

DESCRIPTION

[Title of Invention] EXERCISE MACHINE OF SEAT TYPE

[Technical Field]

[0001] The present invention relates to an exercise machine of seat type for enabling a user sitting in a seat of the machine to take body exercise such as waist twisting exercise.

[Background Art]

[0002] Heretofore there have been developed exercise machines of seat type (balancing training machines) for body-weight reduction, backache prevention, and other purposes. With such an exercise machine, a user sitting in a seat of the machine sets the seat in motion for rocking movement, and then, for example, the user sitting in the seat in a rocking condition twists his/her body at the waist to keep his/her balance, thus taking waist twisting exercise. An example of the exercise machine is disclosed in Patent Literature 1.

 The exercise machine of seat type disclosed in Patent Literature 1 comprises a seat where a user sits and a rocking mechanism mounted under the seat for rocking the seat in a horizontal direction. The rocking mechanism comprises a rotation shaft which is rotated under a driving force exerted by a driving mechanism, and a support arm member for converting the rotation of the rotation shaft into horizontal rocking motion and transmitting the horizontal rocking motion to the seat.

[Prior Art Reference]

[Citation List]

[0003] Patent Literature 1: Japanese Unexamined Patent
Publication JP-A 2013-123441

[Summary of Invention]

[Technical Problem]

In the exercise machine of seat type disclosed in Patent Literature 1, the described rotation shaft is disposed centrally of the machine so as to point in the horizontal direction. The described support arm member is disposed on each of the right side and the left side of the rotation shaft, that is; there is provided a total of two support arm members, namely the right and left support arm members taken as a pair.

The seat supporting structure of such an exercise machine disclosed in Patent Literature 1, while affording the effect of supporting the seat at a plurality of support points with stability, has limitations upon the range of rocking motion of the seat. That is, for example, a plurality of the support arm members interfere with each other, or the support arm member interferes with a placement stand, and, as a consequence, the seat is strictly limited in its horizontal or vertical rocking motion.

[0005] The present invention has been devised in view of the circumstances as discussed supra, and accordingly an object of the present invention is to provide an exercise machine of

seat type that is capable of rocking a seat in horizontal and vertical directions over a wide rocking range, thus enabling users to take swinging exercise with high effectiveness.

[Solution to Problem]

[0006] To accomplish the described object, the following technical means is adopted for the implementation of the present invention.

That is, an exercise machine of seat type pursuant to the present invention comprises: a seat where a user is able to sit; a rocking mechanism for rocking the seat at least in a horizontal direction; a driving mechanism for driving the rocking mechanism; and a placement stand on which are placed the rocking mechanism and the driving mechanism. In this construction, the rocking mechanism comprises a horizontally-extending rotation shaft which is rotated under a driving force exerted by the driving mechanism, and a single conversion section for converting a rotation of the rotation shaft into horizontal rocking motion.

[0007] In the present invention, it is preferable that the conversion section is located centrally of the rotation shaft in the horizontal direction.

In the present invention, it is preferable that the conversion section comprises: a rotary boss portion attached for unitary rotation to the rotation shaft, the outer peripheral surface of which is formed with a sloping face inclined with respect to the axis of the rotation shaft; an annular fit portion

rotatably fitted onto the sloping face of the rotary boss portion, for supporting the seat from below; and a rotation restraining portion for restraining the annular fit portion against unitary rotation in sync with the rotation of the rotation shaft.

[0008] In the present invention, it is preferable that the placement stand is formed with an horizontally-extending slot for receiving part of the rotation restraining portion and for guiding the rotation restraining portion in horizontal movement.

In the present invention, it is preferable that at least the periphery of the seat is made of an elastic body.

[Advantageous Effects of Invention]

[0009] The exercise machine of seat type pursuant to the present invention is capable of rocking the seat in horizontal and vertical directions over a wide rocking range, thus enabling users to take twisting exercise with high effectiveness.

[Brief Description of Drawings]

[0010] [FIG. 1] FIG. 1 is an overall perspective view showing the operation of the exercise machine of seat type.

[FIG. 2] FIG. 2 is a perspective view showing the internal structure of the exercise machine of seat type.

[FIG. 3] FIG. 3 is a perspective view showing the structure of the rocking mechanism of the exercise machine of seat type.

[FIG. 4] FIG. 4 is a sectional view showing the horizontal section of the rocking mechanism of the exercise machine of seat type.

[FIG. 5] FIG. 5 is a bottom view of the rocking mechanism of the exercise machine of seat type as seen from its bottom.

[Description of Embodiment]

[0011] Hereinafter, an embodiment of the present invention will be described with reference to drawings.

As shown in FIGs. 1 to 5, an exercise machine of seat type 1 pursuant to the present invention is designed to be placed on a substantially flat stable surface, such for example as a chair's seat, for imparting twisting movement to user's waist or belly. When a user loses his/her balance due to the twisting movement imparted by the exercise machine of seat type 1, he/she tries to keep or restore his/her sitting posture, and this exercise makes it possible to tone up muscles around user's waist and inner muscles, and thereby obtain advantageous effects such as body-weight reduction effect and backache prevention effect.

[0012] In the description of the present embodiment, a direction from right to left in FIGs. 1 to 5 will be referred to as a right-left, or horizontal direction for the explanation of the machine 1, and a direction from front to rear in FIGs. 1 to 5 will be referred to as a front-rear direction for the explanation of the machine 1. Moreover, a direction from top to bottom in FIGs. 1 to 5 will be referred to as a top-bottom, or vertical direction for the explanation of the machine 1. These directions used for the explanation of the machine 1 coincide with the horizontal direction, the front-rear direction, and

the vertical direction based on the view of a user sitting in the exercise machine of seat type 1.

[0013] As shown in FIG. 1, the exercise machine of seat type 1 pursuant to the present invention comprises a casing 2 and a seat 3 mounted above the casing 2. As shown in FIGs. 2 and 3, the casing 2 is internally provided with a rocking mechanism 4 for rocking the seat 3 and a driving mechanism 5 for driving the rocking mechanism 4. In the exercise machine of seat type 1, the seat 3 is rocked in the horizontal direction and the vertical direction by the operation of the driving mechanism 5 and the rocking mechanism 4, thus imparting twisting movement to the user sitting in the seat 3.

[0014] As shown in FIG. 1, the casing 2 is a low-profile upwardly opening case member shaped in a rounded rectangle as seen in plan view. The casing 2 is composed of a flat plate-shaped lower casing 6 and a dam-shaped upper casing 7 formed along the outer edge of the lower casing 6. The upper casing 7 is fitted onto the lower casing 6 from above, thus providing an inner space in the casing 2 (upwardly-opening space) for accommodating the rocking mechanism 4 (that will hereafter be described in detail).

[0015] The lower casing 6 is internally formed with a centrally-located recess 8 (housing recess) in which is fitted a placement stand 9 carrying the rocking mechanism 4 from above. Moreover, the lower casing 6 has a leg portion 10 in the form of a circular plate disposed on its lower surface so as to protrude

downwardly.

The seat 3 is a platy member shaped in a rounded rectangle as seen in plan view, which is large enough for the user to sit therein. Moreover, the seat 3 is curved so that the central part is located below the level of the right and left ends. The user inserts his/her hip in this concave central part, whereupon the seat 3 fits snugly against user's buttocks.

[0016] Moreover, the lower surface of the seat 3 is formed with a foot portion 11 extending along the edge of the seat 3 so as to define an annular shape which is smaller than the contour of the seat 3. The foot portion 11 is a downwardly-drooping skirt member made of an elastic material such as rubber or elastomer, for externally covering (protecting) the driving section (driving mechanism 5) mounted inside the casing 2. The foot portion 11 helps prevent inadvertent insertion of user's finger or toe into the driving section in the middle of rocking motion of the seat 3.

[0017] Moreover, the seat 3 has a composite structure. More specifically, on the top side of the rectangular seat 3 (lower seat body) is arranged an upper seat body 3A which is brought into direct contact with the buttocks of the user sitting in the seat 3. The upper seat body 3A is greater in area than the seat 3, and is disposed in overlying relation with the upper surface of the seat 3. That is, the upper seat body 3A extends radially outwardly from the outer edge of the seat 3. The upper

seat body 3A is, like the described foot portion 11, made of an elastic material such as rubber or elastomer in the interest of enabling the user to sit comfortably. In the case of providing such an upper seat body 3A, even when the user inadvertently inserts his/her finger or toe into the interior part under the seat 3 during rocking motion of the seat 3, the upper seat body 3A is able to become warped and deformed. Consequently, it never occurs that the user sustains an injury to his/her finger or toe caught between the seat 3 and the floor, or between the seat 3 and the placement stand 9.

[0018] The seat 3 does not necessarily have to have the composite structure, and may be designed in a single-piece construction. Also in this case, at least the periphery of the seat 3 is preferably made of an elastic body.

Moreover, as shown in FIGs. 2 and 3, a through hole 12 is formed in the upper surface of the right side of the seat 3 so as to pass through the seat 3 in the vertical direction. At the lower surface of the seat 3, the through hole 12 is located in alignment with the position of a gear 14 attached to a rotation shaft 13 which will hereafter be described, so that the gear 14 and the seat 3 do not make contact with each other when the seat 3 is tilted to the right with consequent downward movement of its right end.

[0019] Under the seat 3 is mounted the rocking mechanism 4 for rocking the seat 3 in the horizontal direction while

supporting the seat 3 from below. The rocking mechanism 4 is placed on the placement stand 9 housed inside the casing 2 so as to be located on the central part of the lower casing 6 covered with the described foot portion 11.

As shown in FIGs. 2 and 3, the rocking mechanism 4 comprises the horizontally-oriented rotation shaft 13 which is rotatably driven by the driving mechanism 5, and a conversion section 15 for converting the rotation of the rotation shaft 13 into horizontal rocking motion.

[0020] Next, the placement stand 9, the rotation shaft 13, the conversion section 15, and the driving mechanism 5 that constitute the exercise machine of seat type 1 pursuant to the present invention will be described with reference to drawings.

The placement stand 9 is a plate (platy body) shaped in a rounded rectangle as seen in plan view, which is fitted in the housing recess 8 of the lower casing 6 from above. On the left-hand and right-hand parts of the upper surface of the placement stand 9 are arranged upwardly-protruding supports 16L and 16R, respectively, for supporting the described rotation shaft 13 from below. Moreover, the upper surface of each of the supports 16L and 16R is formed with a recess 8 which receives a bearing 17 for journaling the rotation shaft 13.

[0021] The placement stand 9 has formed in its region between the left-hand support 16L and the right-hand support 16R a slot 20 for receiving part of a rotation restraining portion 19 of

an annular fit portion 18 that will hereafter be described. The slot 20 is a horizontally-extending groove (hole) formed so as to pass through the placement stand 9 in the vertical direction. That is, by inserting part of the rotation restraining portion 19 into the slot 20, it is possible to guide the rotation restraining portion 19 in horizontal movement while restraining its movement in the front-rear direction.

[0022] The slot 20 will be described later in more detail along with the description of the rotation restraining portion 19.

The rotation shaft 13, which is a long, round bar-shaped member spanning the region under the described seat 3 in the horizontal direction, is journaled on the bearing 17 housed in the described recess 8 of the support 16. The bearing 17 is disposed at each end of the rotation shaft 13 in the horizontal direction, and, the use of these bearings 17 permits free rotation of the rotation shaft 13 about a horizontally-directed axis.

[0023] Moreover, the gear 14, which is capable of transmission of a rotational driving force exerted by the driving mechanism 5 (driving motor 21), is disposed on the right side of the center (rotary boss portion 23) of the rotation shaft 13, so that the rotation shaft 13 can be driven to rotate about a horizontally-directed axis by the driving mechanism 5 which will hereafter be described.

The driving mechanism 5 comprises a driving motor 21 mounted

with its driving shaft aligned with the horizontal direction, and a power transmission shaft 22, oriented perpendicularly to the axis of the driving motor 21, to which is transmitted a rotational driving force exerted by the driving motor 21. The power transmission shaft 22 is oriented perpendicularly also to the rotation shaft 13 whose axis points in the horizontal direction. By bringing the gears formed in the driving shaft, the power transmission shaft 22, and the rotation shaft 13, respectively, into meshing engagement with one another, the rotational driving force of the driving motor 21 can be transmitted from the driving shaft to the rotation shaft 13 through the power transmission shaft 22.

[0024] In the described conversion section 15, the rotary boss portion 23, the annular fit portion 18, and the rotation restraining portion 19 combine to effect conversion of a rotational driving force exerted by the rotation shaft 13 into horizontal rocking motion. The exercise machine of seat type 1 pursuant to the present invention is characterized in that the described conversion section 15 is mounted as one unit (a single conversion section 15 is mounted) to the rotation shaft 13, and that the conversion section 15 is located centrally of the rotation shaft 13 in the horizontal direction.

[0025] The following describes the details of the conversion section 15 which constitutes a feature of the exercise machine of seat type 1 pursuant to the present invention.

The conversion section 15 imparts horizontal rocking motion to the seat 3 by converting the rotational driving force of the rotation shaft 13 into a horizontal force. More specifically, the conversion section 15 comprises: the rotary boss portion 23 attached for unitary rotation to the rotation shaft 13, the outer peripheral surface of which is formed with a sloping face 24 inclined with respect to the axis of the rotation shaft 13; the annular fit portion 18 rotatably fitted onto the sloping face 24 of the rotary boss portion 23, for supporting the seat 3 from below; and the rotation restraining portion 19 for restraining the annular fit portion 18 against unitary rotation in sync with the rotation of the rotation shaft 13.

[0026] As shown in FIG. 4, the rotary boss portion 23, which is a member shaped in a circular plate attached to the described rotation shaft 13, is screwed or otherwise fastened to the rotation shaft 13 for unitary rotation with the rotation shaft 13 about a horizontally-directed axis. The outer peripheral surface of the rotary boss portion 23 is formed with the sloping face 24 (inclined cam face) which goes around an axis extending in a direction intersected by the axis of the rotation shaft 13. The annular fit portion 18 is fitted onto the exterior of the sloping face 24 via a shaft bearing 26.

[0027] The annular fit portion 18 is a member disposed under the seat 3 for supporting the seat 3 from below. More specifically, the annular fit portion 18 is a plate member shaped in

substantially the letter of "U" when viewed from the left (right), which is secured to the lower surface of the seat 3. Moreover, the tip of the annular fit portion 18 (that part of the annular fit portion 18 located farthest away from the seat 3) is formed with a centrally-located circular opening 25 for receiving the rotary boss portion 23. The opening 25 is formed so as to pass through the annular fit portion 18 in the horizontal direction. The described shaft bearing 26 is fitted in the opening 25 so as to be secured to the inner peripheral surface of the opening 25.

[0028] The rotation restraining portion 19 is formed so as to protrude downwardly from the bottom of the annular fit portion 18. The rotation restraining portion 19 has its tip rendered insertable into the described slot 20, and is hence guided in horizontal rocking motion, while being restrained against movement in the front-rear direction, by the horizontally-extending slot 20.

More specifically, as shown in FIG. 5, the described slot 20 is an oblong opening groove shaped so that the opening width in the horizontal direction is about twice the opening width in the front-rear direction. Moreover, each opening end of the slot 20 in the horizontal direction has an arcuate edge, the radius of curvature of which is slightly greater than the outside diameter of the rotation restraining portion 19 which is inserted into the slot 20. The outer peripheral surface of the rotation

restraining portion 19 makes surface-to-surface contact with the opening edge of the slot 20 over a wide range extending halfway around the circumference. This makes it possible to reduce the contact pressure applied to the rotation restraining portion 19 and the slot 20, and thereby prevent the wearing away of the rotation restraining portion 19 and the slot 20 caused by sliding movement.

[0029] The exercise machine of seat type 1 pursuant to the present invention is characterized in that the described conversion section 15 is mounted as one unit (a single conversion section 15 is mounted) to the rotation shaft 13, and that the described conversion section 15 is located centrally of the rotation shaft 13 in the horizontal direction.

That is, only one rotation shaft 13 is provided in the exercise machine of seat type 1 pursuant to the present invention, and, only one conversion section 15 (the rotary boss portion 23 and the annular fit portion 18 fitted onto the rotary boss portion 23) is disposed on the single rotation shaft 13. Thus, the single conversion section 15 undertakes all of rocking motions, namely horizontal and vertical rocking motions, of the seat 3.

[0030] As contrasted to the exercise machine of seat type 1 pursuant to the present invention, the conventional exercise machine has a plurality of annular fit portions (conversion sections). In the case of providing a plurality of annular fit portions on the rotation shaft, chances are high that the annular

fit portions will interfere with each other or the annular fit portion will interfere with other member during the rocking motion of the seat, and it is thus inevitable that the seat has to be strictly limited in its rocking motion to avoid interference.

[0031] In this regard, in the exercise machine of seat type 1 pursuant to the present invention, as constituent components of the conversion section 15, there are provided only one rotary boss portion 23 and only one annular fit portion 18 which is fitted onto the rotary boss portion 23. Thus, the seat 3 is supported by the single, centrally-located conversion section 15.

In this way, even when the seat 3 is rocked greatly about the centrally-located single conversion section 15 in the horizontal and vertical directions, problems such as interference between the annular fit portion 18 and other member are less likely to occur. Consequently, by virtue of greater rocking motion of the seat 3, the user is able to take exercise with higher effectiveness.

[0032] In cases where sufficient interference prevention effect cannot be obtained simply by providing only one conversion section 15 and disposing it in the central part of the machine, as in the case of forming the through hole 12 in the described seat 3, it is advisable to form a hole in a part which is brought into contact with an interference-prone member, such as the gear 14, or to reduce the thickness of this part, to avoid interference.

This makes it possible to place the seat 3 in proximity to the rocking mechanism 4 in the vertical direction, and thereby render the exercise machine of seat type 1 lower in profile and compact.

[0033] Moreover, in the case of providing only one conversion section 15, a load applied to the seat 3 may be concentrated on the single conversion section 15. It is thus advisable to provide a reinforcement member, such as a strengthening rib 27 (refer to FIG. 4), in the conversion section 15.

The following describes a method for rocking the seat 3 in the horizontal direction by the described rocking mechanism 4, expressed differently, an exercise method using the exercise machine of seat type 1 pursuant to the present invention.

That is, when operating the rotation shaft 13 to rotate about the horizontally-directed axis under a rotational driving force produced by the described driving mechanism 5, the rotary boss portion 23 mounted for unitary rotation with the rotation shaft 13 is rotated correspondingly. At this time, since the sloping face 24 formed on the outer peripheral surface of the rotary boss portion 23 extends along a trackway such as to go around an axis pointing in a direction intersected by the axis of the rotation shaft 14, the annular fit portion 18, being designed to slide along this sloping face 24, seeks to rotate about the rotation shaft 13 while following a trackway such as to run meanderingly around the axis of the rotation shaft 13.

[0034] However, the bottom of the annular fit portion 18 is formed with the described downwardly-protruding rotation restraining portion 19, and the lower end of the rotation restraining portion 19 is inserted in the slot 20 of the placement stand 9. Thus, it never occurs that the annular fit portion 18 is rotated unitarily with the rotary boss portion 23 in the front-rear direction. In the meantime, the rotation restraining portion 19 is movable along the slot 20 in the horizontal direction, wherefore the annular fit portion 18 is not restrained against horizontal rocking motion by the rotation restraining portion 19. Accordingly, upon rotation of the rotation shaft 13, the annular fit portion 18 is rocked in the horizontal direction while being restrained against rotation in the front-rear direction, thus causing the seat 3 disposed above the annular fit portion 18 to rock in the horizontal direction.

[0035] In this construction, with the single conversion section 15 (annular fit portion 18) located centrally of the rotation shaft 13, even when the seat 3 is rocked greatly about the conversion section 15 in the horizontal and vertical directions, problems such as interference between the annular fit portion 18 and other member are less likely to occur. Consequently, by virtue of greater rocking motion of the seat 3, the user is able to take exercise with higher effectiveness.

 It should be understood that the exercise machine of seat type 1 pursuant to the present invention is not limited to the

embodiment described hereinabove, and that particulars that are not explicitly specified in the disclosed embodiment, for example, working conditions, operation conditions, and the dimensions and weights of the constituent components are determined in the light of the common knowledge of those skilled in the art within the usual range.

[Explanation of Reference Symbols]

[0036]

- 1 Seating exercise machine
- 2 Casing section
- 3 Seat section
- 3A Upper seat body
- 4 Rocking mechanism
- 5 Driving mechanism
- 6 Lower casing
- 7 Upper casing
- 8 Recess (Housing recess)
- 9 Placement stand
- 10 Leg portion
- 11 Foot portion
- 12 Through hole
- 13 Rotation shaft
- 14 Gear
- 15 Conversion section
- 16L Left-hand support

16R	Right-hand support
17	Bearing
18	Annular fit portion
19	Rotation restraining portion
20	Slot
21	Driving motor
22	Power transmission shaft
23	Rotary boss portion
24	Sloping face
25	Opening
26	Shaft bearing
27	Reinforcement rib

CLAIMS

1. An exercise machine of seat type comprising:
a seat where a user is able to sit;
a rocking mechanism for rocking said seat at least in a horizontal direction;
a driving mechanism for driving said rocking mechanism;
and
a placement stand on which are placed said rocking mechanism and said driving mechanism,
said rocking mechanism comprising a horizontally-extending rotation shaft which is rotated under a driving force exerted by the driving mechanism, and a single conversion section for converting a rotation of said rotation shaft into horizontal rocking motion.
2. The exercise machine of seat type according to claim 1, wherein said conversion section is located centrally of said rotation shaft in the horizontal direction.
3. The exercise machine of seat type according to claim 1, wherein said conversion section comprises:
a rotary boss portion attached for unitary rotation to said rotation shaft, an outer peripheral surface of which is formed with a sloping face inclined with respect to an axis of

said rotation shaft;

an annular fit portion rotatably fitted onto the sloping face of said rotary boss portion, for supporting said seat from below; and

a rotation restraining portion for restraining said annular fit portion against unitary rotation in sync with the rotation of said rotation shaft.

4. The exercise machine of seat type according to claim 3, wherein said placement stand is formed with an horizontally-extending slot for receiving part of said rotation restraining portion and for guiding said rotation restraining portion in horizontal movement.

5. The exercise machine of seat type according to any one of claims 1 to 4,

wherein at least a periphery of said seat is made of an elastic body.