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(54) **ROWING MACHINE WITH HYDRAULIC RESISTANCE**

(57) The invention relates to a water-resistant rowing machine including a frame, a handle, a seat and pedals arranged on the frame. The water-resistant rowing machine further includes: a resistance mechanism having a water tank arranged at one end of the frame and a rotation portion arranged in the water tank, the rotation portion being connected to the handle through a transmission mechanism to implement linkage among the handle, the seat and the rotation portion; and an adjustment mechanism having a holding portion that cooperates with the rotation portion for adjusting the rotation

resistance of the rotation portion. In the apparatus of the invention, since a turntable is arranged on the rotation shaft, holding blocks on two clamping terminals are in contact with two end faces of the turntable respectively and the clamping terminals are slidably disposed on the frame, the contact area of the holding blocks with the turntable can be adjusted, and a greater contact area will lead to a greater rotation resistance to the rotation shaft, thereby the user can adjust the rotation resistance as needed.

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Description

FIELD

[0001] The application relates to the technical field of exercise equipment, and more particularly to a water-resistant rowing machine.

BACKGROUND

[0002] Water-resistant rowing machine is a kind of aerobic exercise equipment for improving the comprehensive ability, its movement is similar to the process of water boating, i.e., in exercising, exercise intensity of muscle of the body part is enhanced by utilizing resistance from water in the water tank and the change of the impeller speed, so that the body gets full exercise. The adjustment way of the existing water-resistant rowing machine is single, the movement resistance can be changed by the user only based on the high or low of the movement speed, the adjustability of the movement resistance is low, thus it is impossible to satisfy different movement demands and achieve combination of several resistance adjustment ways to make users get a better exercise experience.

[0003] The above-mentioned information disclosed in the background is only intended to enhance the understanding of the background of the invention and therefore may contain information that is not the prior art known to those skilled in the art.

SUMMARY

[0004] In view of this, the embodiments of the present application provide a water-resistant rowing machine to solve at least the problems existing in the prior art.

[0005] The technical solutions of the embodiments of the present application are implemented as following. According to an embodiment, it is provided a water-resistant rowing machine including a frame, and a handle, a seat and pedals, which are arranged on the frame, wherein the water-resistant rowing machine further includes: a resistance mechanism having a water tank arranged at one end of the frame and a rotation portion arranged in the water tank, the rotation portion being connected to the handle through a transmission mechanism to implement linkage among the handle, the seat and the rotation portion; and an adjustment mechanism having a holding portion which cooperates with the rotation portion for adjusting a rotation resistance of the rotation portion.

[0006] In some embodiments, the rotation portion includes a rotation shaft vertically inserted in the water tank, one end of the rotation shaft extends out of the water tank and is rotatably connected to the one end of the frame, and blades are provided at another end of the rotation shaft.

[0007] In some embodiments, a turntable is arranged horizontally at the one end of the rotation shaft that ex-

tends out of the water tank, the holding portion includes two clamping terminals spaced apart and slidably connected to the one end of the frame, holding blocks are symmetrically arranged on opposite end faces of the two clamping terminals, end faces of the holding blocks can be in contact with end faces of the turntable, and the contact area can be adjusted by means of a sliding movement of the holding portion relative to the frame.

[0008] In some embodiments, the end faces of the turntable are parallel to the end faces of the holding blocks and the turntable is located between the holding blocks of one of the two clamping terminals and the holding blocks of another one of the two clamping terminals.

[0009] In some embodiments, the holding block is made of a magnetic material and the turntable is made of a non-magnetically permeable material.

[0010] In some embodiments, the holding blocks are distributed in an arc shape on an end face of the clamping terminal, and the arc shape is adapted to a shape of the outer edge of the turntable.

[0011] In some embodiments, the adjustment mechanism further includes an adjustment rod, one end of the adjustment rod is connected to the two clamping terminals, and another end of the adjustment rod is retractably arranged in the one end of the frame and is connected to a knob arranged on the one end of the frame.

[0012] In some embodiments, an elastic mechanism is arranged between the adjustment rod and the two clamping terminals.

[0013] In some embodiments, the holding portion includes an electromagnetic brake arranged on the rotation shaft and a control button arranged on the frame and connected to the electromagnetic brake.

[0014] In some embodiments, the blade is in a rectangular shape, a fan shape or an elliptical shape.

[0015] In some embodiments, the transmission mechanism includes an elastic cord and a fixed pulley arranged on the frame, one end of the elastic cord is connected to the handle, another end of the elastic cord passes round the fixed pulley and is wound onto the one end of the rotation shaft extending out of the water tank, one end of another elastic cord is wound onto the one end of the rotation shaft extending out of the water tank and another end of the another elastic cord is connected to the frame through the fixed pulley.

[0016] In some embodiments, the transmission mechanism includes a unidirectional bearing and an elastic cord, the unidirectional bearing is arranged between the rotation shaft and the frame, one end of the elastic cord is connected to the handle and another end of the elastic cord is wound and fixed to the rotation shaft.

[0017] In some embodiments, the water-resistant rowing machine further includes a water supply system having an inlet pipe and an outlet pipe, which are communicated with the water tank for increasing or decreasing water amount in the water tank.

[0018] The invention has the following advantages by adopting the above technical solutions: 1. In the appara-

tus of the invention, since a turntable is arranged on the rotation shaft, holding blocks on two clamping terminals are respectively in contact with two end faces of the turntable and the clamping terminals are slidably disposed on the frame, the contact area of the holding blocks with the turntable can be adjusted, and a greater contact area will lead to a greater rotation resistance to the rotation shaft, thereby the user can adjust the rotation resistance as needed. 2. In the invention, since an elastic mechanism is arranged between the clamping terminal and the adjustment rod, the holding portion can swing with the turntable under the action of a spring when the rotation shaft and the turntable are rotated, and the adjustment rod connected to the clamping terminal will not swing with the clamping terminal, thereby avoiding damage to the adjustment rod under a bending moment. 3. In the apparatus of the invention, since a water supply system connected to the water tank is provided, and the water supply system is in communication with the water tank through an inlet pipe and an outlet pipe, the water amount in the water tank can be adjusted, and the rotation resistance of the blade in the water tank can be changed, therefore the movement resistance can be changed according to the user's demand. 4. The turntable of the invention is made of a non-magnetically permeable material, and the holding block is made of a magnetic material, therefore when the holding block is in contact with the turntable, it is possible to increase the frictional resistance of the turntable without interfering with the normal rotation of the turntable. 5. In the invention, a plurality of resistance adjustment mechanisms can be used in combination, therefore a large range resistance adjustment can be achieved, and meanwhile fine adjustment to resistance can be achieved, which enriches the resistance adjustment way. The various resistance adjustment way enable the user to obtain more different exercise experiences, thereby improving the applicability of the water-resistant rowing machine.

[0019] The above summary is merely for the purpose of illustration and is not intended to be limited in any way. In addition to the aspects, embodiments and features described above, further aspects, embodiments, and features of the invention will be readily apparent from the following detailed description with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] In the drawings, the same reference numerals refer to like or similar parts or elements throughout several drawings, unless otherwise specified. These drawings are not necessarily drawn to scale. It is to be understood that these drawings only depict some embodiments according to the present disclosure and should not be construed as limiting the scope of the invention.

Figure 1 is a schematic view of the overall structure of the invention;

Figure 2 is a partially enlarged view of an adjustment mechanism of the invention.

DETAILED DESCRIPTION

[0021] In the following, only certain exemplary embodiments are briefly described. As will be appreciated by those skilled in the art, the described embodiments may be modified in various different ways without departing from the spirit or scope of the invention. Accordingly, the drawings and description are to be regarded as being illustrative in nature and not restrictive.

[0022] In the description of the invention, it is to be understood that the orientation or positional relationship indicated by the terms "center", "longitude", "transverse", "length", "width", "thickness", "upper", "lower", "front", "behind", "left", "right", "vertical", "horizontal", "top", "bottom", "internal", "external", "clockwise", "counterclockwise" is based on the orientation or positional relationship indicated in the figures, and is merely intended to facilitate illustration of the invention and simplify the description and is not intended or implied that the devices or elements indicated must have a specific orientation and be constructed and operated in a particular orientation and therefore can not be understood as limitations to the invention. In addition, the terms "first" and "second" are merely for illustrative purposes and are not to be construed as indicating or imposing a relative importance or implicitly indicating the number of technical features indicated. Thus, a feature that is defined using "first" or "second" may expressly or implicitly include one or more the features. In the description of the invention, the meaning of "a plurality of" refers to two or more, unless otherwise specifically defined..

[0023] In the description of the invention, it is to be noted that, unless otherwise expressly specified or limited, the terms "mount," "connect", "couple" are to be broadly understood, for example, it may be fixed connection, detachable connection, or integral connection; it may be mechanical connection or electrical connection or communication with each other; it may be direct connection or indirect connection by an intermediate medium; it may be interconnection of two elements or an interaction relationship of two elements. The specific meanings of the above terms in the invention may be understood by those skilled in the art in light of the circumstances..

[0024] In the invention, unless otherwise expressly specified or limited, a first feature being "above" or "lower" a second feature may indicate the first feature directly contacts the second feature, and may also indicate a first feature does not directly contact with a second feature but contacts with the second feature by other features therebetween. Also, a first feature being "on", "above", "over" a second feature includes the first feature being directly above or obliquely above the second feature, or only indicates the horizontal height of the first feature is higher than that of the second feature. A first feature is

"beneath", "below" and "under" a second feature includes the second feature being directly above or obliquely above the first feature, or only indicates the horizontal height of the first feature is less than that of the second feature.

[0025] Specifically, as shown in Figure 1, the water-resistant rowing machine of the invention includes: a frame 1 arranged on the ground, a handle 2 slidably connected to a first end 11 of the frame 1, a seat 3 slidably connected to the second end 12 of the frame 1, and pedals 4 arranged on the frame 1 at a position that is close to the handle 2. The water-resistant rowing machine further includes a resistance mechanism 5 and an adjustment mechanism 6. The resistance mechanism 5 includes a water tank 51 arranged at the first end 11, and a rotation portion is arranged in the water tank 51, the rotation portion is connected to the handle 2 through a transmission mechanism 7 so as to realize the linkage between the handle 2, the rotation portion and the seat 3 when the user pulls the handle 2. The adjustment mechanism 6 has a holding portion which cooperates with the rotation portion for adjusting the rotation resistance of the rotation portion by the holding force applied to the rotation portion from the holding portion.

[0026] As shown in Figures 1 and 2, the rotation portion includes a rotation shaft 53 vertically inserted in the center of the water tank 51, and one end of the rotation shaft 53 extends out of the top surface of the water tank 51 and is rotatably connected to the frame 1, another end of the rotation shaft 53 is located in the water tank 51, and a plurality of blades 54 for stirring the water flow are spaced-arranged at the other end of the rotation shaft 53 in the circumferential direction.

[0027] In order to increase the rotation resistance of the blade 54, it is possible to increase the contact area of the blade 54 with water, for example using a blade 54 in a rectangular shape, a fan shape or an elliptical shape.

[0028] It is to be noted that, the blade 54 is tightly connected to the rotation shaft 53 by a strut 55, and in order to enhance the working strength of the blade 54, a reinforcing bar 56 may be arranged on an end surface of the blade 54 on which the blade 54 is connected with the strut 55.

[0029] As shown in Figure 2, a horizontally disposed turntable 52 is sleeved on one end of the rotation shaft 53 that extends out of the water tank 51. The holding portion includes two clamping terminals 62 spaced apart in the vertical direction and slidably connected to the first end 11 of the frame 1. Holding blocks 63 are symmetrically arranged on opposite end faces of the two clamping terminals 62. The holding blocks are used to clamp the upper end face and the lower end face of the turntable 52, i.e., the end face of the holding block 63 can be in contact with the upper end face or the lower end face of the turntable 52. The contact area is adjusted by adjusting the sliding distance of the clamping terminals 62 on the first end 11 of the frame 1, and a larger contact area leads to a large frictional resistance and thus a greater rotation

resistance of the rotation shaft 53.

[0030] In a preferred embodiment, the clamping terminal 62 is of a plate-like structure having an arc shape, a plurality of holding blocks 63 evenly distributed in an arc shape are arranged on the clamping terminal 62, and the arc-shaped structure constituted by the holding blocks 63 is adapted to the shape of the outer edge of the turntable 52, so that the end faces of the respective holding blocks 63 can be brought into contact with the turntable 52 to improve the frictional resistance.

[0031] It should be noted that the turntable 52 is located between the two clamping terminals 62 and the upper and lower end faces of the turntable 52 are parallel to the end faces of the two clamping terminals 62 so that the two clamping terminals 62 can be in complete contact with the turntable 52, thereby improving the efficiency of resistance adjustment. The holding block 63 is made of a magnetic material and the turntable 52 is made of a non-magnetically permeable material so that the turntable 52 can fluidly rotate between the two clamping terminals 62. When the upper holding blocks 63 and the lower holding blocks 63 corresponding to the upper holding blocks 63, which are made of a magnetic material, are attracted to each other, the clamping force of the two clamping terminals 62 to the turntable 52 is increased to provide a certain resistance to the rotation of the turntable 52 and the rotation shaft 53.

[0032] As shown in Figure 2, the two clamping terminals 62 can move on the first end 11 of the frame 1 by means of a retractable adjustment rod 64. One end of the adjustment rod 64 is connected to one end of the clamping terminal 62 that remotes from the turntable 52, and another end of the adjustment rod 64 is retractably disposed in the first end 11 of the frame 1. A knob 65 is also arranged on the first end 11 of the frame 1 and the knob 65 is connected to the other end of the adjustment rod 64 located in the first end 11 for controlling the amount of expansion and contraction of the adjustment rod 64 so as to adjust the movement distance of the clamping terminal 62 on the frame driven the adjustment rod 64, and thus change the contact area of the end face of the respective holding blocks 63 with the end face of the turntable 52.

[0033] Since when the rotation shaft 53 is rotated the holding block 63 in contact with the turntable 52 will swing, an elastic mechanism may be arranged between the adjustment rod 64 and the clamping terminal 62 in order to prevent the adjustment rod 64 from being broken due to an excessive bending moment generated when the rotation shaft 53 is rotated at a high speed. The elastic mechanism includes fixed plates 66 and a spring 61 in which one fixed plate 66 is connected to one end of the adjustment rod 64 and the other fixed plate 66 is connected to the two clamping terminals 62 and at least one spring 61 is provided between two fixed plates 66. When the turntable 52 is rotated at a high speed, the clamping terminal 62 connected to one end of the spring 61 is swung with the turntable 52, and the adjustment rod 64

connected to another end of the spring 61 does not deform, thereby preventing damage to the holding portion.

[0034] In another preferred embodiment, the holding portion may adjust the rotation resistance of the rotation shaft 53 by using an electromagnetic brake. The electromagnetic brake is sleeved on one end (not shown) of the rotation shaft 53 that extends out of the water tank 51. A control button connected to the electromagnetic brake is arranged on the frame 1 for adjusting the holding force of the electromagnetic brake to the rotation shaft 53.

[0035] As shown in Figure 1, the transmission mechanism 7 includes an elastic cord 71 and a plurality of fixed pulleys 72 arranged on the frame 1. One end of the elastic cord 71 is connected to the handle 2 and another end of the elastic cord 71 is wound around and fixed to one end of the rotation shaft 53 extending out of the water tank 51 after passing round one or more fixed pulleys 72 in sequence. One end of another elastic cord 71 is wound around and fixed to one end of the rotation shaft 53 extending out of the water tank 51, and another end of the another elastic cord 71 is connected to the bottom of the frame 1 after passing round one or more fixed pulleys 72 in sequence. When the user pulls the handle 2 toward the second end 11 of the frame 1, the handle 2 drives the elastic cord 71 to rotate the rotation shaft 53, and when the rotation shaft 53 is rotated, the other elastic cord 71 is released from the rotation shaft 53. On the contrary, when the handle 2 is reset to the first end 11 of the frame 1, the rotation shaft 53 is rotated reversely and produces a rebound force, the elastic cord 71 is wound around the rotation shaft 53, and the other elastic cord 71 is also wound around the rotation shaft 53 under the driving of the rotation shaft 53.

[0036] It is to be noted that, in order to prevent the elastic cord 71 from being loosen to thus reduce the rotation efficiency of the rotation shaft 53, a tension pulley (not shown) may be arranged on the frame 1 for tensioning the elastic cord 71.

[0037] In another preferred embodiment, the transmission mechanism 7 includes an elastic cord 71 and a unidirectional bearing (not shown). The unidirectional bearing is sleeved on one end of the rotation shaft 53 which is rotatably connected to the frame 1, one end of the elastic cord 71 is connected to the handle 2 and another end of the elastic cord 71 is wound around and fixed to the rotation shaft 53 after passing round the fixed pulley 72. When the user pulls the handle 2 toward the second end 12 of the frame 1, the handle 2 pulls the elastic cord 71 to rotate the rotation shaft 53. When the handle 2 is reset to the first end 11 of the frame 1, under the action of the unidirectional bearing, the rotation shaft 53 is rotated reversely and generates a rebound force, and the elastic cord 71 is wound on the rotation shaft 53.

[0038] As shown in Figure 1, the apparatus of the invention further includes a water supply system 8 including an inlet pipe 81 communicating with the upper portion of the water tank 51 and an outlet pipe 82 communicating with the lower portion of the water tank 51. The water

supply system 8 feeds water into the water tank 51 through the inlet pipe 81 so as to increase water amount in the water tank 51, thereby increasing the rotation resistance to the rotation shaft 53 driving the blade 54 to rotate. By withdrawing water in the water tank 51 to the water supply system 8 through the outlet pipe 82, the water amount in the water tank 51 is reduced, thereby reducing the rotation resistance to the rotation shaft 53 driving the blade 54 to rotate.

[0039] As shown in Figure 1, a sliding channel 13 is arranged on the second end 12 of the frame 1, and the seat 3 is slidably disposed on the sliding channel 13, and when the user steps on the pedal 4 with foot, the pedal 4 generates an opposite acting force to the user so that the user pulls the handle 2 to together slide toward the direction of the second end 12 of the frame 1 through the seat 3.

[0040] When the apparatus of the invention is in operation, the user sits on the seat 3, holds the handle 2 with two hands, and steps on the pedals 4 with two feet, and when the user's foot step forcefully the pedals 4, the user will slide with the seat 3 toward the second end 12 of the frame 1 via the sliding channel 13, and meanwhile the hands pull the handle 2 to together move toward the second end 12. When the handle 2 is moved toward the second end 12, the elastic cord 71 connected to the handle 2 is pulled, and at this time the rotation shaft 53 connected to the elastic cord 71 causes the blades 54 in the water tank 51 to rotate in the water of the water tank 51 so as to provide the rotation shaft 53 with rotation resistance. When the force that the user pulls the handle 2 is increased, the intensity of exercise will be increased, thereby achieving the purpose of exercising the body. When the user releases the force, the rotation shaft 53 automatically rotate in a reverse direction so that the elastic cord 71 is wound around the rotation shaft 53 again, and the elastic cord 71 pulls the handle 2 toward the first end 11 of the frame 1 so that the handle 2 and the user are reset to the initial position.

[0041] When the user needs to change the exercise intensity, the following ways can be used to perform adjustment:

1. the operator manually adjusts the knob 65 to adjust the contact area of the holding block 63 on the clamping terminal 62 with the turntable 52 by the adjustment rod 64 so as to change the rotation resistance of the rotation shaft 53 and thus adjust the movement intensity of the user.

2. the water amount in the water tank 51 is changed by the water supply system 8, thus the rotation resistance of the blades 54 in water is changed, thereby adjusting the exercise intensity of the user.

3. the user changes the reciprocating pull frequency of the handle 2 to adjust the rotation speed of the rotation shaft 53, thereby adjusting the exercise in-

tensity of the user.

4. the operator manually adjusts the control button to adjust the rotation resistance of the rotation shaft 53 by changing the holding force of the electromagnetic brake to the rotation shaft 53, thereby adjusting the exercise intensity of the user.

5. the above four ways are used in combination to adjust the resistance of the resistance mechanism 5, thereby changing the exercise intensity of the user.

[0042] The foregoing are merely specific embodiments of the invention, but the scope of the invention is not to be limited thereto. The person skilled in the art can easily conceive various changes or replacements within the scope of the invention as disclosed, and these change or replacements are to be contained within the scope of the invention. Accordingly, the scope of protection of the invention should be based on the scope of protection of the claims.

Claims

1. A water-resistant rowing machine comprising a frame, and a handle, a seat and pedals, which are arranged on the frame, wherein the water-resistant rowing machine further comprises:

a resistance mechanism having a water tank arranged at one end of the frame and a rotation portion arranged in the water tank, the rotation portion being connected to the handle through a transmission mechanism to implement linkage among the handle, the seat and the rotation portion; and
an adjustment mechanism having a holding portion which cooperates with the rotation portion for adjusting a rotation resistance of the rotation portion.

2. The water-resistant rowing machine according to claim 1, wherein the rotation portion comprises a rotation shaft vertically inserted in the water tank, one end of the rotation shaft extends out of the water tank and is rotatably connected to the one end of the frame, and blades are provided at another end of the rotation shaft.

3. The water-resistant rowing machine according to claim 2, wherein a turntable is arranged horizontally at the one end of the rotation shaft that extends out of the water tank, the holding portion comprises two clamping terminals spaced apart and slidably connected to the one end of the frame, holding blocks are symmetrically arranged on opposite end faces

of the two clamping terminals, end faces of the holding blocks are contactable with end faces of the turntable, and a contact area can be adjusted by a sliding movement of the holding portion relative to the frame.

4. The water-resistant rowing machine according to claim 3, wherein the end faces of the turntable are parallel to the end faces of the holding blocks and the turntable is located between the holding blocks of one of the two clamping terminals and the holding blocks of another one of the two clamping terminals.

5. The water-resistant rowing machine according to claim 3, wherein the holding block is made of a magnetic material and the turntable is made of a non-magnetically permeable material.

6. The water-resistant rowing machine according to claim 3, wherein the holding blocks are distributed in an arc shape on an end face of the clamping terminal, and the arc shape is adapted to a shape of the outer edge of the turntable.

7. The water-resistant rowing machine according to claim 3, wherein the adjustment mechanism further comprises an adjustment rod, one end of the adjustment rod is connected to the two clamping terminals, and another end of the adjustment rod is retractably arranged in the one end of the frame and is connected to a knob arranged on the one end of the frame.

8. The water-resistant rowing machine according to claim 7, wherein an elastic mechanism is arranged between the adjustment rod and the two clamping terminals.

9. The water-resistant rowing machine according to claim 2, wherein the holding portion comprises an electromagnetic brake arranged on the rotation shaft and a control button arranged on the frame and connected to the electromagnetic brake.

10. The water-resistant rowing machine according to claim 2, wherein the blade is in a rectangular shape, a fan shape or an elliptical shape.

11. The water-resistant rowing machine according to claim 2, wherein the transmission mechanism comprises an elastic cord and a fixed pulley arranged on the frame, one end of the elastic cord is connected to the handle, another end of the elastic cord passes round the fixed pulley and is wound onto the one end of the rotation shaft extending out of the water tank, one end of another elastic cord is wound onto the one end of the rotation shaft extending out of the water tank and another end of the another elastic cord is connected to the frame through the fixed pulley.

12. The water-resistant rowing machine according to claim 2, wherein the transmission mechanism comprises a unidirectional bearing and an elastic cord, the unidirectional bearing is arranged between the rotation shaft and the frame, one end of the elastic cord is connected to the handle and another end of the elastic cord is wound and fixed to the rotation shaft. 5
13. The water-resistant rowing machine according to any one of claims 1 to 12, further comprising a water supply system having an inlet pipe and an outlet pipe, which are communicated with the water tank for increasing or decreasing water amount in the water tank. 10 15

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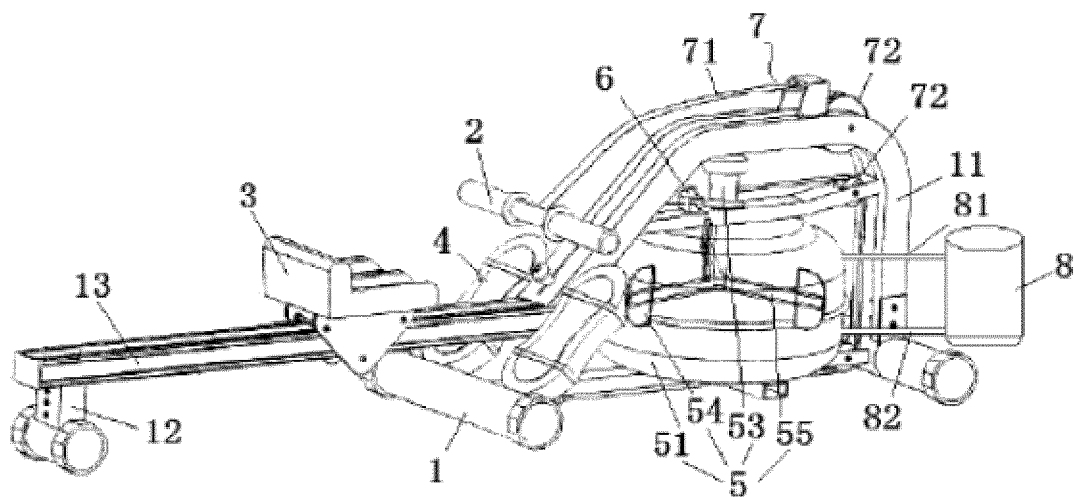


Fig. 1

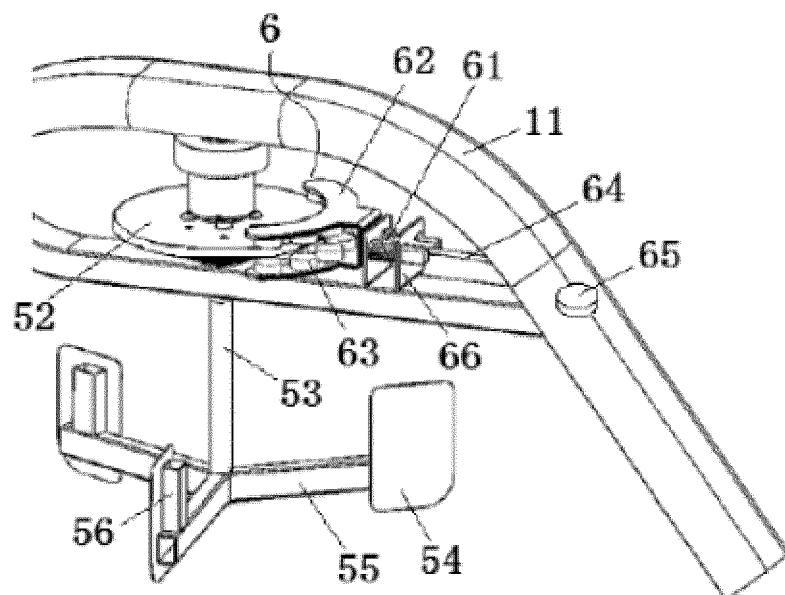


Fig. 2



EUROPEAN SEARCH REPORT

Application Number
EP 17 17 1898

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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