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(54) **STEPPER EXERCISE MACHINE**

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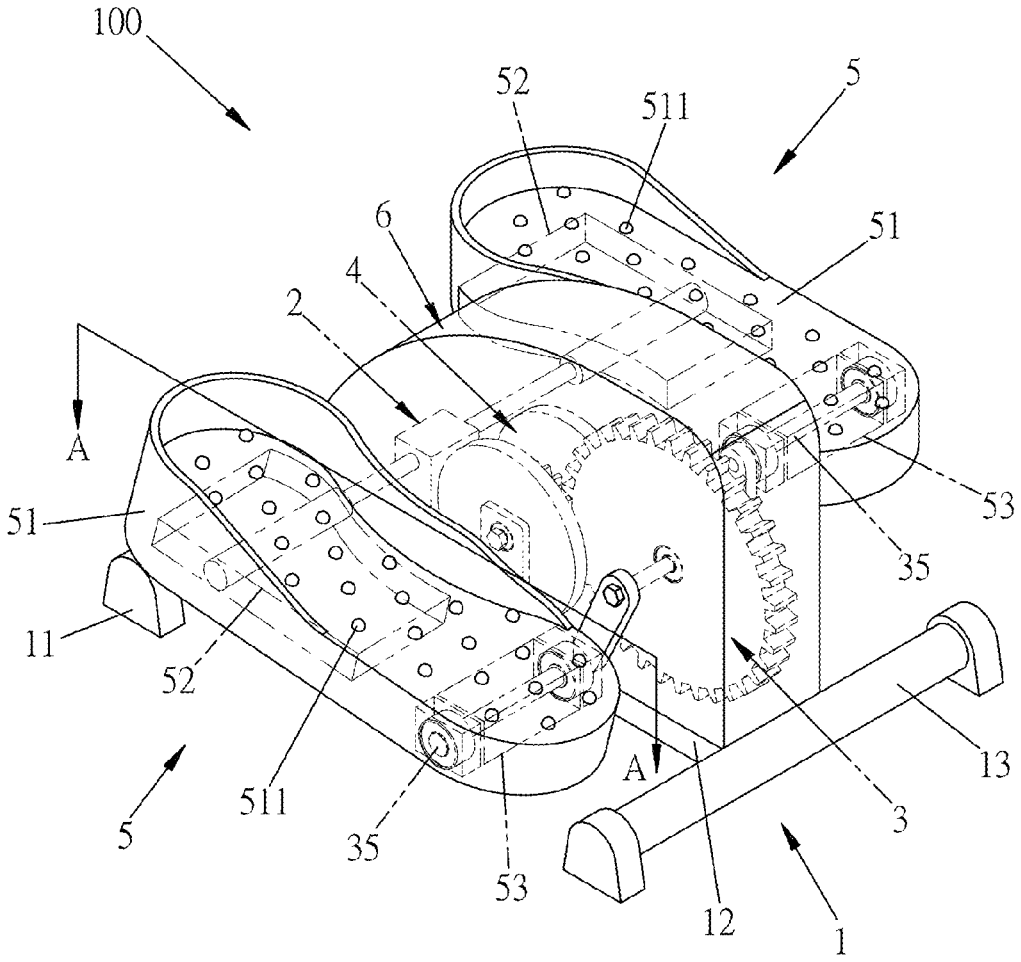
(57) **ABSTRACT**

A stepper exercise machine is provided. When a pedal is pedaled by a user, a drive gear is rotated forward or rearward. One end of a link is rotated about a drive rod, and a turning lever connected to the other end of the link is confined by a second accommodation trough of the pedal, so that the link brings the pedal to move in the up-down direction and the front-rear direction. In cooperation with a shaft which is fixed, a sleeve is rotatable relative to the shaft. When the pedal is driven, a first accommodation space provides a space for the pedal to move in the front-rear direction. By means of the action of two flywheels to provide an acceleration effect, the rotation of the drive gear is to speed up, so that the user can reduce the force exerted to the pedal.



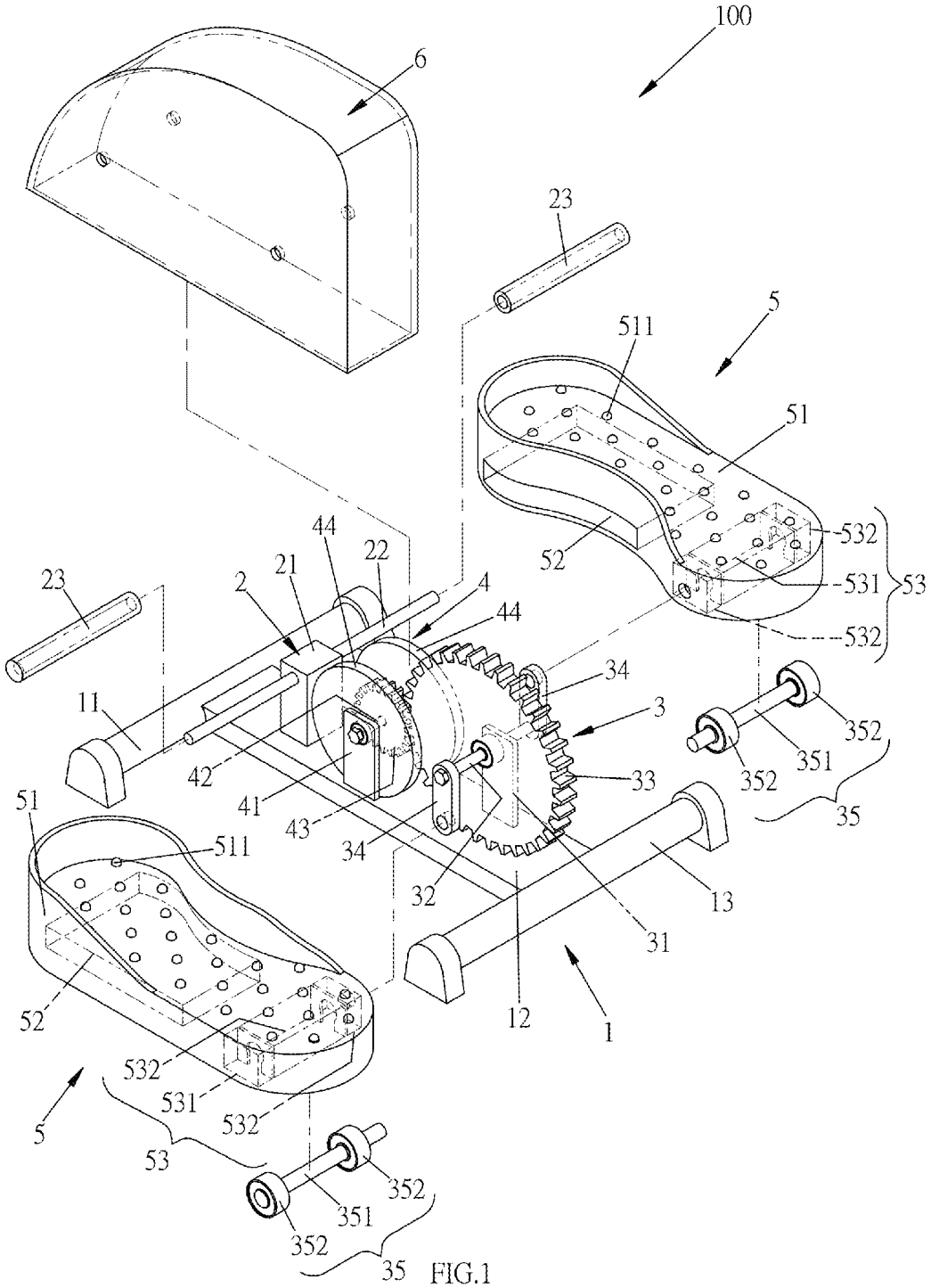

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FIG.1

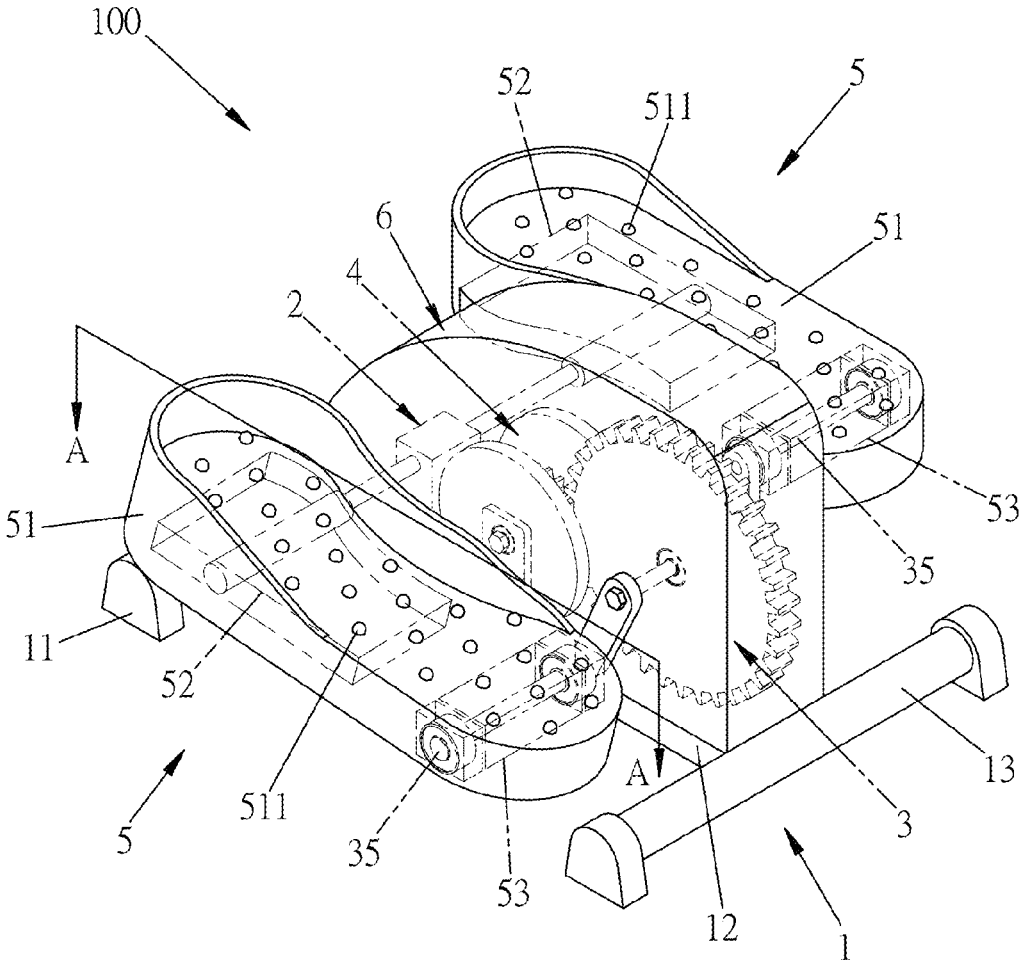

FIG.2

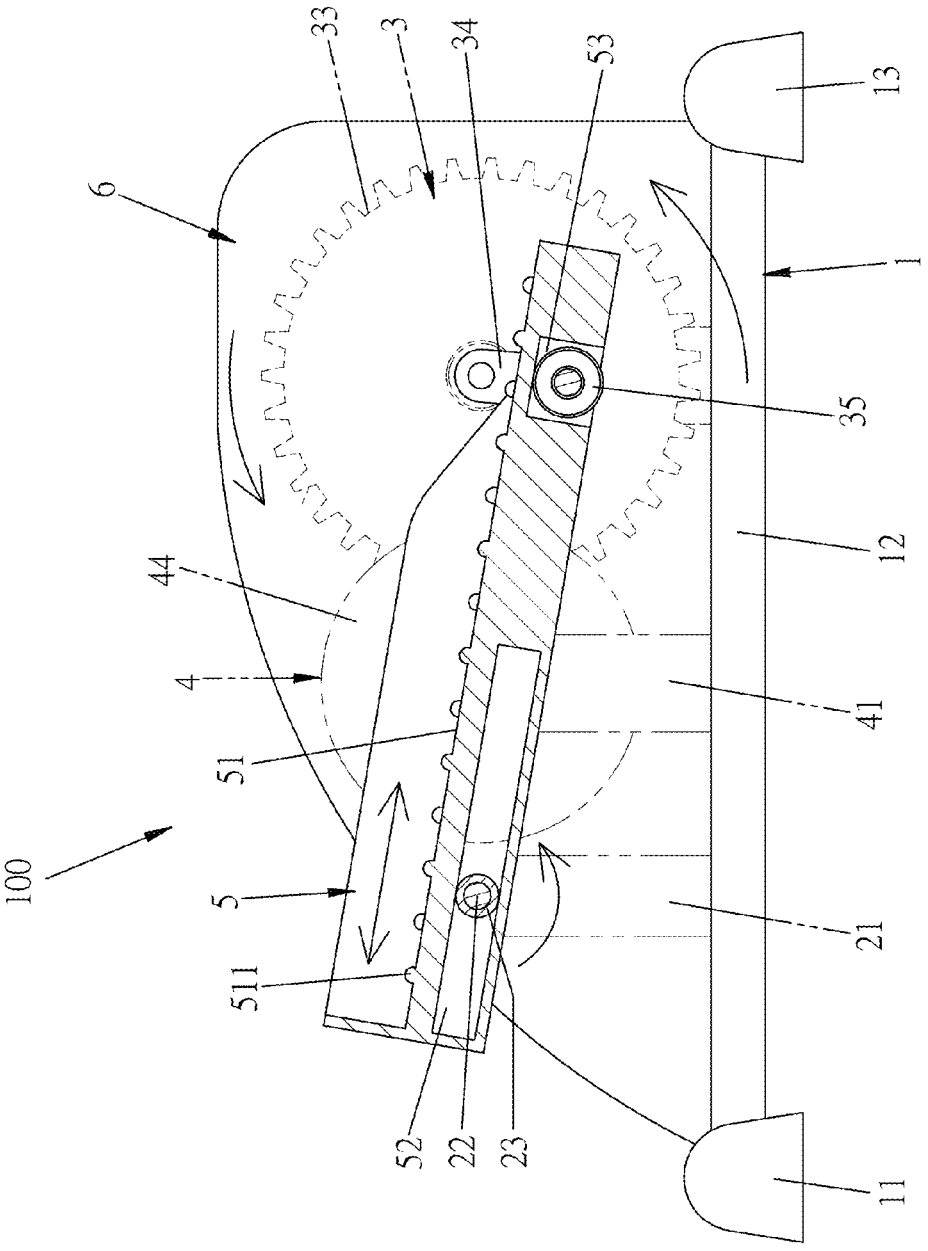

FIG.3

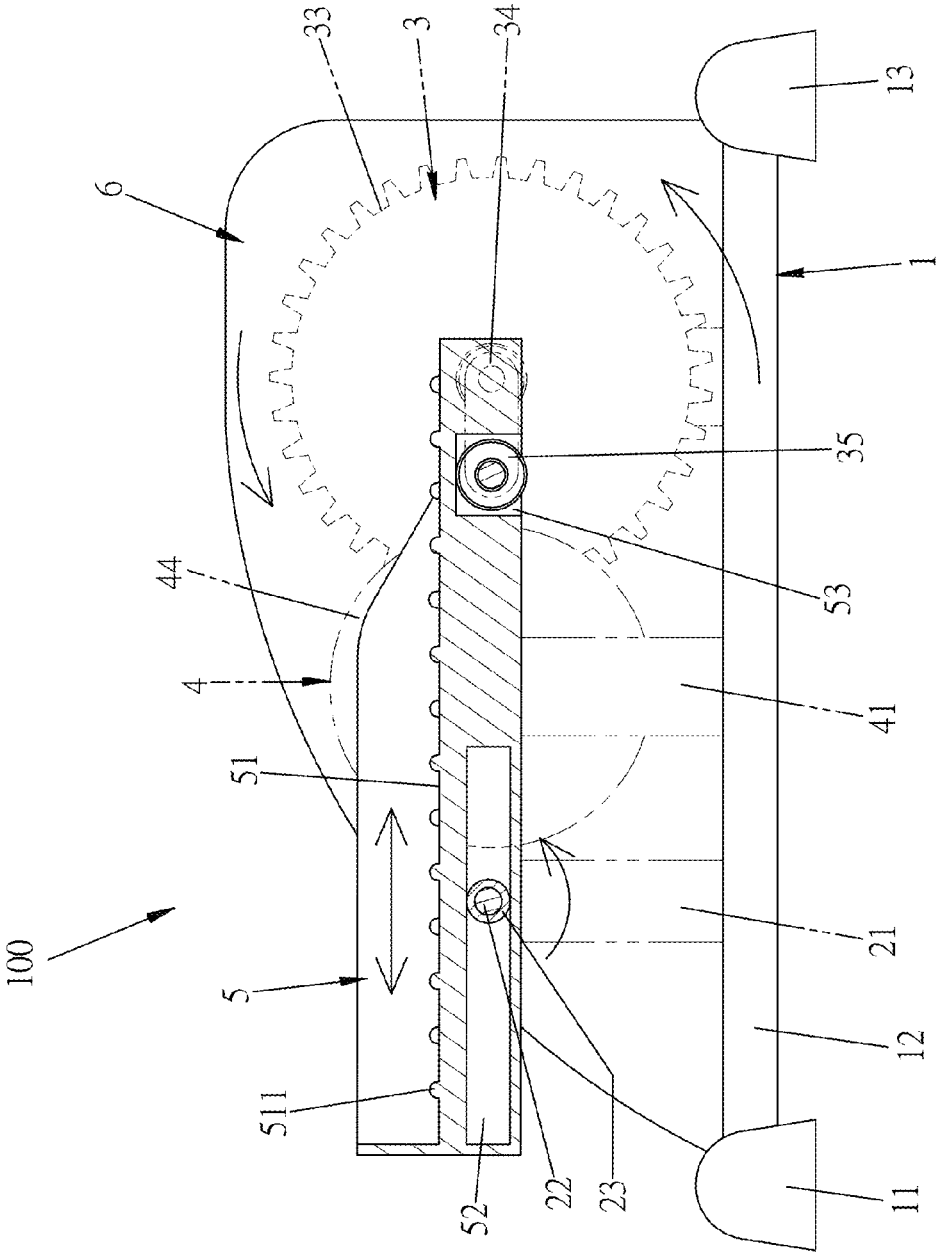

FIG.4

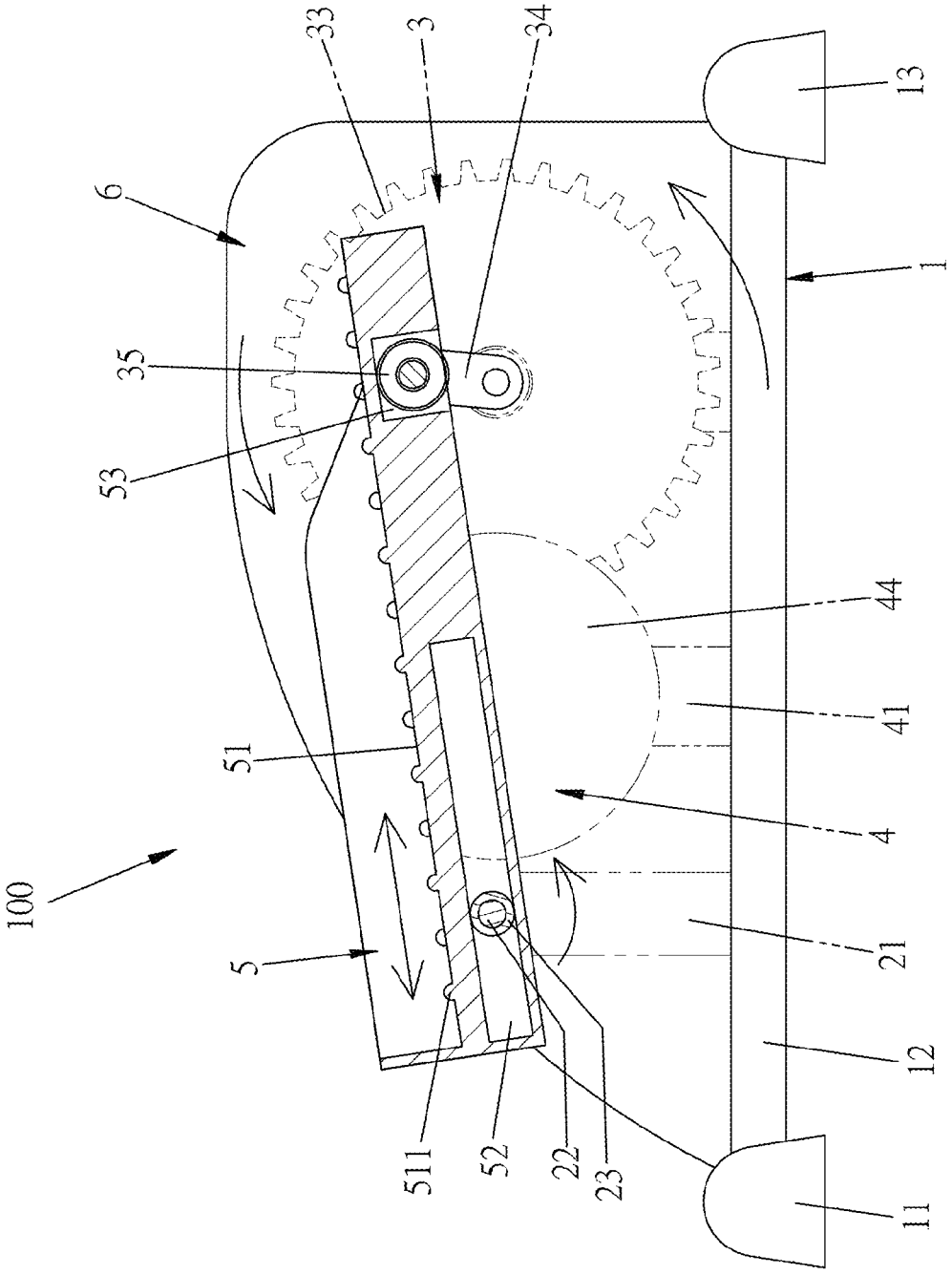

FIG.5

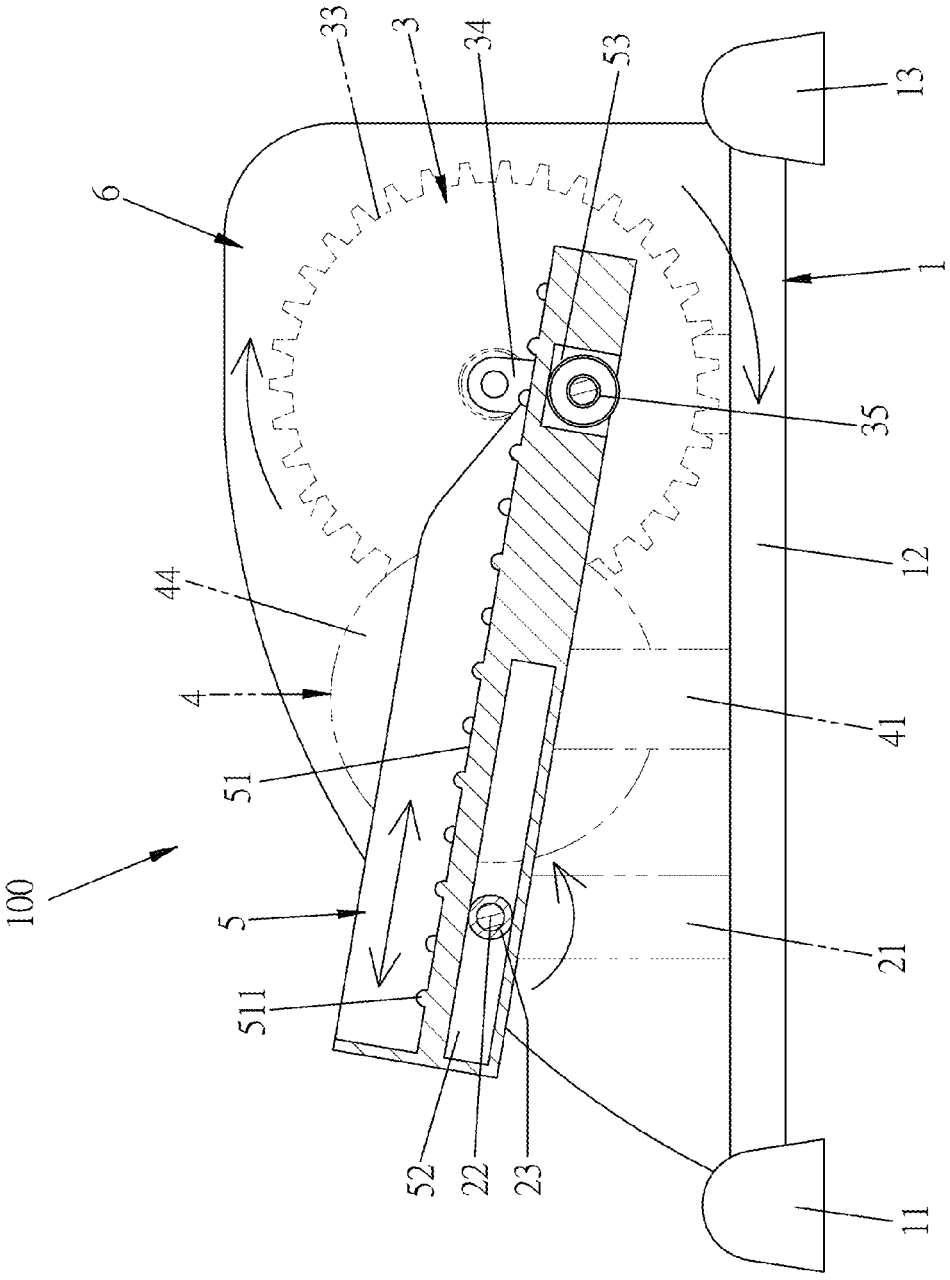

FIG.6

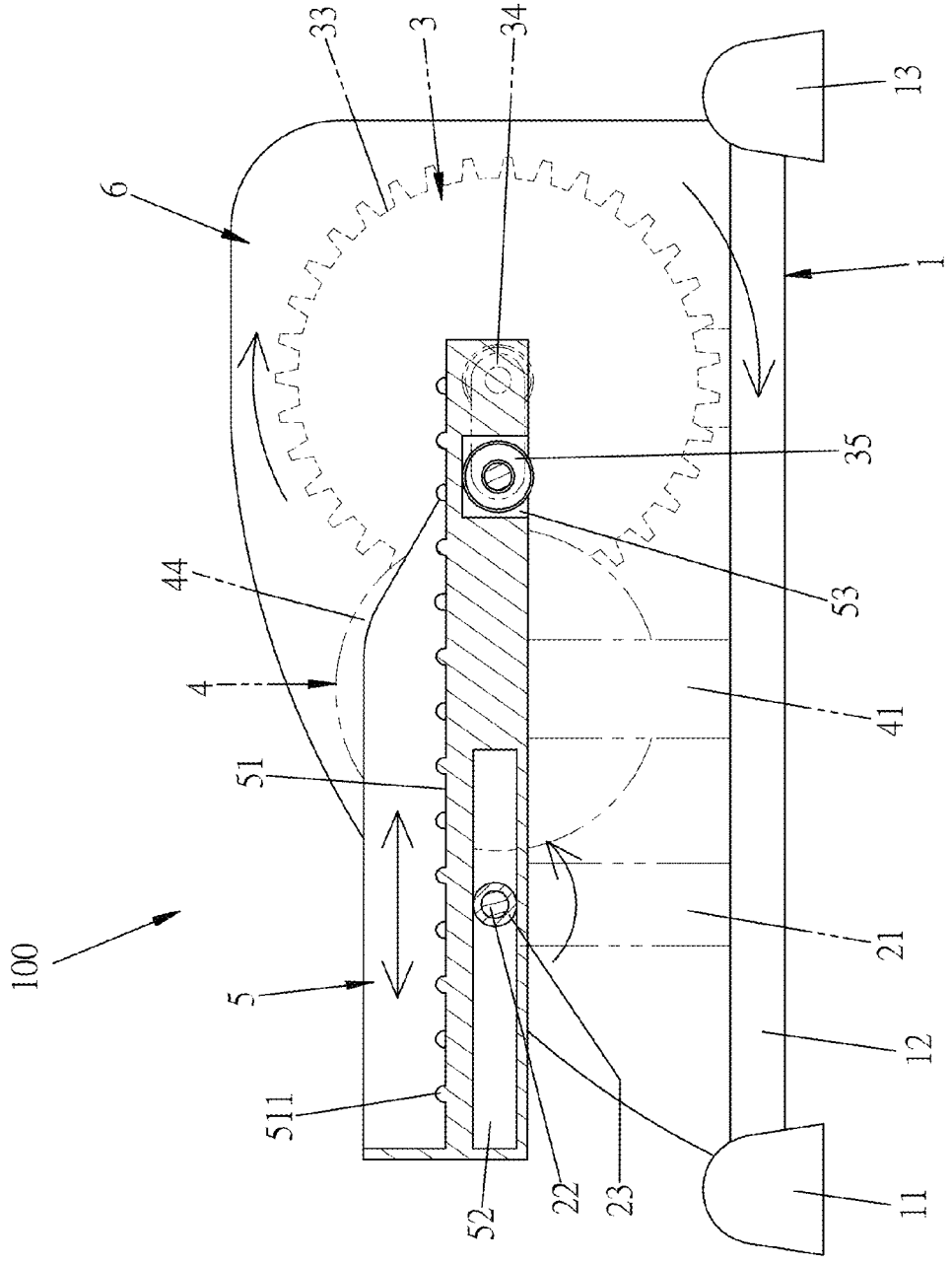

FIG.7

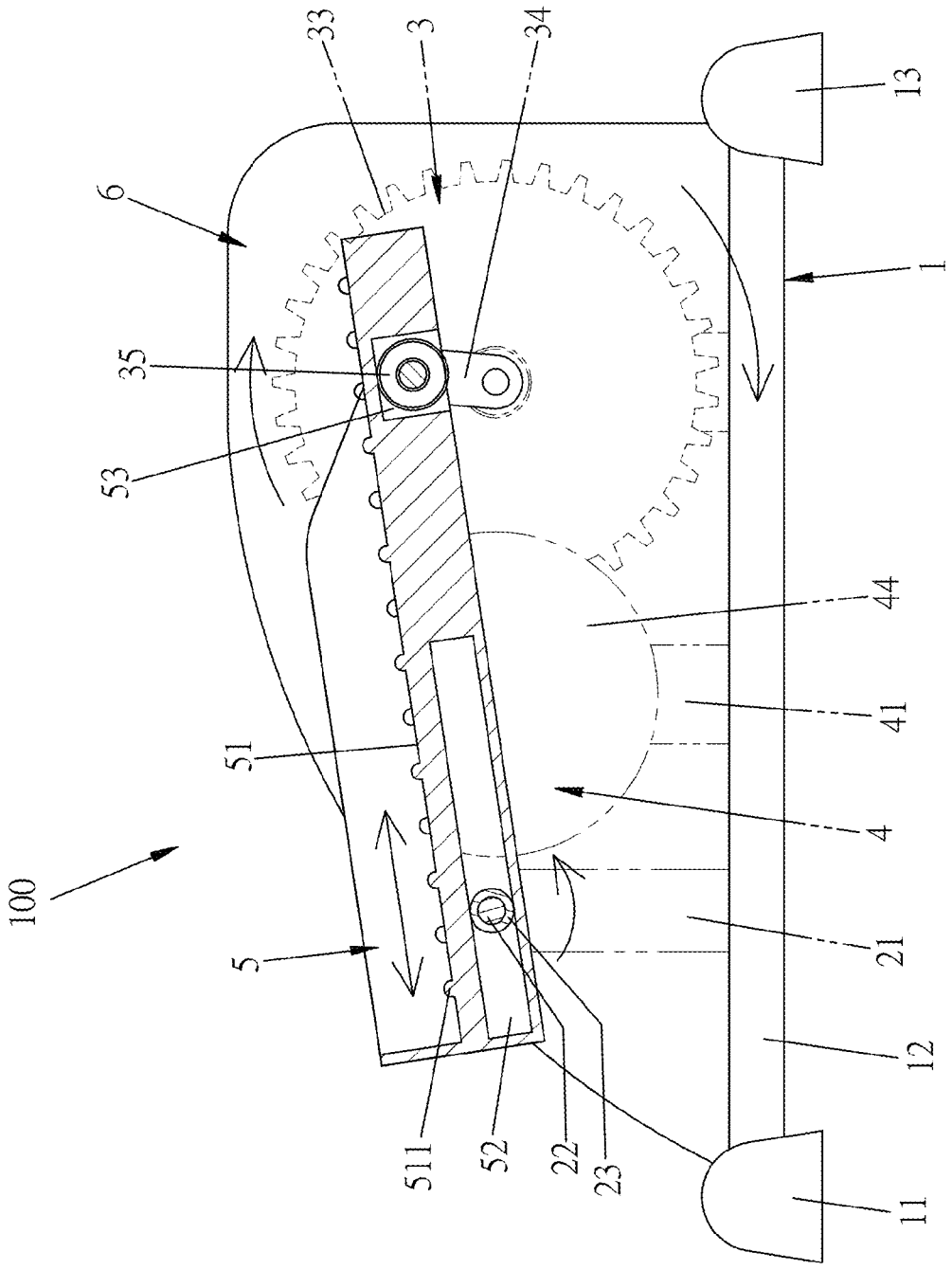

FIG.8

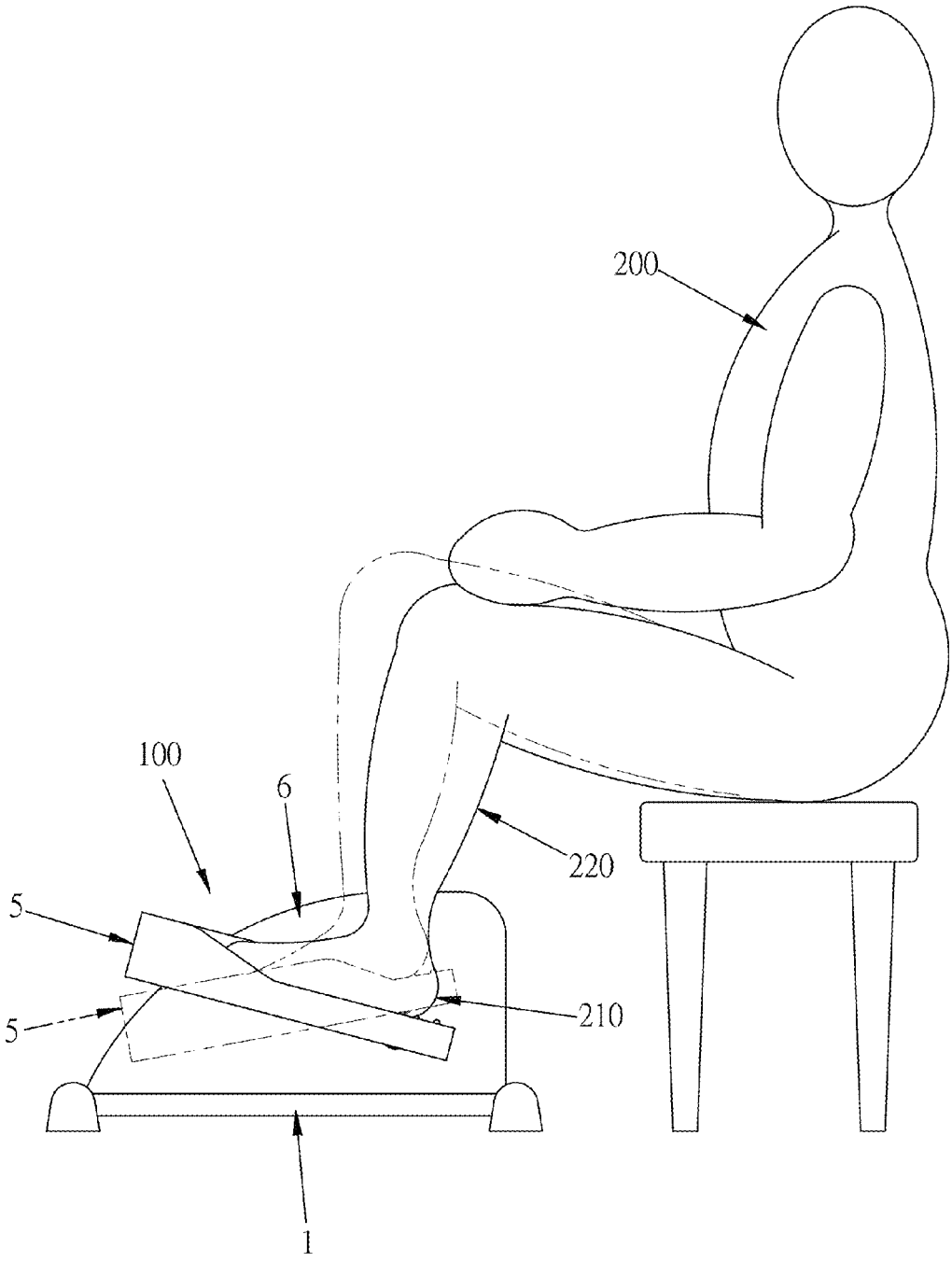

FIG.9

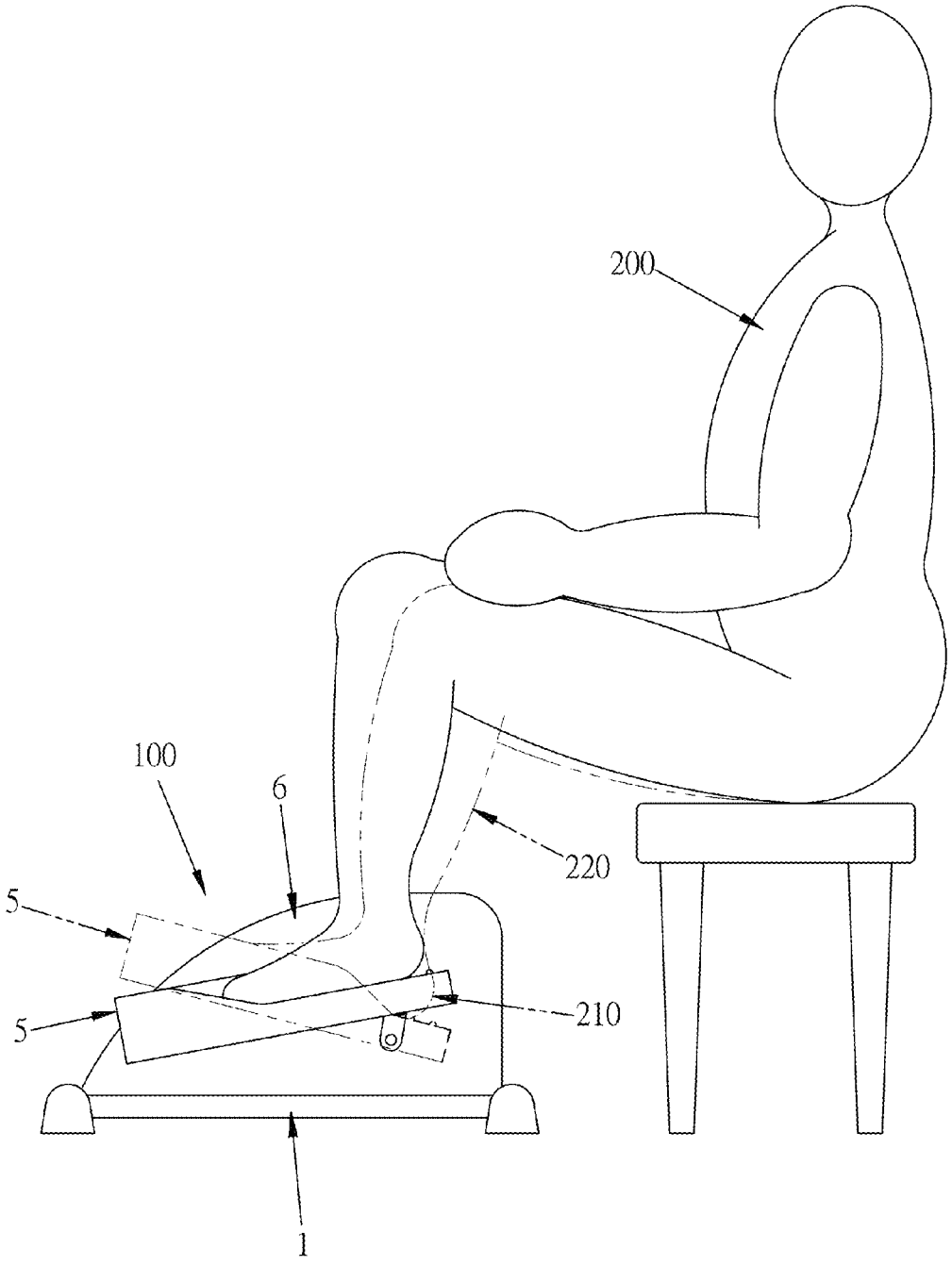

FIG.10

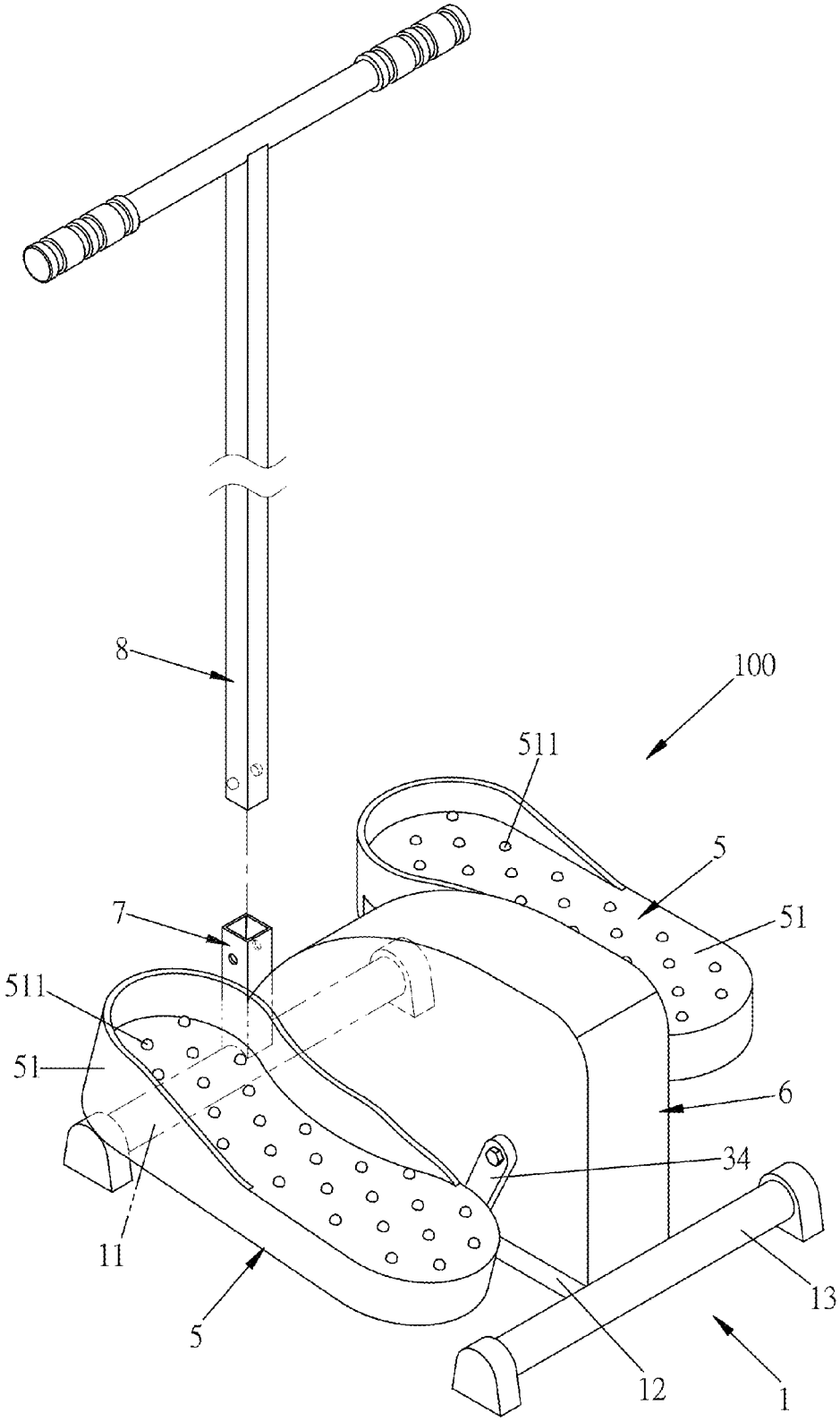

FIG.11

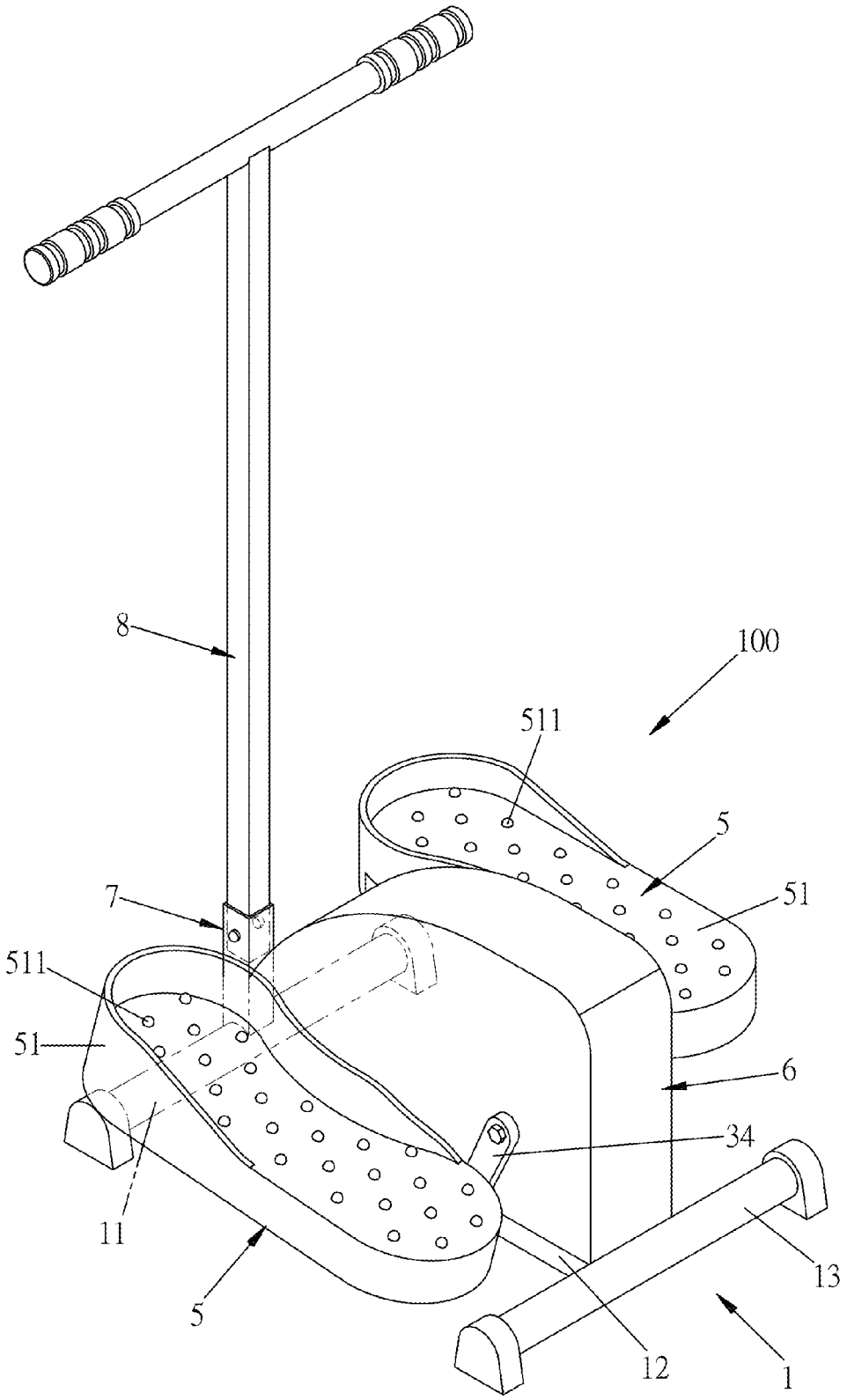

FIG.12

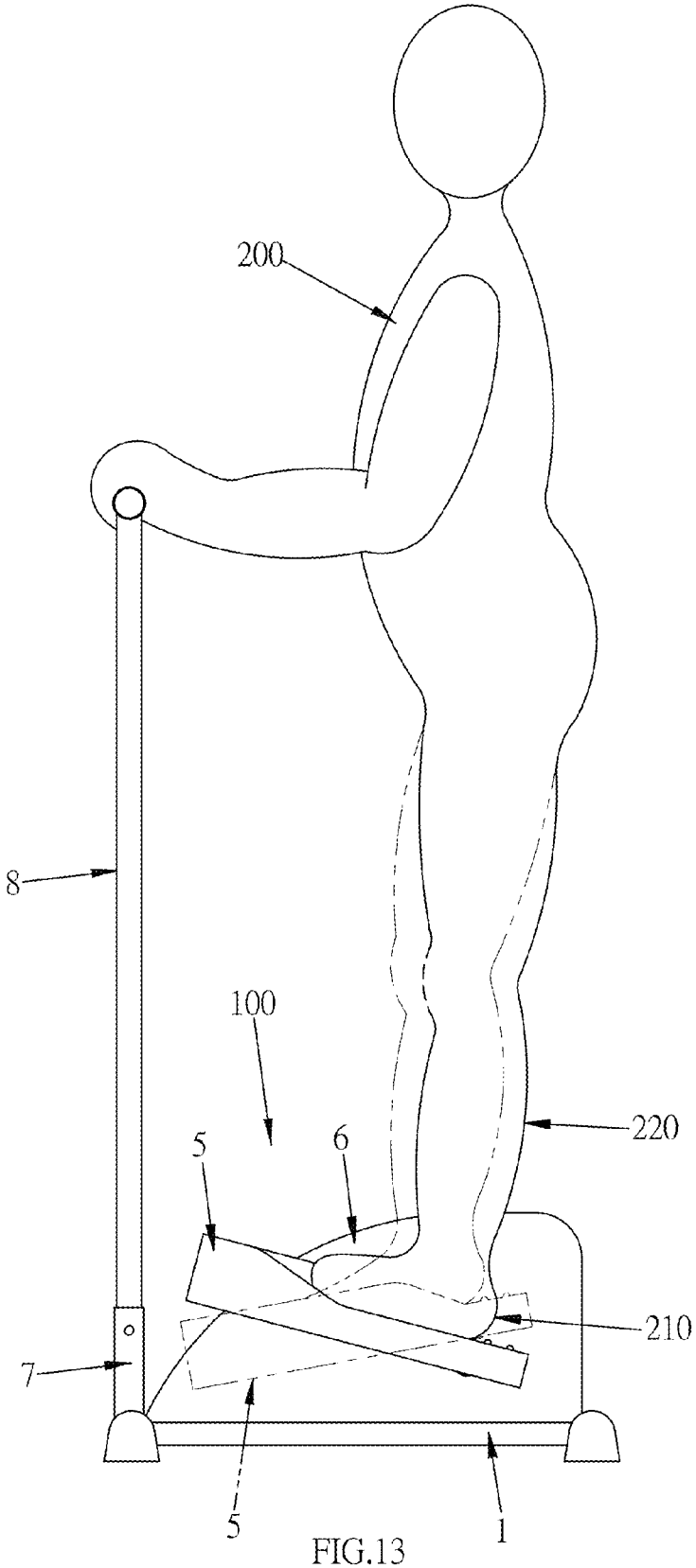

FIG.13

STEPPER EXERCISE MACHINE

FIELD OF THE INVENTION

[0001] The present invention relates to a stepper exercise machine, and more particularly to a stepper exercise machine capable of stretching the muscles of the let of the user when the front portion of the foot of the user is forced to tilt.

BACKGROUND OF THE INVENTION

[0002] There are many indoor leg training machines on the market, such as a treadmill, a stepper, an elliptical machine (commonly known as an elliptical machine, a space walking machines, etc.), and a stationary bicycle. It is easy to hurt the knee and ankle of the user because of vibration and pressure.

[0003] The elliptical machine provides the same function as the stationary bicycle, for example, the motion of ascending and bending knee. The angles of the foot and the leg of the user are substantially the same. The front of the foot cannot be tilted to stretch the muscles of the leg, not like the function of the stepper.

[0004] As to the aforementioned elliptical machine, the user must stand with both hands to hold the handles for keeping a balance. The structure is complex and bulky, and the price is high. It is usually used in a professional gym, not suitable for domestic use. As to the stationary bicycle, the user can sit on the stationary bicycle for doing exercise. But, it also has the shortcomings of a complex and bulky structure and a slightly high price. It cannot be widely used like a stepper which is small in size and low in price.

[0005] A stepper exercise machine as disclosed in U.S. Pat. No. 6,705,975 comprises a base, two platform elements, and two elastic elements.

[0006] The two platform elements are pivotally coupled to the base. The two elastic elements are located between the base and the corresponding platform elements. The two elastic elements provide the recoil force for the platform elements, instead of mechanical hydraulic pressure, so that the structure of the stepper exercise machine is simplified and the user can choose a different way for operation.

[0007] However, one end of the platform unit is pivotally connected to the base, and the other end of the platform unit is connected to the elastic element. When the user pedals the machine, one end of the platform unit, connected to the base, functions as a pivot, and the other end of the platform unit, connected to the elastic member, is pedaled up and down. The user is allowed to move in the up and down direction when the machine is operated. When the user doesn't apply force, the operation will be stopped immediately. This way is unable to reduce the force exerted by the user or bring the user's feet to reciprocate in an inertia manner. It is very inconvenient.

[0008] Particularly, the exercise effect of a conventional stepper exercise machine on the market is to reciprocate the legs, knees and ankles with a small angle. Although the foot can be tilted to provide a partial stretching effect, the machine is operated by means of the user's weight. This is obviously against the user's natural walking posture and cannot provide a natural and comfortable operation for the user. Therefore, it cannot be used for stretching.

SUMMARY OF THE INVENTION

[0009] The primary object of the present invention is to provide a stepper exercise machine. When the user pedals the machine, a pair of flywheels made of a metal material is simultaneously driven to provide an acceleration effect. The rotation of a drive gear is to speed up, so that the user can reduce the force exerted to two pedals and a drive wheel unit continues to turn in the same direction. The two pedals can be pedaled continuously and smoothly. The front portion of the foot is forced to tilt to stretch the muscles of the leg of the user, which is the main feature of the present invention.

[0010] The present invention is to provide a stepper exercise machine. Through a transmission mechanism that the two pedals drive the drive gear to link a transmission wheel and the two flywheels, the user can do exercise in a sitting manner or in a standing manner. The stepper exercise machine has the advantages of occupying less space, a low cost, and a low failure rate. This is a further feature of the present invention.

[0011] The present invention is to provide a stepper exercise machine. Through the arrangement of the two elongated pedals, the user may have a choice for a desired stepping position. When the heel is positioned rearward, the tilt angle of the foot is relatively large during exercise, that is, the relative effect of stretching is strong; when the heel is positioned forward, the tilt angle of the foot is relatively small during exercise, that is, the relative effect of stretching is weak. The user himself/herself can adjust the angle of stretching to achieve a more extensive applicability.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. **1** is an exploded view of a stepper exercise machine of the present invention;

[0013] FIG. **2** is a perspective view of the stepper exercise machine of the present invention;

[0014] FIGS. **3-8** are schematic views showing the operation of the stepper exercise machine taken along line A-A of FIG. **2**;

[0015] FIGS. **9-10** are schematic views of the stepper exercise machine of the present invention, showing that the user sits to pedal the machine;

[0016] FIG. **11** is an exploded view of the stepper exercise machine according to another embodiment of the present invention;

[0017] FIG. **12** is a perspective view of the stepper exercise machine of FIG. **11**; and

[0018] FIG. **13** is a schematic view of the stepper exercise machine of FIG. **11**, showing that the user stands to pedal the machine.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0019] Advantages and features of the inventive concept and methods of accomplishing the same may be understood more readily by reference to the following detailed description of embodiments and the accompanying drawings. The inventive concept may, however, be embodied in many different forms and should not be construed as being limited to the embodiments set forth herein.

[0020] Referring to FIG. **1** and FIG. **2**, a stepper exercise machine **100** of the present invention comprises a base **1**, a support assembly **2**, a drive wheel unit **3**, a flywheel unit **4**, two pedals **5**, and a cover **6**.

[0021] The base **1** is generally in an I-like shape. The base **1** includes a front transverse rod **11**, a connecting rod **12**, and a rear transverse rod **13**. Two ends of the connecting rod **12** are connected to the front transverse rod **11** and the rear transverse rod **13**, respectively. The connecting rod **12** and the front transverse rod **11** are perpendicular to each other. The connecting rod **12** and the rear transverse rod **13** are perpendicular to each other.

[0022] The support assembly **2** includes a first support member **21**, a shaft **22**, and two sleeves **23**. The first support member **21** is located close to a front end of the base **1** and extends upward. The shaft **22** is inserted through one end of the first support member **21**, far away from the base **1**. The shaft **22** and the first support member **21** are perpendicular to each other. The two sleeves **23** are rotatably fitted on two ends of the shaft **22** and located at left and right sides of the first support member **21**, respectively.

[0023] The drive wheel unit **3** includes a second support member **31**, a drive rod **32**, a drive gear **33**, two links **34**, and two turning levers **35**. The second support member **31** is located close to a rear end of the base **1** and extends upward. The second support member **31** is spaced from the first support member **21**. The drive rod **32** is inserted through one end of the second support member **31**, far away from the base **1**, and is further inserted through the center of the drive gear **33**. The drive rod **32** is interlinked with the drive gear **33**. The drive rod **32** is perpendicular to the second support member **31** and parallel to the shaft **22**. The two links **34** are pivotally connected to two ends of the drive rod **32** and located at left and right sides of the drive gear **33**. The links **32** each extend outward from the corresponding end of the drive rod **32** in an opposite direction. Each of the two turning levers **35** is rotatably connected to one end of the corresponding link **34**, far away from the drive rod **32**. The turning levers **35** are parallel to the drive rod **32**, respectively.

[0024] The flywheel unit **4** includes a third support member **41**, a spindle **42**, a transmission gear **43**, and two flywheels **44** made of a metal material. The third support member **41** extends upward from the base **1** and is located between the first support member **21** and the second support member **31**. The spindle **42** is pivotally inserted through one end of the third support member **41**, far away from the base **1**. The spindle **42** is further inserted through the two flywheels **44** and the transmission gear **43**. The spindle **42** is interlinked with the two flywheels **44** and the transmission gear **43**. The transmission gear **43** is located between the two flywheels **44**. The transmission gear **43** meshes with the drive gear **33**. The shaft **22**, the drive rod **32**, and the spindle **42** are disposed at the same height.

[0025] The two pedals **5** are located at left and right sides of the base **1**. Each pedal **5** includes a main body **51**, a first accommodation trough **52**, and a second accommodation trough **53**. The first accommodation trough **52** is disposed close to a front end of a bottom of the main body **51** for accommodating a corresponding one of the sleeves **23** to move therein. The second accommodation trough **53** is disposed close to a rear end of the bottom of the main body **51** for accommodating and limiting a corresponding one of the turning levers **35** to move therein.

[0026] Furthermore, a plurality of massage protrusions **511** are formed on the top surface of the main body **51** for simultaneously massaging the feet of a user **200** when the user **200** pedals the stepper exercise machine, as shown in FIG. **9** and FIG. **10**.

[0027] Each tuning lever **35** includes a lever **351** and two turning wheels **352**. The two turning wheels **352** are rotatably connected to two ends of the lever **351**, respectively. The second accommodation trough **53** of each pedal **5** has a connection space **531** and two turning wheel spaces **532**. Two ends of the connection space **531** are in communication with the two turning wheel spaces **532**, respectively. The connection space **531** is configured to receive the lever **351**. The two turning wheel spaces **532** are configured to receive and limit the two turning wheels **352**.

[0028] The cover **6** is configured to cover the support assembly **2**, the drive wheel unit **3**, and the flywheel unit **4**. The two sleeves **23**, the two links **34**, and the two turning levers **35** are exposed out of the cover **6**.

[0029] Referring to FIGS. **3** to **5** as well as FIGS. **9** to **10**, when the user **200** sits with his/her heel **210** to exert force to the rear end of the pedal **5**, the drive gear **33** is rotated forward. One end of the link **34** is rotated about the drive rod **32**. The turning lever **35** connected to the other end of the link **34** is limited by the second accommodation trough **53** of the pedal **5**, so that the rotation of the link **34** brings the pedal **5** to move in the up-down direction and the front-rear direction. The shaft **22** is fixed, and only the sleeve **23** is rotatable relative to the shaft **22**. When the pedal **5** is driven by the link **34** to move in the front-rear direction, the first accommodation space **52** provides a space for the pedal **5** to move in the front-rear direction.

[0030] When the link **34** drives the drive rod **32** and the drive gear **33** to rotate, the drive gear **33** drives the transmission gear **43** and the two flywheels **44** to rotate because the drive gear **33** meshes with the transmission gear **43**. After that, by means of the inertia rotation of the two flywheels **44**, the transmission gear **43** is driven to rotate the drive gear **33** so that the user **200** can reduce the force exerted to the pedal **5**.

[0031] In addition, the heights of the shaft **22**, the drive rod **32**, and the spindle **42** are substantially the same. When the heel **210** of the user **200** is turned to the lowest point of the link **34** along with the rear end of the pedal **5**, the front portion of the foot is forced to tilt to stretch the muscles of the leg **220** of the user **200**.

[0032] Referring to FIGS. **6** to **8** as well as FIGS. **9** to **10**, when the user **200** sits with his/her heel **210** to exert force to the rear end of the pedal **5**, the drive gear **33** is rotated forward. One end of the link **34** is rotated about the drive rod **32**. The turning lever **35** connected to the other end of the link **34** is limited by the second accommodation trough **53** of the pedal **5**, so that the rotation of the link **34** brings the pedal **5** to move in the up-down direction and the front-rear direction. The shaft **22** is fixed, and only the sleeve **23** is rotatable relative to the shaft **22**. When the pedal **5** is driven by the link **34** to move in the front-rear direction, the first accommodation space **52** provides a space for the pedal **5** to move in the front-rear direction.

[0033] When the link **34** drives the drive rod **32** and the drive gear **33** to rotate, the drive gear **33** drives the transmission gear **43** and the two flywheels **44** to rotate because the drive gear **33** meshes with the transmission gear **43**. By means of the action of the inertia rotation of the two metal and extra-heavy flywheels **44** to provide an acceleration effect, the rotation of the drive gear **33** is to speed up, so that

the user **200** can reduce the force exerted to the pedal and the drive wheel unit **3** continues to turn in the same direction. The two pedals **5** can be pedaled continuously and smoothly.

[0034] In addition, the heights of the shaft **22**, the drive rod **32**, and the spindle **42** are substantially the same. When the heel **210** of the user **200** is turned to the lowest point of the link **34** along with the rear end of the pedal **5**, the front portion of the foot is forced to tilt to stretch the muscles of the leg **220** of the user **200**.

[0035] FIGS. **11** to **13** illustrate another embodiment of the stepper exercise machine **100** of the present invention. The stepper exercise machine **100** may further comprise a receiving pipe **7** extending up from the front end of the base **1** (i.e., the junction of the front transverse rod **11** and the connecting rod **12**) for insertion of a T-shaped handle **8**. The T-shaped handle **8** can be adjusted up and down. This embodiment allows the user **200** to exercise in a standing manner so as to achieve the same effects as the above-described, reducing the force exerted by the user **200** and stretching the muscles of the leg **220**.

[0036] In addition, the length of the link **34** can be adjusted. By adjusting the length of the link **34**, the angle to stretch the muscles of the leg **220** of the user **200** can be adjusted for different users.

[0037] Although particular embodiments of the present invention have been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the present invention. Accordingly, the present invention is not to be limited except as by the appended claims.

What is claimed is:

1. A stepper exercise machine, comprising:

a base;

a support assembly, including a first support member, a shaft, and two sleeves, the first support member being located close to a front end of the base and extending upward, the shaft being inserted through one end of the first support member, far away from the base, the shaft and the first support member being perpendicular to each other, the two sleeves being rotatably fitted on two ends of the shaft and located at left and right sides of the first support member respectively;

a drive wheel unit, including a second support member, a drive rod, a drive gear, two links, and two turning levers, the second support member being located close to a rear end of the base and extending upward, the second support member being spaced from the first support member, the drive rod being inserted through one end of the second support member, far away from the base, and further inserted through a center of the drive gear, the drive rod being interlinked with the drive gear, the drive rod being perpendicular to the second support member and parallel to the shaft, the two links being pivotally connected to two ends of the drive rod and located at left and right sides of the drive gear, the two links each extending outward from a corresponding one of the two ends of the drive rod in an opposite direction, each of the two turning levers being rotatably connected to one end of a corresponding one of the two links, far away from the drive rod, the turning levers being parallel to the drive rod respectively;

a flywheel unit, including a third support member, a spindle, a transmission gear, and two flywheels made of a metal material, the third support member extending upward from the base and being located between the first support member and the second support member, the spindle being pivotally inserted through one end of the third support member, far away from the base, the spindle being further inserted through the two flywheels and the transmission gear, the spindle being interlinked with the two flywheels and the transmission gear, the transmission gear being located between the two flywheels, the transmission gear meshing with the drive gear, the shaft, the drive rod, and the spindle being disposed at a same height; wherein when the links drive the drive rod and the drive gear to rotate, the drive gear drives the transmission gear and the two flywheels to rotate;

two pedals, located at left and right sides of the base, the pedals each including a main body, a first accommodation trough, and a second accommodation trough, the first accommodation trough being disposed close to a front end of a bottom of the main body for accommodating a corresponding one of the sleeves to move therein, the second accommodation trough being disposed close to a rear end of the bottom of the main body for accommodating and limiting a corresponding one of the turning levers to move therein; and

a cover, covering the support assembly, the drive wheel unit, and the flywheel unit, the two sleeves, the two links, and the two turning levers being exposed out of the cover.

2. The stepper exercise machine as claimed in claim **1**, wherein the base has an I shape, the base includes a front transverse rod, a connecting rod, and a rear transverse rod, two ends of the connecting rod are connected to the front transverse rod and the rear transverse rod respectively, the connecting rod and the front transverse rod are perpendicular to each other, and the connecting rod and the rear transverse rod are perpendicular to each other.

3. The stepper exercise machine as claimed in claim **1**, wherein the tuning levers each include a lever and two turning wheels, and the two turning wheels are rotatably connected to two ends of the lever, respectively.

4. The stepper exercise machine as claimed in claim **3**, wherein the second accommodation trough of each of the pedals has a connection space and two turning wheel spaces, two ends of the connection space are in communication with the two turning wheel spaces respectively, the connection space is configured to receive the lever, and the two turning wheel spaces are configured to receive and limit the two turning wheels.

5. The stepper exercise machine as claimed in claim **1**, further comprising a receiving pipe extending up from the front end of the base for insertion of a T-shaped handle, the T-shaped handle being adjustable up and down.

* * * * *