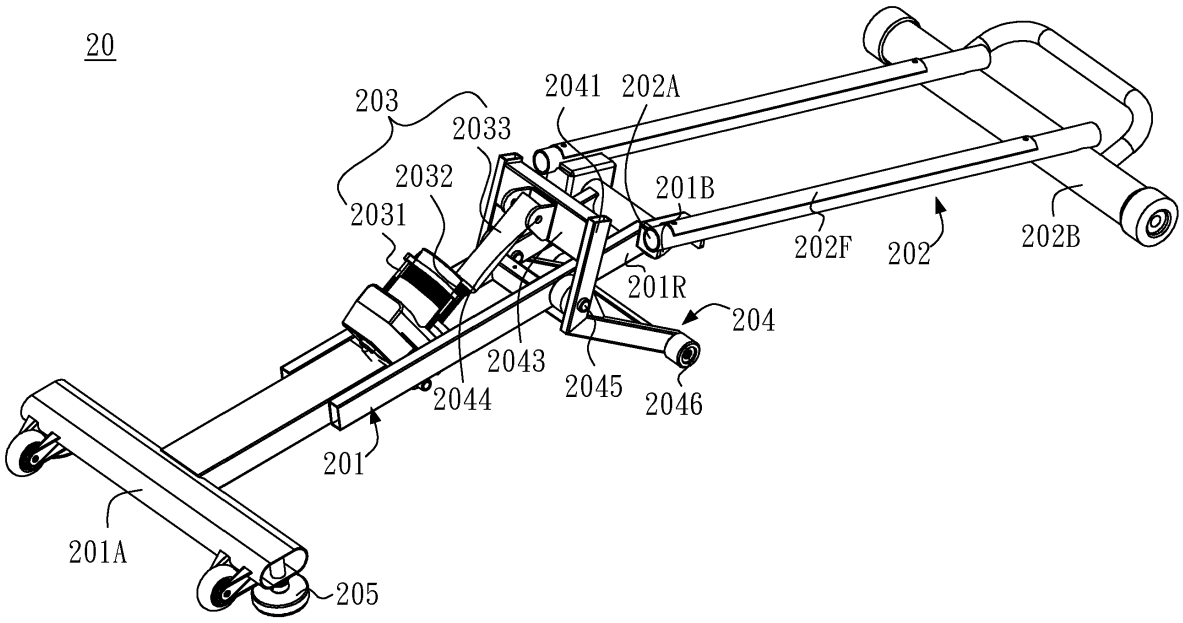

FIG.2

EP 2 889 056 A1

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to an exercise device, and more particularly relates to exercise device providing elliptical or elliptical-like exercising paths.

2. Description of Related Art

[0002] Without limiting the disclosed embodiments, an elliptical trainer, also called a cross-trainer or an X-trainer, is a stationary exercise machine to simulate stair climbing, walking, or running.

[0003] The elliptical trainer does not cause excessive pressure to the joints as the two legs simultaneously share the burden, hence decreasing the risk of impact injuries.

[0004] The elliptical trainer typically includes two pedals. A user steps on the pedals and the operation of the elliptical trainer cause the pedals to provide a moving path. For conventional elliptical trainers, the path of the pedals cannot be varied.

[0005] Taiwan Patent, Publication No., M403355, entitled "Rising Device for Elliptical Trainers," discloses an elliptical trainer with a rising device that can adjust the path of the pedals. As shown in Fig. 1, the rising device 40 comprises a motor assembly 403 including a motor 4031, a screw 4032, and an internally-thread tube 4033. The motor 4031 can drive the screw 4032 to rotate and to make the internally-thread tube 4033 moving in the direction away from the motor 4031. The stick 4051 of the rising device 405 is pushed by the internally-thread tube 4033, causing the wheel 413 sliding on the ground and the guider 402 above the frame 401 rotating about two ear parts 4021. An angle is therefore present between the guider 402 and the frame 401, and the tracks of the pedals are thus varied. The entire contents of above-mentioned Taiwan Patent are incorporated herein by reference.

[0006] Yet there is still a need for an elliptical trainer that can reduce cost and increase stability and varieties of exercise.

SUMMARY OF THE INVENTION

[0007] In one general aspect, the present invention relates to an exercise device, and more particularly relates to exercise device providing elliptical exercise paths.

[0008] In an embodiment of the present invention, an exercise device is provided with a reciprocal-movement mechanism and an angle-adjusting chassis comprising a frame, a guider, and a driving assembly. The reciprocal-movement mechanism is operable between at least a first position and a second position, the reciprocal-movement mechanism has a front portion and a rear portion. The angle-adjusting chassis is coupled with the reciprocal-movement mechanism, the angle-adjusting chassis configured to change at least one of a moving path of the reciprocal-movement mechanism, the first position, and the second position. The frame is coupled with the front portion of the reciprocal-movement mechanism, the frame having a front portion configured to be supported by a supporting surface and a rear portion. The guider is movably coupled with the rear portion of the reciprocal-movement mechanism, the guider having a front portion pivotably coupled with the rear portion of the frame, the guider having a rear portion configured to be supported by the supporting surface. The driving assembly is coupled with the frame for driving a moving piece that causes the rear portion of the frame to rise or fall between a first level and a second level, wherein a movement of the rear portion of the frame causes an incline angle of the guider to vary between a first guider incline angle and a second guider incline angle.

[0009] In one embodiment, the reciprocal-movement mechanism comprises a flywheel providing a damping effect, a driving wheel for driving the flywheel, two cranks respectively arranged at a side of the driving wheel for driving the driving wheel, and two driving arms with each arm comprising two ends in which one end couples with the crank and the other couples with a wheel disposed on the guider.

[0010] In one embodiment, the reciprocal-movement mechanism provides an elliptical or elliptical-like moving path between the first position and the second position and enables an operation by foot movements.

[0011] In one embodiment, the frame is pivotably movable relative to the supporting surface based on a pivot point near the front portion of the frame and near the supporting surface.

[0012] In one embodiment, the guider comprises two guide rails enabling movements of two first members of the reciprocal-movement mechanism along the guide rails, wherein a rear portion of each of the two first members is slidably coupled with a corresponding guide rail of the two guider rails.

[0013] In one embodiment, the supporting surface is ground surface.

[0014] In one embodiment, the guider is pivotably movable relative to the supporting surface based on a pivot point near the rear portion of the guider and near the supporting surface.

[0015] In one embodiment, at least the front portion of the frame and the rear portion of the guider provide ground support for supporting the exercise device when the exercise device rests on the supporting surface.

[0016] In one embodiment, the guider rotates clockwise around a pivot point near the rear portion of the guider to increase the incline angle when the frame rotates counterclockwise around a pivot point near the front portion of the frame, resulting in a first frame incline angle between a bottom of the frame and the supporting surface and the incline angle between the first guider incline angle

and the second guider incline angle, with the incline angle being between a bottom of the guider and the supporting surface.

[0017] In one embodiment, the driving assembly comprises a motor, a screw rod driven by the motor, an internally-threaded tube rotatably coupled with the screw rod and driven by the motor to move along the screw, and the moving piece coupled with the internally-threaded tube.

[0018] In one embodiment, the moving piece is pivotably coupled with the frame and has a first portion sliably supported by the supporting surface and the second portion driven by the motor through the internally-thread tube so that a movement of the internally-threaded tube along the screw causes the first portion to slide, on the supporting surface, either forward to increase the incline angle or backward to decrease the the incline angle.

[0019] In one embodiment, the rear portion of the frame is pivotably mounted below the front portion of the guider with two parallel pivot points. In one embodiment, a rear end of the frame is pivotally attached to and below the front end of the guider.

[0020] In one embodiment, at least a two pads are arranged under and near the front portion of the frame, wherein each of the two pads comprises a surface for contacting the supporting surface and a curved junction corresponding to and coupled with an arced junction of the frame.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

Fig. 1 is a front view showing a conventional rising device for an elliptical trainer.

Fig. 2 is a front view showing an angle-adjusting chassis according to a first embodiment of the present invention.

Figs. 3A, 3B, and 4 are side and front views showing an exercise device according to a first embodiment of the present invention.

Fig. 5 is a front view showing an angle-adjusting chassis according to a second embodiment of the present invention.

Figs. 6A, 6B, and 7 are side and front views showing an exercise device according to a second embodiment of the present invention.

Figs. 8A and 8B are front views showing an exercise device according to a third embodiment of the present invention.

Figs 9A-9D show the detail of a pad used in embodiments of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0022] Embodiments of the invention are now described and illustrated in the accompanying drawings, instances of which are to be interpreted to be to scale in some implementations while in other implementations, for each instance, not. In certain aspects, use of like or the same reference designators in the drawings and description refers to the same, similar or analogous components and/or elements, while according to other implementations the same use should not. According to certain implementations, use of directional terms, such as, top, bottom, left, right, up, down, over, above, below, beneath, rear, front, clockwise, and counterclockwise, are to be construed literally, while in other implementations the same use should not. While the invention will be described in conjunction with these specific embodiments, it will be understood that it is not intended to limit the invention to these embodiments. On the contrary, it is intended to cover alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims. In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. The present invention may be practiced without some or all of these specific details. In other instances, well-known process operations and components are not described in detail in order not to unnecessarily obscure the present invention. While drawings are illustrated in detail, it is appreciated that the quantity of the disclosed components may be greater or less than that disclosed, except where expressly restricting the amount of the components.

[0023] Referring to Fig. 2, an angle-adjusting chassis 20 is disclosed according to a first embodiment of the present invention. As shown in Fig. 2, the angle-adjusting chassis 20 comprises a frame 201, a guider 202, a driving assembly 203, and a moving piece 204. Preferably, the front end 201 A of the frame 201 has a wheel or a pivot contacting with a supporting surface, and the rear end 202B of the guider 202 has a wheel or a pivot contacting with the supporting surface. The supporting surface is preferably, but is not limited to, the ground. In an embodiment, the front portion of the frame 201 is configured to be supported by the supporting surface or ground. In an embodiment, the rear portion of the guider 202 is configured to be supported by the supporting surface or ground.

[0024] The rear portion 201R of the frame 201 pivotably couples with the front portion 202F of the guider 202; the connection can be the horizontally connected or connected above or below the guider 202. In this context, the term "the rear portion 201R of the frame 201" refers to the rear end 201B of the frame 201 and the portion near the rear end 201B, and the term "the front portion 202F of the guider 202" refers to the front end 202A of the guider 202 and the portion near the front end 202A.

[0025] In this preferred embodiment, the rear end 201

B of the frame 201 is pivotably mounted below the front end 202A of the guider 202. In an embodiment, the rear end 201B of the frame 201 is pivotally attached to and below the front end 202A of the guider 202. In another embodiment, the rear end 201B of the frame 201 pivotably couples with the front end 202A of the guider 202. In this embodiment, the moving piece 204 pivotably couples with the frame 201, and the driving assembly 203 couples with the frame 201 for driving the moving piece 204 that cause the rear portion of the frame 201 to rise or fall between a first level and a second level, wherein a movement of the rear portion of the frame causes an incline angle of the guider to vary between a first guider incline angle and a second guider incline angle.

[0026] In this embodiment, the driving assembly may comprise, but is not limited to, a motor 2031, a screw 2032, and an internally-thread tube 2033. For example, the moving piece 204 may comprise two first linkage parts 2041 and a second linkage part 2043. The two first linkage parts 2041 are respectively arranged at a side of the frame 201, and a second linkage part 2043 connects with the two first linkage parts 2041.

[0027] An upper end of the moving piece 204 may pivotably couple with the internally-thread tube 2033 via a pivot 2044. For example, the second linkage part 2043 may pivotably couple with the internally-thread tube 2033 via the pivot 2044. A middle portion of each first linkage part 2041 may pivotably couple with the frame 201, and a lower end of each first linkage part 2041 may comprise a wheel 2046 in contact with the supporting surface or the ground.

[0028] It should be noted that the two first linkage parts 2041 are arranged outside of the frame 201 in this embodiment, while they can be arranged inside of the frame in another embodiment. Further, the quantity of the first linkage part could be single. In addition, at least a pad 205 is arranged under the front end 201A of the frame 201, for stabilizing the front end 201A of the frame 201, and/or adjusting the distance between the frame and the supporting surface.

[0029] Figs. 3A and 3B show an exercise device 1 according to a first embodiment of the present invention. The exercise device 1, such as an elliptical trainer, comprises the above-mentioned angle-adjusting chassis 20 and a reciprocal-movement mechanism 30. The reciprocal-movement mechanism 30 can be operated by a user, e.g., operable for simulating stair climbing, walking, or running. The reciprocal-movement mechanism 30 has a front portion 30A and a rear portion 30B. The frame 201 couples with the front portion 30A of the reciprocal-movement mechanism 30. The guider 202 movably couples with the rear portion 30B of the reciprocal-movement mechanism 30. The angle-adjusting chassis 20 comprises the frame 201, the guider 202, the driving assembly 203, and the moving piece 204. Fig. 3A shows the reciprocal-movement mechanism 30, the frame 201 and the guider 202 of the elliptical trainer 1 at a first position, and Fig. 3B shows the reciprocal-movement mechanism 30, the frame 201, and the guider 202 of the elliptical trainer 1 at a second position. The angle-adjusting chassis 20 is configured to change at least one of a moving path of the reciprocal-movement mechanism 30, the first position, and the second position.

[0030] In one embodiment, the frame 201 is pivotably movable relative to the supporting surface based on a pivot point near the front portion of the frame 201 and near the supporting surface. In one embodiment, the guider 202 is pivotably movable relative to the supporting surface based on a pivot point near the rear portion of the guider and near the supporting surface. In one embodiment, at least the front portion of the frame 201 and the rear portion of the guider 202 provide ground support for supporting the exercise device when the exercise device rests on the supporting surface.

[0031] As shown in Figs. 3A and 3B, the driving assembly 203 comprises a motor 2031, a screw 2032, and an internally-thread tube 2033 according to this embodiment. The motor 2031 can drive the screw 2032 to rotate and to make the internally-thread tube 2033 moving in the direction away from the motor 2031, so as to push the moving piece 204. When the driving assembly 203 pushes the moving piece 204, the moving piece 204 rotates clockwise around the pivot 2045, resulting in the wheel 2046 being moved forward, the frame 201 rotating counterclockwise around its front end 201A, and the guider 202 rotating clockwise around its rear end 202B. As a result, a first angle $\theta 1$ (first incline frame angle) is present between the frame 201 and the supporting surface (e.g., the ground), and a second $\theta 2$ is present between the guider 202 and the supporting surface. The reciprocal-movement mechanism 30 is at the second position, as shown in Fig. 3B. Referring to Figs. 3A and 3B, the driving assembly 203 drives the moving piece 204 that cause the rear portion of the frame 201 to rise or fall between a first level (Fig. 3A) and a second level (Fig. 3B), wherein a movement of the rear portion of the frame causes an incline angle of the guider to vary between a first guider incline angle (θ_{G1}) and a second guider incline angle (θ_{G2}).

[0032] The above-mentioned operation can be reversible. The motor 2031 can drive the screw 2032 to rotate and to make the internally-thread tube 2033 moving in the direction toward the motor 2031, and hence cause reciprocal-movement mechanism 30, the frame 201 and the guider 202 back to the first position as shown in Fig. 3A.

[0033] Fig. 4 shows more detail of the elliptical trainer 1. The reciprocal-movement mechanism 30 may comprise, but is not limited to, a flywheel 309 providing a damping effect, a driving wheel 308 for driving the flywheel 309, two cranks 307 respectively arranged at a side of the driving wheel 308 for driving the driving wheel 308, two driving arms 311 with each arm 311 comprising two ends, in which one end couples with the crank 307 and the other couples with a wheel 313 disposed on the guider 202. In addition, two handle members 306 mov-

ably coupled to the angle-adjusting chassis 20, each of the two handle members 306 having at least one upper end 302 for enabling a user operating by hand. In particular, two handles 302 respectively couples with a swing arm 306, which couples with a linkage arm 310, and one end of the linkage arm 310 couples with a first member 312, e.g., pedal 312. Further, the reciprocal-movement mechanism 30 may further comprise a bracket 305. A stationary stick 304 couples with the bracket 305, and a control panel and two stationary handles 303 couple with the stationary stick 304. The guider 202 comprises two guide rails 2024 enabling movements of two first members 312 of the reciprocal-movement mechanism along the guide rails 2024, wherein a rear portion of each of the two first members 312 is slidably coupled with a corresponding guide rail of the two guider rails 2024. Each of the two pedals 312 is pivotally or adjustably coupled with a corresponding linkage arm 310 of the two linkages arms 310.

[0034] The user steps on the pedals 312 with his or her hands holding the stationary handles 303 or the handles 302. Therefore, when the user exerts forces on the handles 302 and pedals 312, the flywheel 309 is driven by the driving wheel 308 via the swing arms 306, the linkage arms 310, the driving arms 311, and the cranks 307, and the wheel 313 reciprocates on the guider 202, and the pedals 312 makes an elliptical or elliptical-like circle, respectively. The user can control the driving assembly 203, e.g., motor, via the control panel 301, so as to control the first angle $\theta 1$ and the second angle $\theta 2$ (the incline angle of the guider). The degree or slope of the first angle $\theta 1$, the second angle 02, and the incline angle of the guider can be varied. In addition, the swing arm 306 and the handle 302 could slightly tilt when the frame 201 is risen. The reciprocal-movement mechanism 30 provides elliptical or elliptical-like moving paths between the first position and the second position and enables an operation by foot movements of the user.

[0035] Referring to Fig. 5, an angle-adjusting chassis 50 is disclosed according to a second embodiment of the present invention. As shown in Fig. 5, the angle-adjusting chassis 50 comprises a frame 501, a guider 502, a driving assembly 503, and a moving piece 504. Preferably, the front end 501A of the frame 501 has a wheel or pivot contacting with a supporting surface, and the rear end 502B of the guider 502 has a wheel or pivot contacting with the supporting surface. The supporting surface is preferably, but is not limited to, the ground. In an embodiment, the front portion of the frame 501 is configured to be supported by the supporting surface or ground. In an embodiment, the rear portion of the guider 502 is configured to be supported by the supporting surface or ground.

[0036] The rear portion 501R of the frame 501 couples with the front portion 502F of the guider 502; the connection can be the horizontally connected or connected above or below the guider 502. In this context, the term "the rear portion 501R of the frame 501" refers to the rear end 501B of the frame 501 and the portion near the rear end 501B, and the term "the front portion 502F of the guider 502" refers to the front end 502A of the guider 502 and the portion near the front end 502A.

[0037] In this embodiment, the rear end 501B of the frame 501 is pivotably mounted below the front end 502A of the guider 502. In an embodiment, the rear end 501B of the frame 501 is pivotally attached to and below the front end 502A of the guider 502. In another embodiment, the rear end 501B of the frame 501 pivotably couples with the front end 502A of the guider 502.

[0038] In this embodiment, the moving piece 504 pivotably couples with the frame 501, and the driving assembly 503 couples with the frame 501 for driving the moving piece 504 that cause the rear portion of the frame 501 to rise or fall between a first level and a second level, wherein a movement of the rear portion of the frame causes an incline angle of the guider to vary between a first guider incline angle and a second guider incline angle. In this embodiment, the driving assembly 503 may comprise, but is not limited to, a motor 5031, a screw 5032, and an internally-thread tube 5033.

[0039] For instance, the moving piece 504 may comprise a saddle part 5041 and a linkage part 5042. In this embodiment, the saddle part 5041 is, but is not limited to, a U-shaped configuration comprising two arms respectively fixed on the frame 501. An upper end of the linkage part 5042 pivotably couples with the saddle part 5041 via a pivot 5043, and a lower end of the linkage part 5042 pivotably couples with the internally-thread tube 5033 via a pivot 5044. In addition, the lower end of the linkage part 5042 may comprise at least a wheel for in contact with the supporting surface or the ground. In one embodiment, at least the front portion of the frame 501 and the rear portion of the guider 502 provide ground support for supporting the exercise device when the exercise device rests on the supporting surface.

[0040] In addition, at least a pad 505 is arranged under the front end 501A of the frame 501, for stabilizing the front end 501A of the frame 501, and/or adjusting the distance between the frame 501 and the supporting surface.

[0041] In one embodiment, the frame 501 is pivotably movable relative to the supporting surface based on a pivot point near the front portion of the frame 501 and near the supporting surface. In one embodiment, the guider 502 is pivotably movable relative to the supporting surface based on a pivot point near the rear portion of the guider and near the supporting surface.

[0042] Figs. 6A and 6B show an exercise device 2 according to a second embodiment of the present invention. The exercise device 2 comprises the above-mentioned angle-adjusting chassis 50 and a reciprocal-movement mechanism 30. The reciprocal-movement mechanism 30 can be operated by a user, e.g., operable for simulating stair climbing, walking, or running. The reciprocal-movement mechanism 30 has a front portion 30A and a rear portion 30B. The frame 501 couples with the front portion 30A of the reciprocal-movement mechanism 30.

The guider 502 movably couples with the rear portion 30B of the reciprocal-movement mechanism 30. The angle-adjusting chassis 50 comprises the frame 501, the guider 502, the driving assembly 503, and the moving piece 504. Fig. 6A shows the frame 501 and the guider 502 of the elliptical trainer 2 at a first position, and Fig. 6B shows the frame 501 and the guider 502 of the elliptical trainer 2 at a second position. The angle-adjusting chassis 50 is configured to change at least one of a moving path of the reciprocal-movement mechanism 30, the first position, and the second position.

[0043] As shown in Figs. 6A and 6B, the driving assembly 503 comprises a motor 5031, a screw 5032, and an internally-thread tube 5033 according to this embodiment. The motor 5031 can drive the screw 5032 to rotate and to make the internally-thread tube 5033 moving in the direction toward the motor 2031, so as to draw the moving piece 504. When the driving assembly 503 draws the moving piece 504, the moving piece 504 rotates clockwise around the pivot 5043, resulting in the wheel 5045 being moved forward, the frame 501 rotating counterclockwise around its front end 501A, and the guider 502 rotating clockwise around its rear end 502B. As a result, a first angle $\theta 1$ is present between the frame 501 and the supporting surface (e.g., the ground), and a second $\theta 2$ is present between the guider 502 and the supporting surface. The frame 501 and the guider 502 are at the second position, as shown in Fig. 6B. Referring to Figs. 6A and B, the driving assembly 203 drives the moving piece 204 that cause the rear portion of the frame 201 to rise or fall between a first level (Fig. 6A) and a second level (Fig. 6B), wherein a movement of the rear portion of the frame causes an incline angle of the guider to vary between a first guider incline angle (θ_{G1}) and a second guider incline angle (θ_{G2}).

[0044] The above-mentioned operation can be reversible. The motor 5031 can drive the screw 5032 to rotate and to make the internally-thread tube 5033 moving in the direction away from the motor 5031, and hence cause the frame 501 and the guider 502 back to the first position as shown in Fig. 6A.

[0045] Fig. 7 shows more detail of the exercise device 2. The reciprocal-movement mechanism 30 may comprise, but is not limited to, a flywheel 309 providing a damping effect, a driving wheel 308 for driving the flywheel 309, two cranks 307 respectively arranged at a side of the driving wheel 308 for driving the driving wheel 308, two driving arms 311 with each driving arm 311 comprising two ends, in which one end couples with the crank 307 and the other couples with a wheel 313 disposed on the guider 202. In addition, two handle members 306 movably coupled to the angle-adjusting chassis 20, each of the two handle members 306 having at least one upper end 302 for enabling a user operating by hand. In particular, two handles 302 respectively couples with a swing arm 306, which couples with a linkage arm 310, and one end of the linkage arm 310 couples with a first member 312, e.g., pedal 312. Further, the reciprocal-movement mechanism 30 may further comprise a bracket 305. A stationary stick 304 couples with the bracket 305, and a control panel and two stationary handles 303 couple with the stationary stick 304. The operation of the exercise device 2 is the same as the exercise device 1 and hence omitted. The guider 502 comprises two guide rails 5024 enabling movements of two first members 312 of the reciprocal-movement mechanism along the guide rails 5024, wherein a rear portion of each of the two first members 312 is slidably coupled with a corresponding guide rail of the two guider rails 5024. Each of the two pedals 312 is pivotally or adjustably coupled with a corresponding linkage arm 310 of the two linkages arms 310.

[0046] Figs. 8A and 8B show an exercise device 3 according to a third embodiment of the present invention. This embodiment is similar to the first embodiment. In this embodiment, the two first linkage part 2041 are arranged inside of the frame 201. In addition, an upper end of the first linkage part 2041 pivotably couples with the internally-thread tube via a pivot 2044. The detail of the other configuration and operation is similar to the first embodiment and hence omitted.

[0047] As shown in Fig. 8B, the exercise device 3 may comprise a housing 314 disposed on the frame 201 to cover the driving wheel 308, the flywheel 309, and other components. The housing 314 can also be used in the first and second embodiments.

[0048] Figs. 9A-9D show the detail of the pad 205/505. The first embodiment is used to illustrate the pad 205, while the mechanism can be applied to other embodiments. As shown in Figs. 9A-9D, each pad comprises a surface 2054 and a curved junction 2052. The surface is in contact with the supporting surface or ground. An extended mechanism of the frame 201 comprises an arced junction 2012 capable of fitting the curved junction 2052. The curved junction 2052 is in contact with the arced junction 2012 of the frame 201. When the frame 201 is risen or lowered, the curved junction 2052 can rotate, so that the surface 2052 of the pad 205 can always fit with the supporting surface or the ground, and hence the stability is increased.

[0049] Accordingly, embodiments of the present invention provide exercise devices in which the frame and the guider respectively rotate about an end, so as to alter the and control a level of the rear portion of the frame to be between a first level and a second level, and thus change the moving path of the reciprocal-movement mechanism. The frame and guider of conventional trainers are overlapped with each other. By contrast the dimension of the frame is significantly reduced and the frame not overlaps with the guider; and therefore the material cost can be saved. Further, the frame of conventional trainers needs to be horizontally arranged and attached to the ground, while the frame of the present invention has a novel design without those limitations. In addition, because the pivot point of the angle-adjustment chassis is near to the center of the elliptical trainer, the response time of the angle adjustment of this invention is faster than that of

the prior art.

[0050] The intent accompanying this disclosure is to have each/all embodiments construed in conjunction with the knowledge of one skilled in the art to cover all modifications, variations, combinations, permutations, omissions, substitutions, alternatives, and equivalents of the embodiments, to the extent not mutually exclusive, as may fall within the spirit and scope of the invention. Corresponding or related structure and methods disclosed or referenced herein, and/or in any and all co-pending, abandoned or patented application(s) by any of the named inventor(s) or assignee(s) of this application and invention, are incorporated herein by reference in their entireties, wherein such incorporation includes corresponding or related structure (and modifications thereof) which may be, in whole or in part, (i) operable and/or constructed with, (ii) modified by one skilled in the art to be operable and/or constructed with, and/or (iii) implemented/made/used with or in combination with, any part(s) of the present invention according to this disclosure, that of the application and references cited therein, and the knowledge and judgment of one skilled in the art.

[0051] Conditional language, such as, among others, "can," "could," "might," or "may," unless specifically stated otherwise, or otherwise understood within the context as used, is generally intended to convey that embodiments include, and in other interpretations do not include, certain features, elements and/or steps. Thus, such conditional language is not generally intended to imply that features, elements and/or steps are in any way required for one or more embodiments, or interpretations thereof, or that one or more embodiments necessarily include logic for deciding, with or without user input or prompting, whether these features, elements and/or steps are included or are to be performed in any particular embodiment.

[0052] Although specific embodiments have been illustrated and described, it will be appreciated by those skilled in the art that various modifications may be made without departing from the scope of the present invention, which is intended to be limited solely by the appended claims.

Claims

1. An exercise device, comprising:

a reciprocal-movement mechanism operable between at least a first position and a second position, the reciprocal-movement mechanism has a front portion and a rear portion; and
an angle-adjusting chassis coupled with the reciprocal-movement mechanism, the angle-adjusting chassis configured to change at least one of a moving path of the reciprocal-movement mechanism, the first position, and the second position, the angle-adjusting chassis comprising:

a frame coupled with the front portion of the reciprocal-movement mechanism, the frame having a front portion configured to be supported by a supporting surface and a rear portion;
a guider movably coupled with the rear portion of the reciprocal-movement mechanism, the guider having a front portion pivotably coupled with the rear portion of the frame, the guider having a rear portion configured to be supported by the supporting surface; and
a driving assembly coupled with the frame for driving a moving piece that causes the rear portion of the frame to rise or fall between a first level and a second level, wherein a movement of the rear portion of the frame causes an incline angle of the guider to vary between a first guider incline angle and a second guider incline angle.

2. The exercise device of claim 1, wherein the reciprocal-movement mechanism comprises a flywheel providing a damping effect, a driving wheel for driving the flywheel, two cranks respectively arranged at a side of the driving wheel for driving the driving wheel, two driving arms with each arm comprising two ends in which one end couples with one of the two cranks and the other couples with a wheel disposed on the guider.

3. The exercise device of claim 1, wherein the reciprocal-movement mechanism provides an elliptical or elliptical-like moving path between the first position and the second position and enables an operation by foot movements.

4. The exercise device of claim 1, wherein the frame is pivotably movable relative to the supporting surface based on a pivot point near the front portion of the frame and near the supporting surface.

5. The exercise device of claim 1, wherein the guider comprises two guide rails enabling movements of two first members of the reciprocal-movement mechanism along the guide rails, wherein a rear portion of each of the two first members is slidably coupled with a corresponding guide rail of the two guider rails.

6. The exercise device of claim 1, wherein the guider is pivotably movable relative to the supporting surface based on a pivot point near the rear portion of the guider and near the supporting surface.

7. The exercise device of claim 1, wherein the guider rotates clockwise around a pivot point near the rear

portion of the guider to increase the incline angle when the frame rotates counterclockwise around a pivot point near the front portion of the frame, resulting in a first frame incline angle between a bottom of the frame and the supporting surface and the incline angle between the first guider incline angle and the second guider incline angle, with the incline angle being between a bottom of the guider and the supporting surface.

8. The exercise device of claim 1, wherein the driving assembly comprises a motor, a screw rod driven by the motor, an internally-threaded tube rotatably coupled with the screw rod and driven by the motor to move along the screw, and the moving piece coupled with the internally-threaded tube.

9. The exercise device of claim 1, wherein the moving piece is pivotably coupled with the frame and has a first portion sliably supported by the supporting surface and the second portion driven by the motor through the internally-thread tube so that a movement of the internally-threaded tube along the screw causes the first portion to slide on the supporting surface, either forward to increase the incline angle or backward to decrease the incline angle.

10. The exercise device of claim 1, wherein the rear portion of the frame is pivotably attached to and below the front portion of the guider with two parallel pivot points.

11. The exercise device of claim 1, further comprising at least a two pads arranged under and near the front portion of the frame, wherein each of the two pads comprises a surface for contacting the supporting surface and a curved junction corresponding to and coupled with an arced junction of the frame.

12. An exercise device, comprising:

a reciprocal-movement mechanism operable between at least a first position and a second position, the reciprocal-movement mechanism has a front portion and a rear portion; and
an angle-adjusting chassis coupled with the reciprocal-movement mechanism, the angle-adjusting chassis configured to change at least one of a moving path of the reciprocal-movement mechanism, the first position, and the second position, the angle-adjusting chassis comprising:

a frame coupled with the front portion of the reciprocal-movement mechanism, the frame having a front portion configured to be supported by a supporting surface and a rear portion;

a guider movably coupled with the rear portion of the reciprocal-movement mechanism, the guider having a front portion pivotably coupled with the rear portion of the frame, the guider having a rear portion configured to be supported by the supporting surface; and
a driving assembly coupled with the frame for driving a moving piece that causes the guider rotating clockwise around its rear end and the frame rotating counterclockwise around its front end, resulting in a first frame incline angle between the frame and the supporting surface and a second guider incline angle between the guider and the supporting surface

13. The exercise device of claim 12, wherein the reciprocal-movement mechanism comprises a flywheel providing a damping effect, a driving wheel for driving the flywheel, two cranks respectively arranged at a side of the driving wheel for driving the driving wheel, two driving arms with each arm comprising two ends in which one end couples with one of the two cranks and the other couples with a wheel disposed on the guider.

14. The exercise device of claim 12, wherein the reciprocal-movement mechanism provides an elliptical or elliptical-like moving path between the first position and the second position and enables an operation by foot movements.

15. The exercise device of claim 12, wherein the frame is pivotably movable relative to the supporting surface based on a pivot point near the front portion of the frame and near the supporting surface.

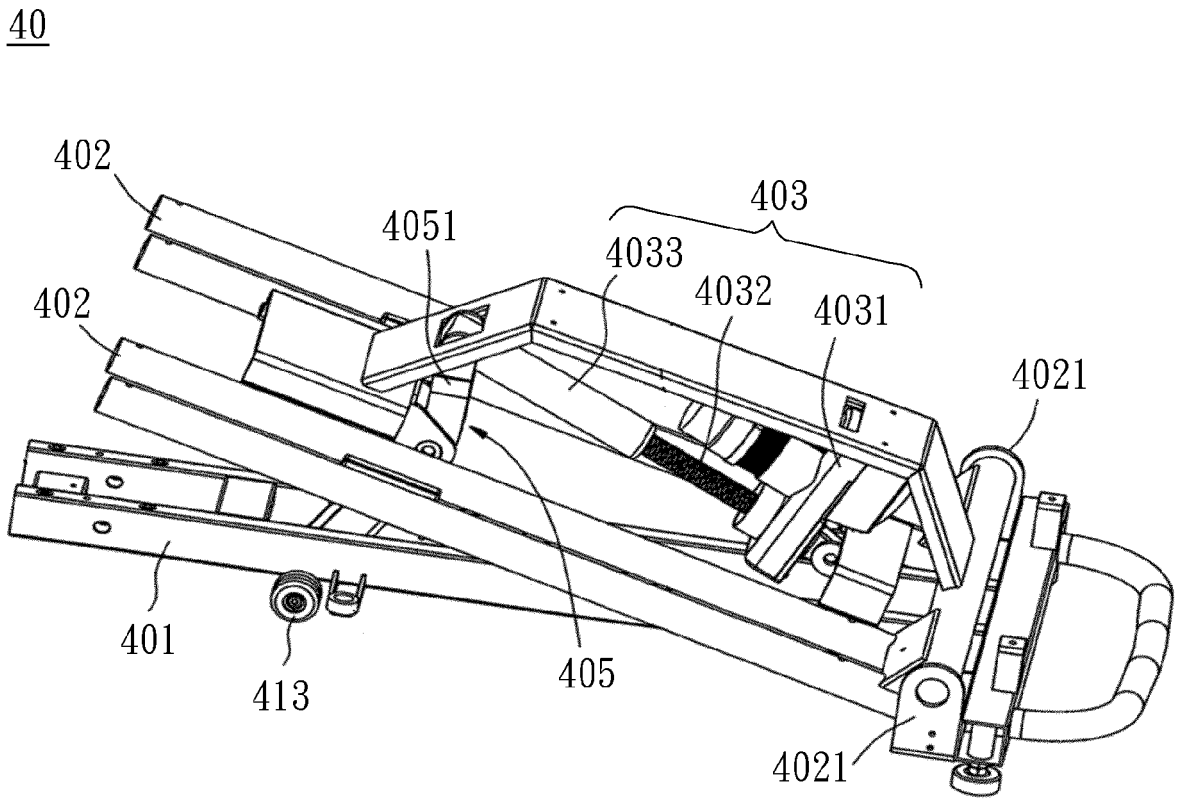

FIG.1

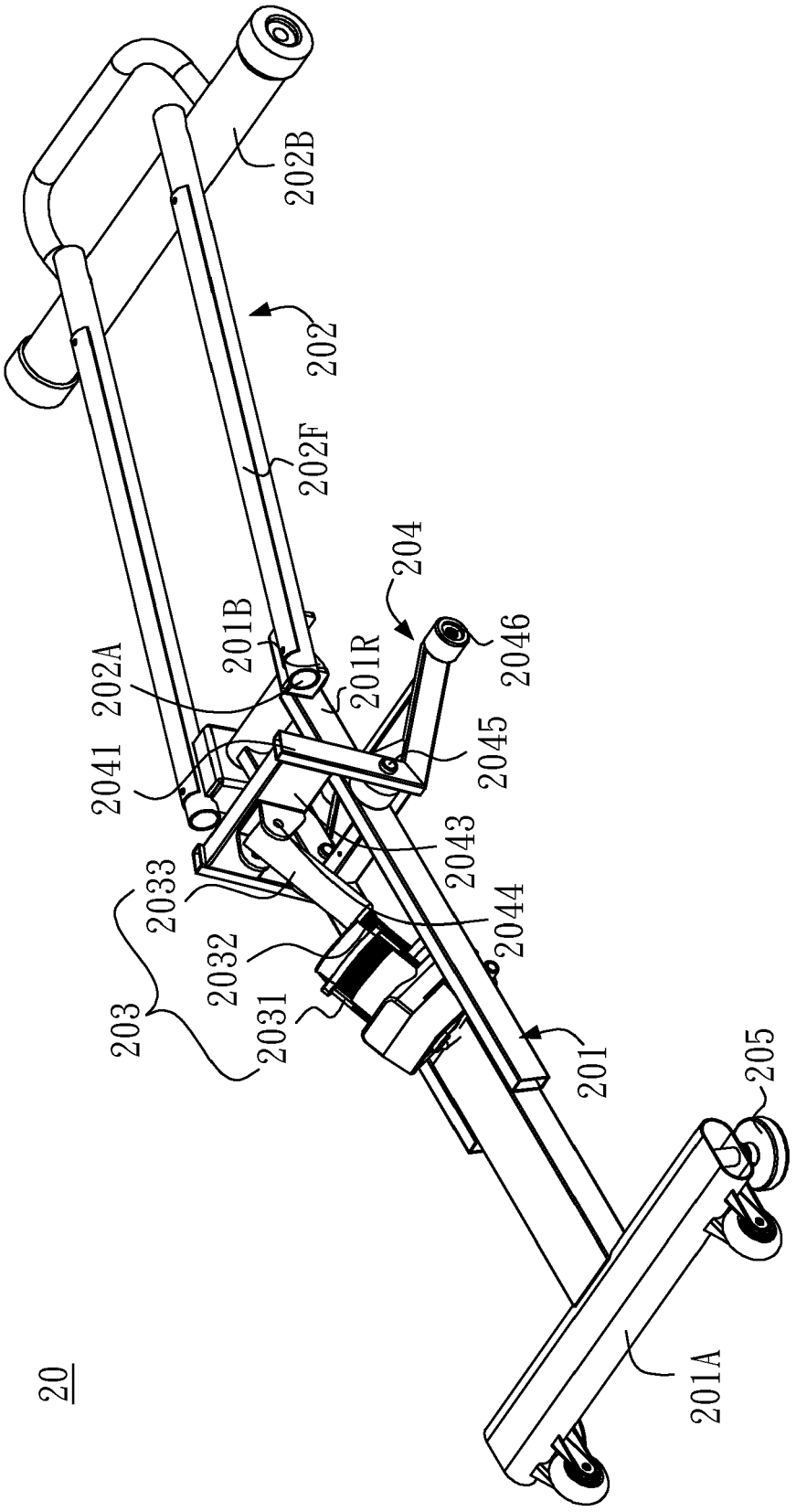
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FIG.2

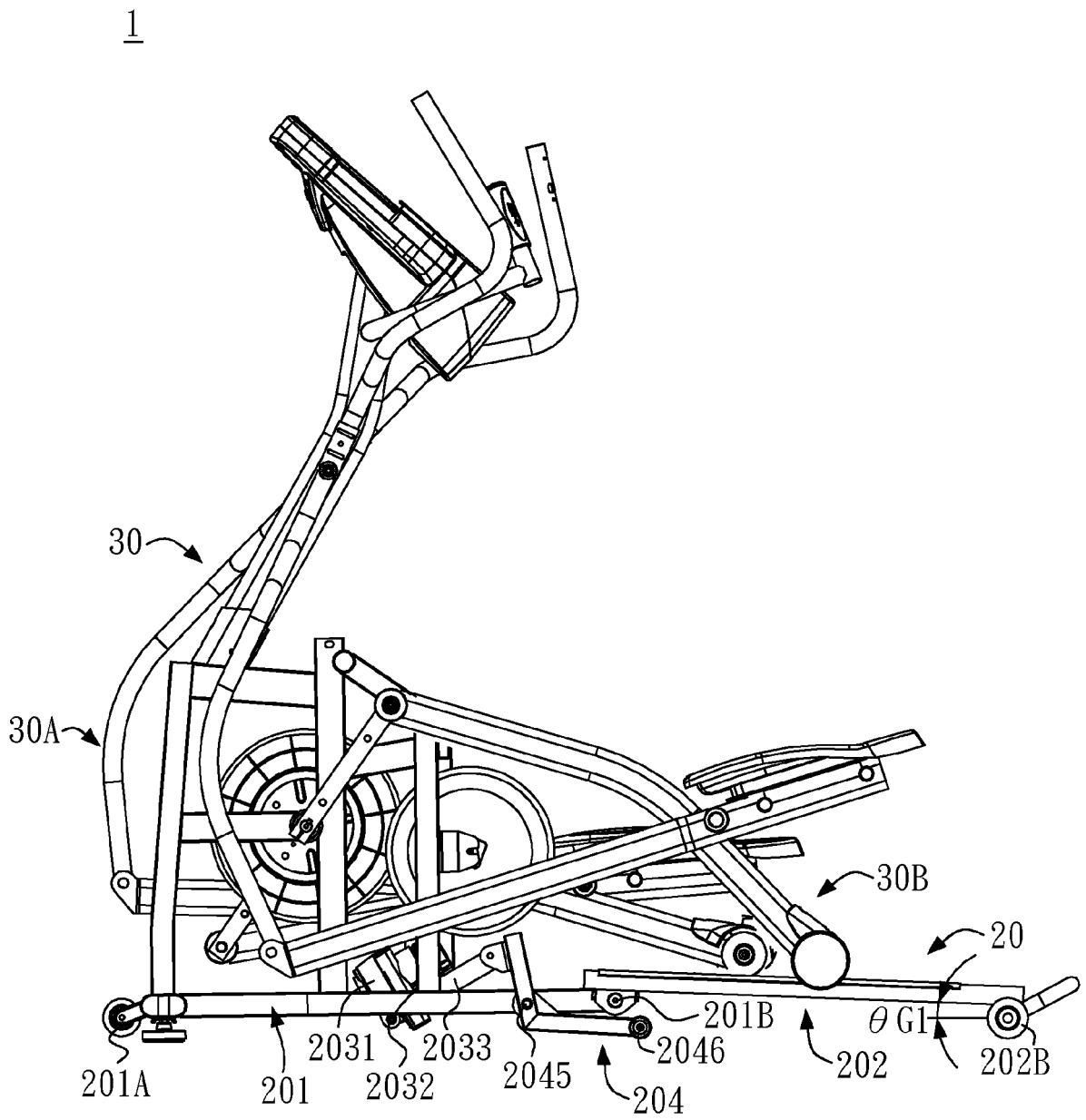
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FIG.3A

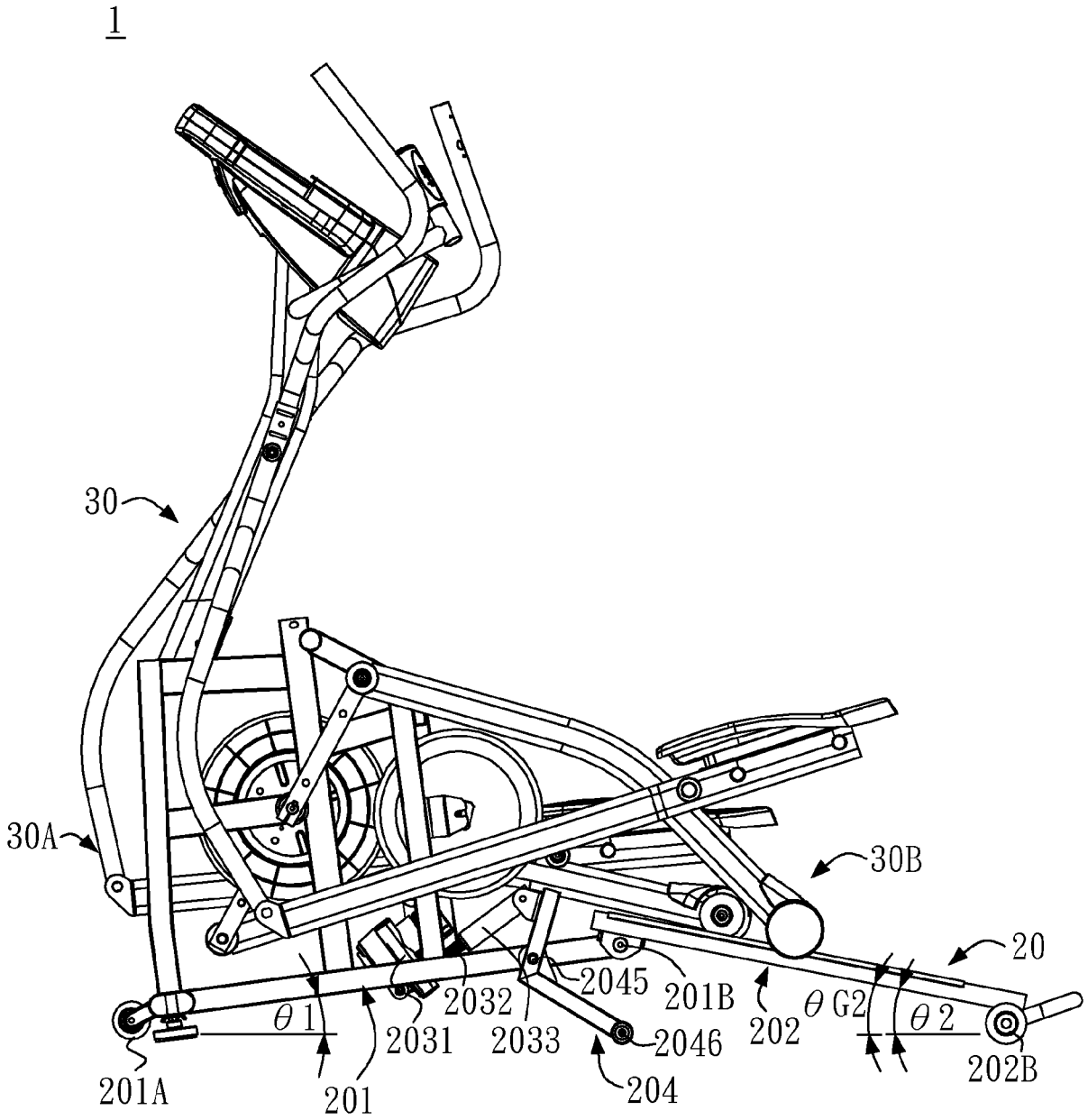
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FIG.3B

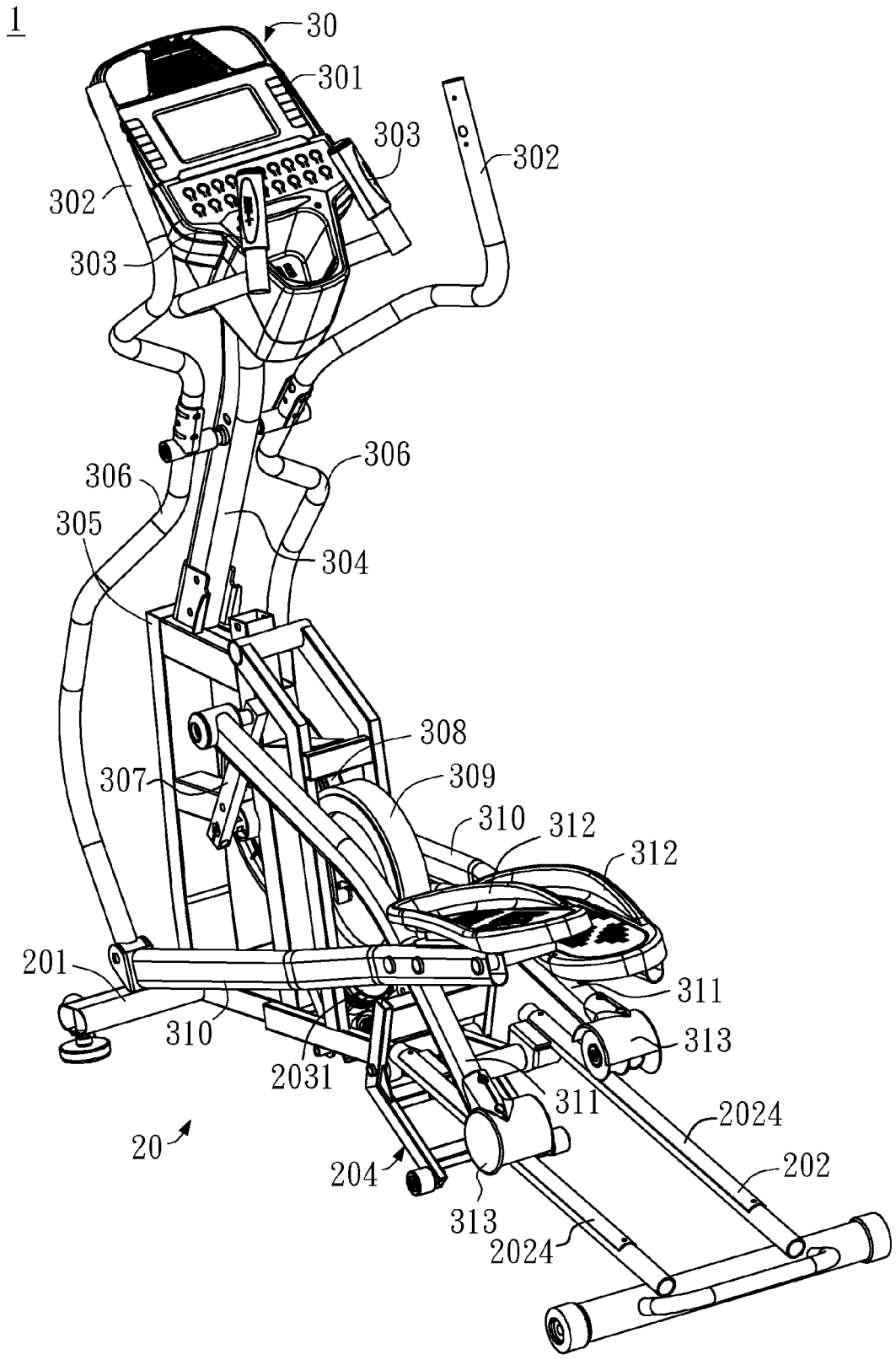
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FIG.4

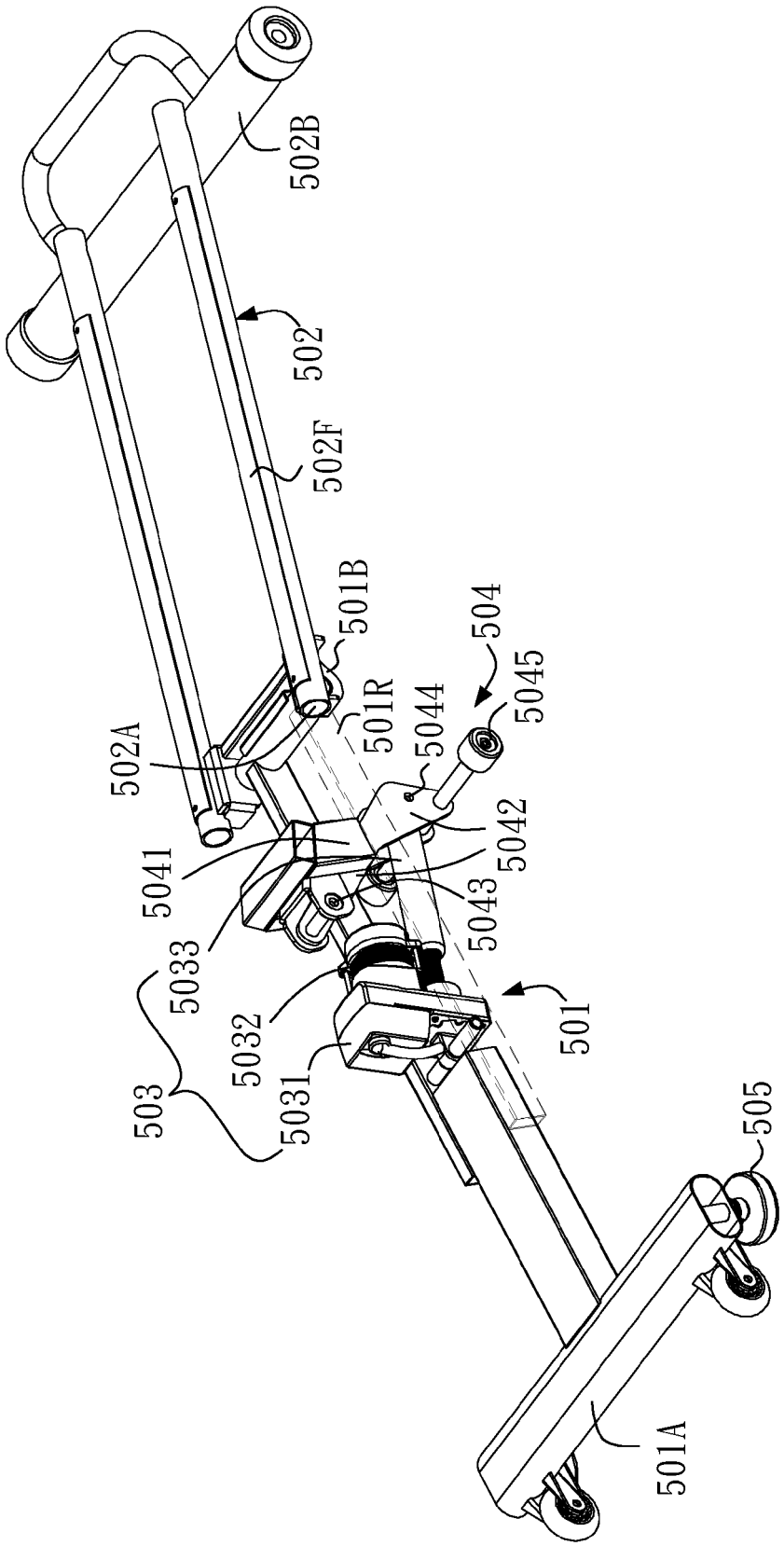
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FIG.5

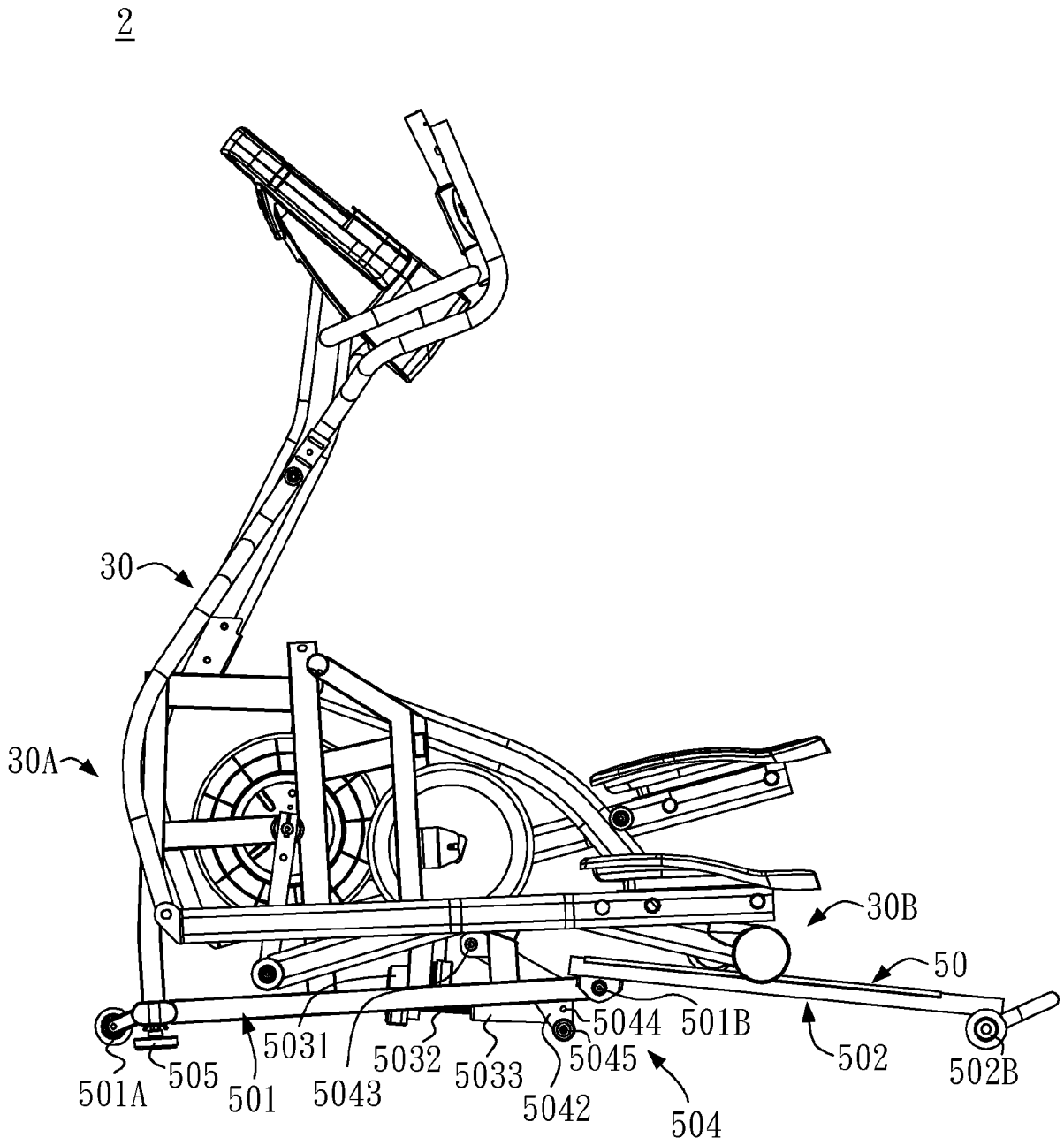
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FIG.6A

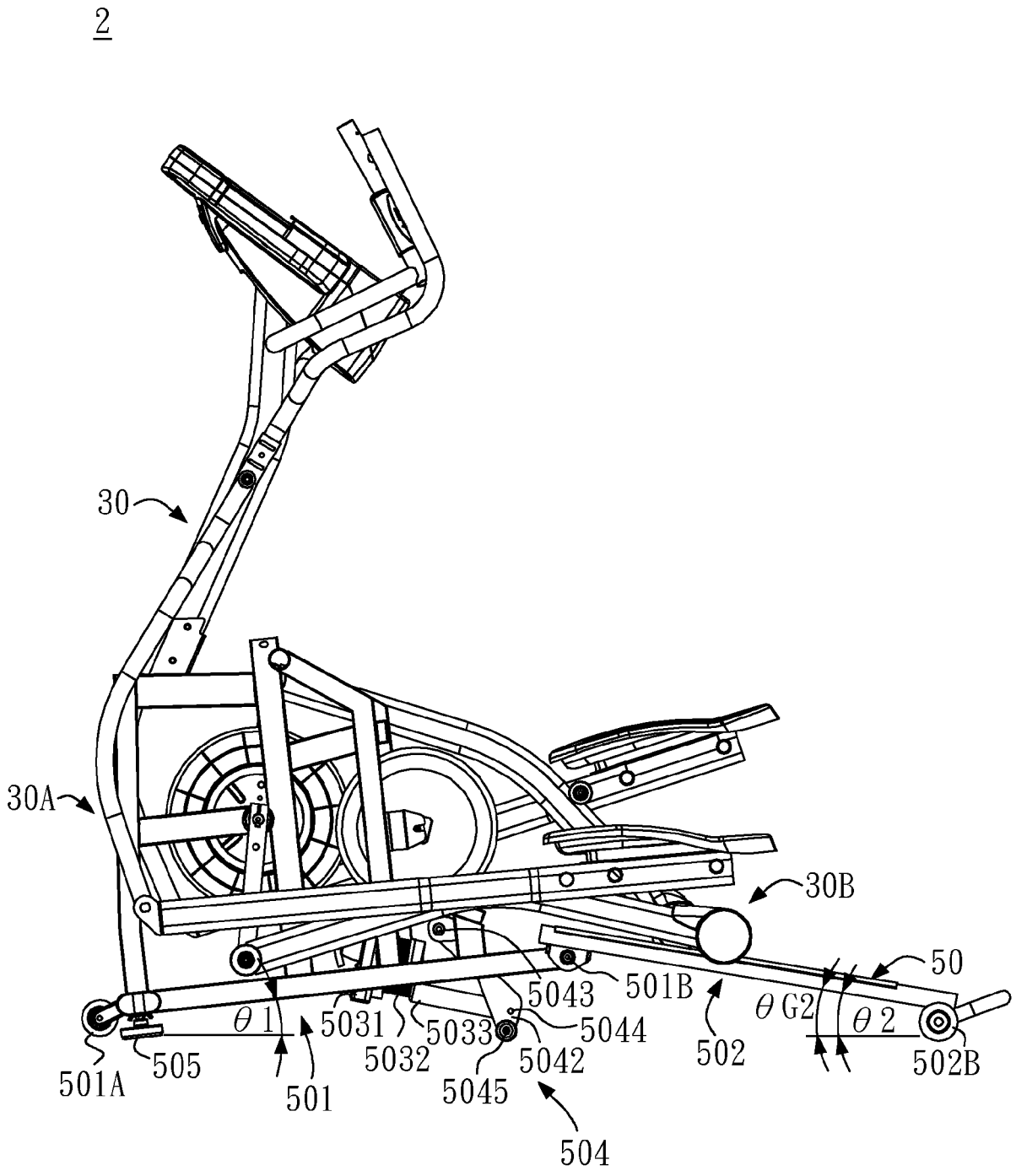
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FIG.6B

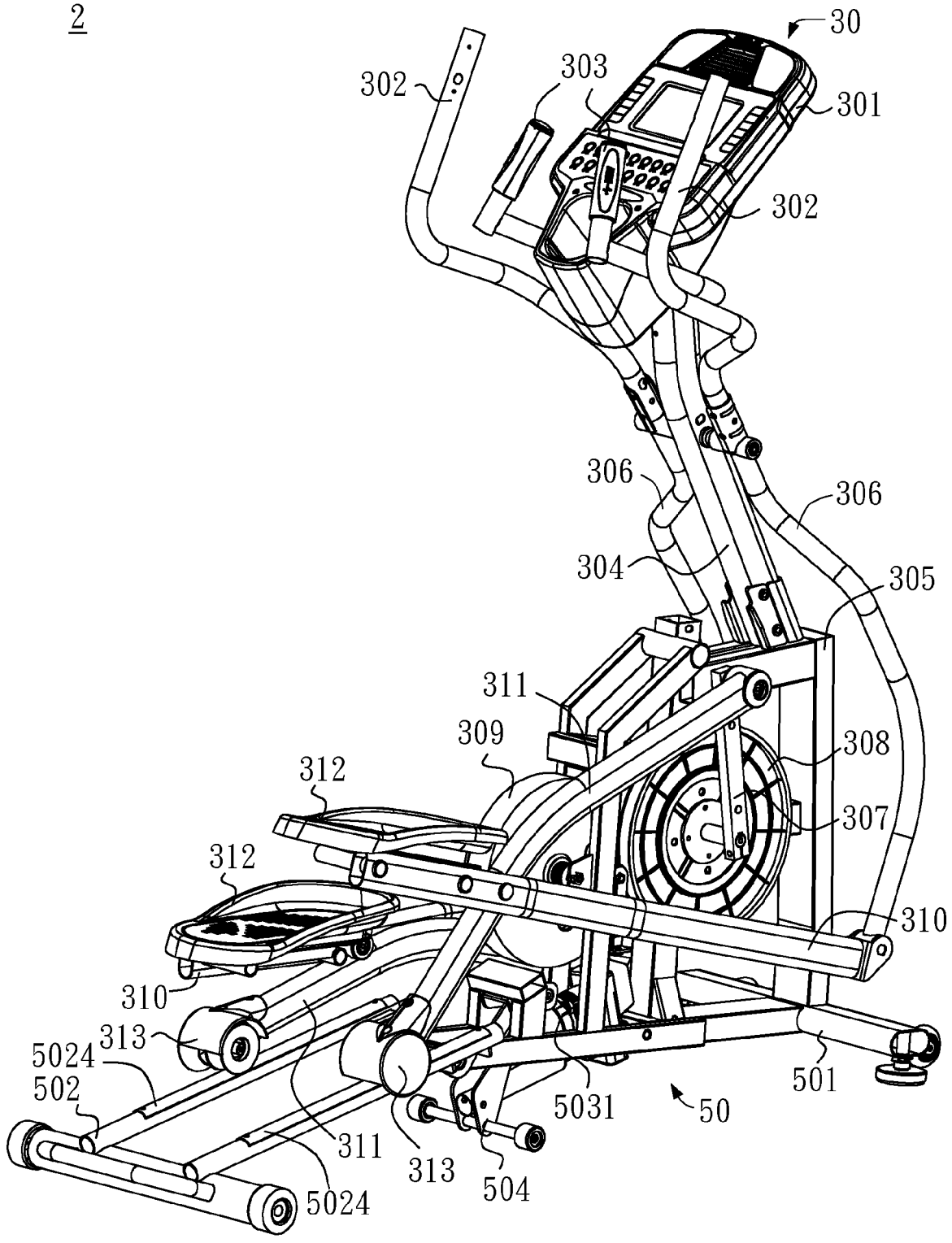
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FIG.7

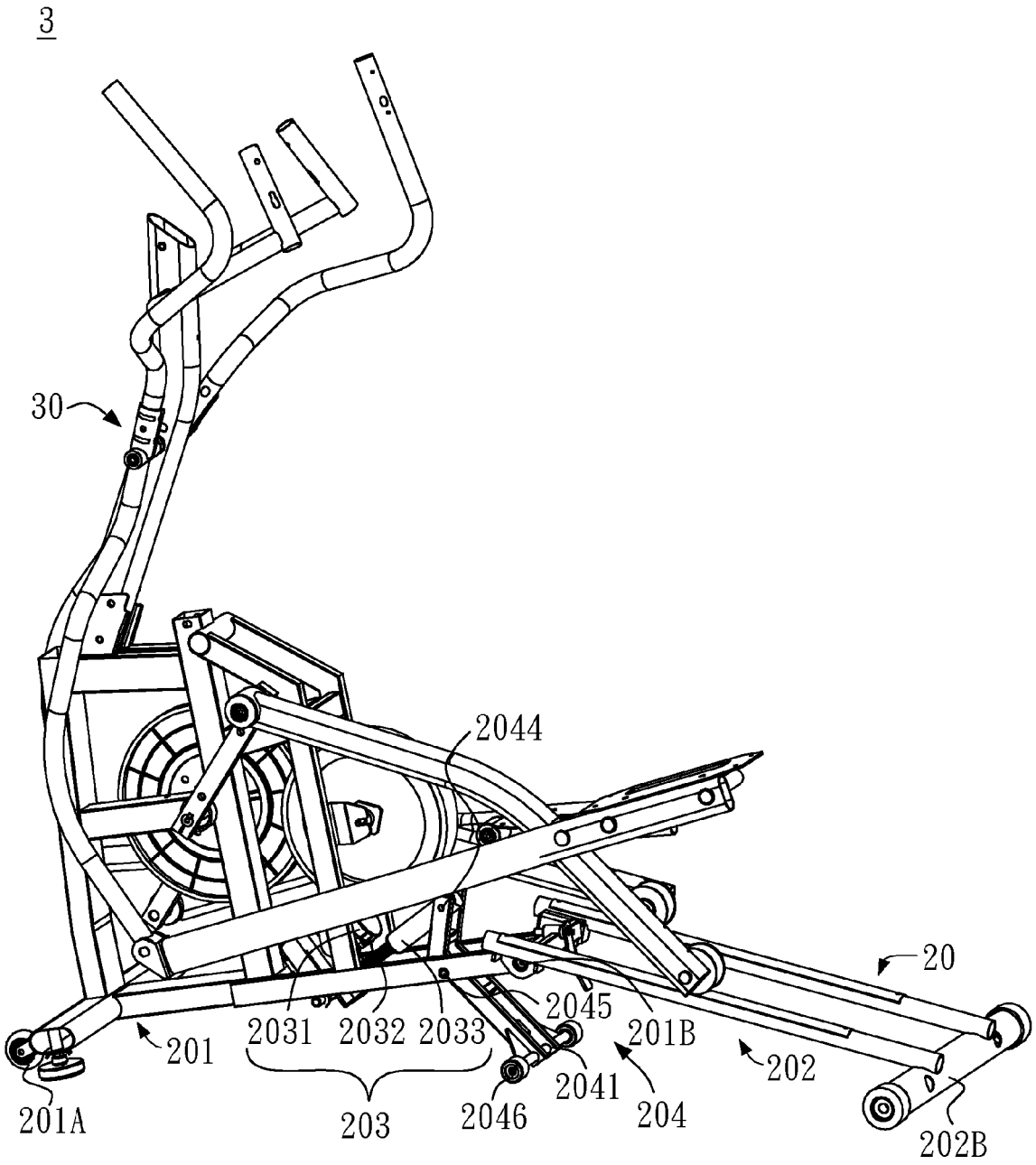
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FIG.8A

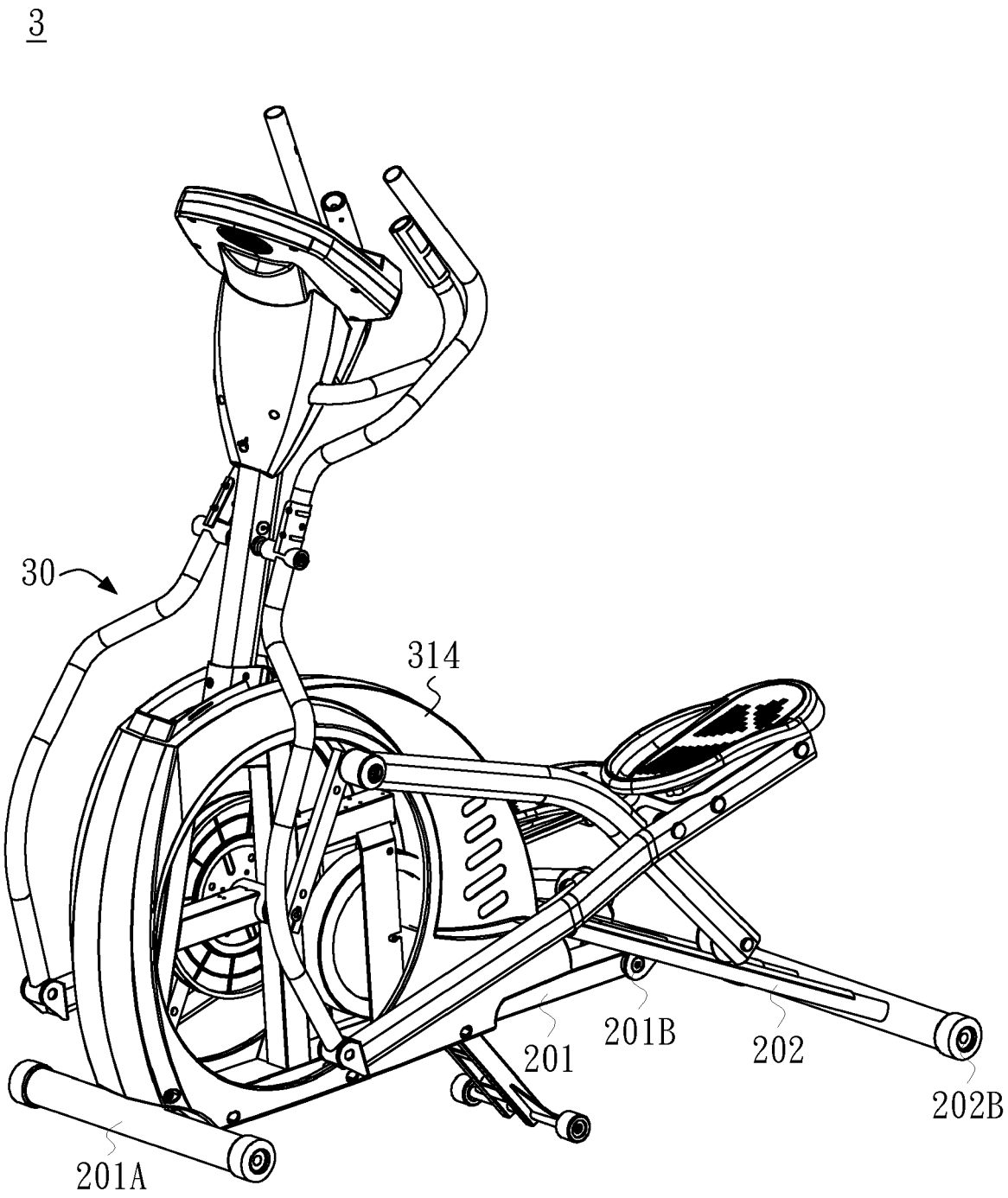

FIG.8B

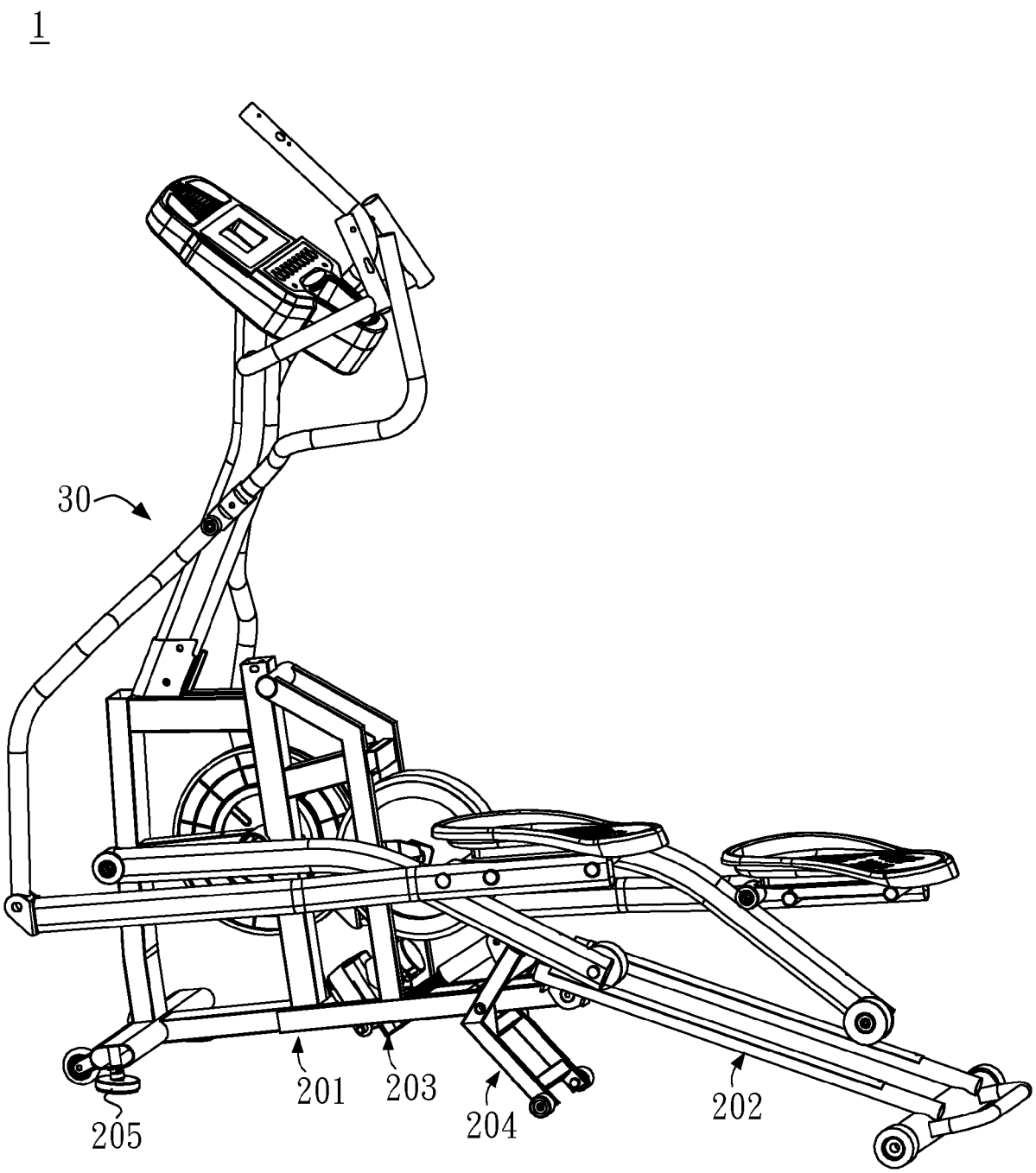

FIG.9A

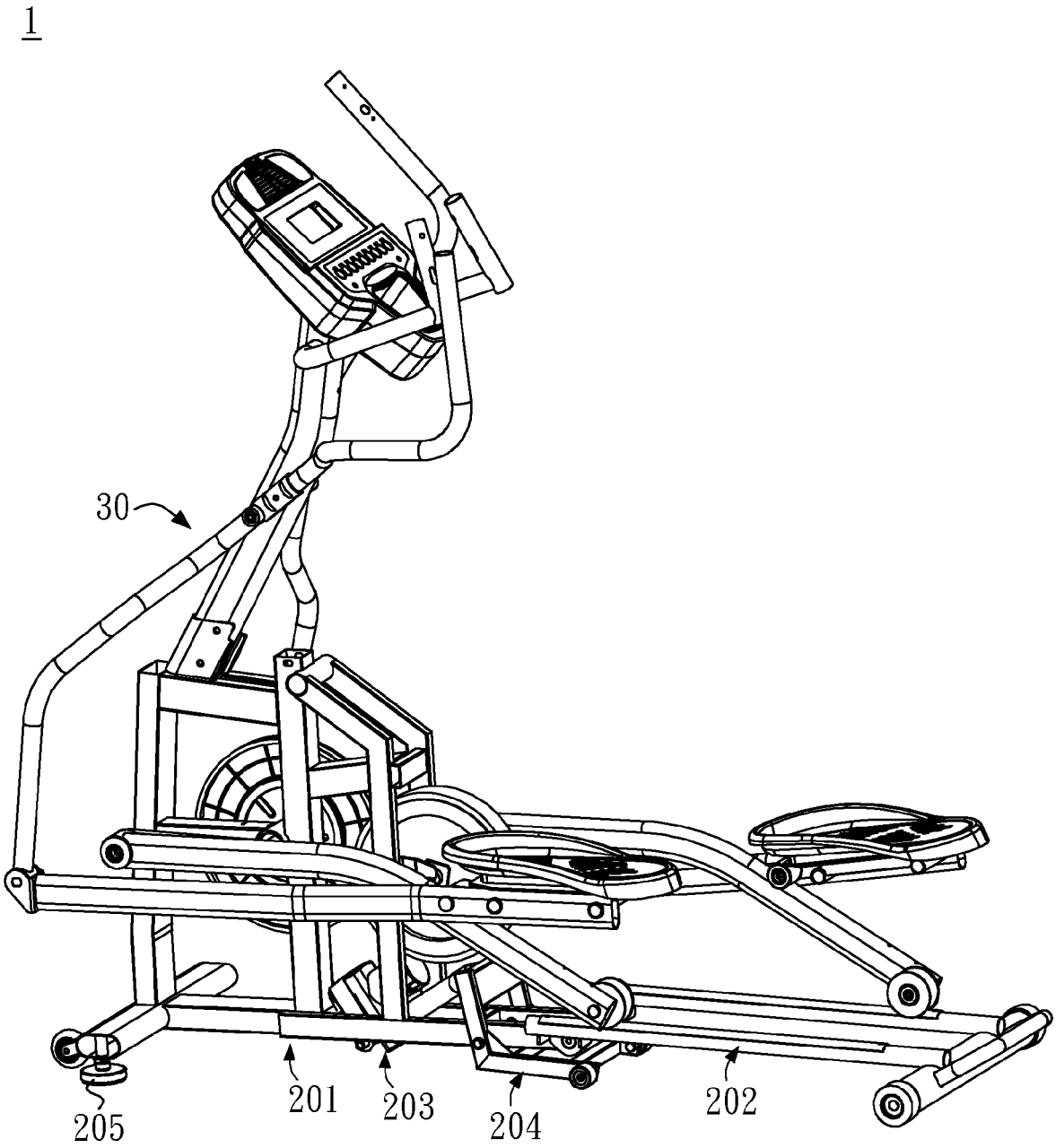

FIG.9B

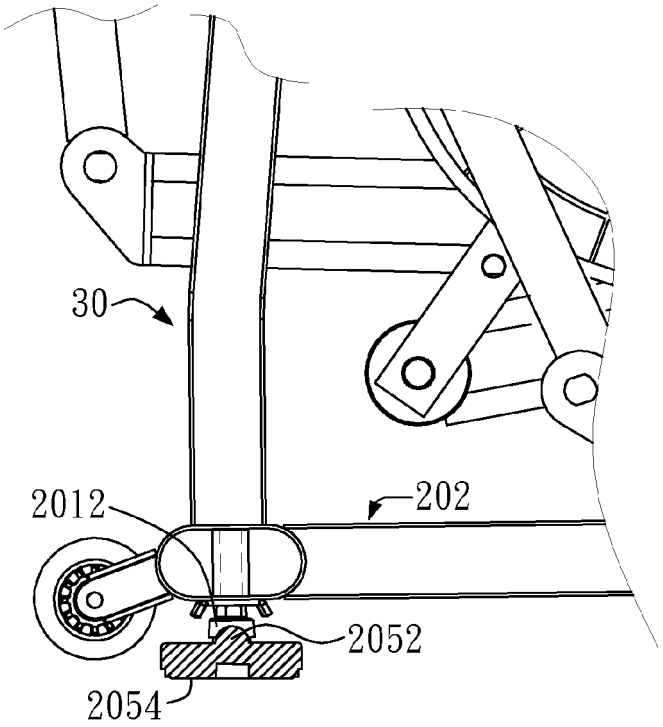

FIG.9C

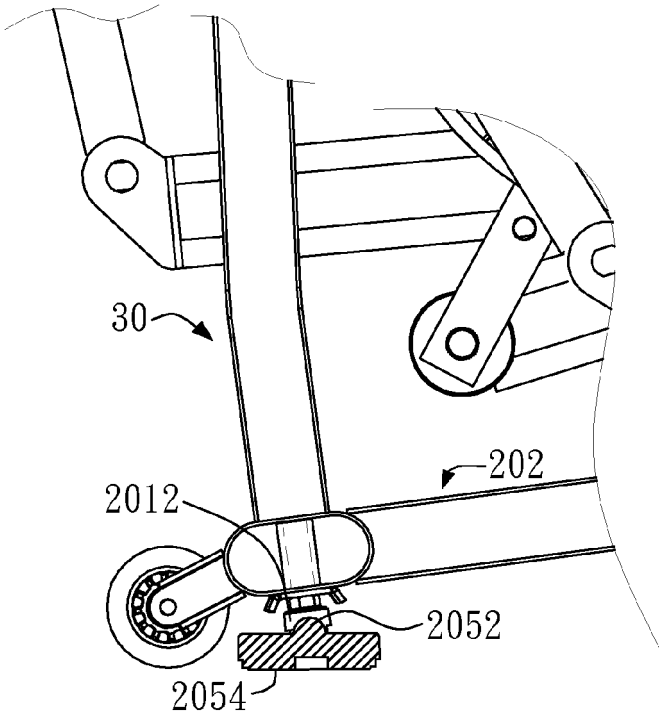

FIG.9D

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EUROPEAN SEARCH REPORT

Application Number
EP 14 16 4548

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2008/300114 A1 (DALEBOUT WILLIAM T [US] ET AL) 4 December 2008 (2008-12-04) * page 2 - page 3; figures * -----	1-15	INV. A63B22/00 A63B22/06
X	US 2012/077645 A1 (LEE SUNNY [TW] ET AL) 29 March 2012 (2012-03-29) * column 2 - column 4; figures * -----	1,12	
A	US 2008/287264 A1 (CHEN MING NAN [TW]) 20 November 2008 (2008-11-20) * abstract; figures * -----	1,12	
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A63B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 April 2015	Borrás González, E

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17-04-2015

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