A bed-shaped exerciser comprising a mechanism for lifting up and moving down alternately right and left legs of user lying on the bed-shaped exerciser and facing upward and a mechanism for swinging the body of user leftward and rightward with the feet being fixed.

Further, a bed-shaped exerciser comprising a bed wherein there are arranged at one end side of an upper surface of a bed body a pair of foot-holding elements for legs exercise for lifting up and moving down alternately right and left feet of user lying on the bed and facing upward, the bed body consisting a separately provided part including the foot-holding element, and the separately provided part of the bed body being adapted to be able to move up and down or rotate with respect to the other part of the bed body.
BEDI-SHAPED EXERCISER

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a bed-shaped exerciser and its construction having a function that a user lying on the exercise-bed and facing upward puts their feet on a predetermined pair of foot-holding elements to activate and move the foot-holding elements in order to start exercise of legs and feet.


[0004] Patients having long been in a hospital or persons being long bedridden almost surely have muscles of and near legs declined or become weaker. Being long bedridden is likely to lead to poor blood circulation to legs, causing an additional symptom of any possible diseases, whereby the situation of being bedridden is not at all wiped away in the worst case due to the additional symptom of disease. For the purpose of avoiding the problem, various attempts and countermeasures have been hitherto taken for keeping muscular strength or power.

[0005] In detail, at a stage when patients recover to some extent from diseases or injuries, the so-called rehabilitation is carried out to apply to patients physiotherapeutic instruments and equipments such as a walk-trainer or the like for regaining muscular power so as to facilitate recovery of the patients. As an actual point of matters, the start of rehabilitation exercise is often likely to delay, i.e., to be hindered due to patients complaining of pains even after a stage when patients could readily regain original functions of organs. Furthermore, in case of aged persons who generally get leg muscles weaken, it is often hard from bitterness of pains for the aged persons to continue exercises, which they carry out on the basis of their intention, such as bending and stretching exercises of legs or walking.

[0006] By sitting on a chair for many hours it possibly happens to cause “economy class syndrome or long flight thrombosis” (Pulmonary Thromboembolism) i.e., to generate thrombus at a bent hip joint or knee joint, or a pressurized thigh or crus. The generated thrombi flow through blood circulation in the body, occasionally leading to a serious disorder, particularly, death. Minutely, the “economy class syndrome” or Pulmonary Thromboembolism occurs often in staying and sleeping in an air plane in a long distance route or in a car provided with no bed therein. Moreover, the disorder also occurs in persons engaging in desk work and in those whose occupation is to drive cars. Thus, it will be conceivable that the number of persons who to take countermeasures against the pulmonary thromboembolism must be large substantially.

[0007] From the above background various apparatuses, devices or instruments, as called therapeutic or health apparatuses or the like are commercially available on the market. But they are seldom long kept in use. A principal reason for it is “bitterness” users or patients feel when they continuously try to activate their muscles by themselves while sensing load.

[0008] In detail, those among various instruments for use in rehabilitation exercise after recovery from injuries or diseases, and those used for complementing lack of exercise for substantially healthy persons in their ordinary everyday life are, conventionally, adapted to cause users or patients to stretch and contract muscles by themselves. Hence, it is quite severe for the users to impose on themselves continuation of using of those conventional apparatuses or instruments even after they feel and sense pains and fatigue. And also, it is much hard for a third person to keep forcing users or patients to continue using of those conventional apparatuses or instruments. Moreover, the constructions of the apparatuses, etc did not give users comfortable use, so that in most cases users easily stop using such apparatuses without achieving desired goal or purpose.

SUMMARY OF THE INVENTION

[0009] Under the above circumstances the Inventor long zealously studied and finally achieved a bed-shaped exerciser according to the present invention characterized in the bed-shaped exerciser comprising a mechanism for lifting up and moving down alternately right and left legs of user lying on the bed-shaped exerciser and facing upward and a mechanism for swinging the body of user leftward and rightward with the feet being fixed.

[0010] In detail, it can be said that the exerciser according to the present invention applies to the body of person lying on the exerciser and facing upward the exertion of an external driving source so as to cause expansion and contraction of muscles, and the exerciser is designed to have configuration of expansion and contraction of muscles similar to that obtainable in actual running (or walking as or when required).

[0011] Although arms are also swung upon actual jogging or walking, the present invention aims to expand and contract muscles of and near legs and feet but not those extending from shoulder joints to remote ends of finger tips of arms.

[0012] The foregoing “mechanism for lifting up and moving down alternately right and left legs of user lying on the bed-shaped exerciser and facing upward” has been hitherto proposed and commercially available. And the mechanism “for swinging rightward and leftward the body of user lying on the exerciser and facing upward with feet and head being fixed” has been recently called “goldfish motion exerciser” and variously and much commercially available on the market. The present invention can be said to have combination of functions of these mechanisms. It has been found that in the present invention, the cycle of lifting up and moving down legs and the cycle of swinging the body are adjusted and also amplitude adjusted, so that expansion and contraction of muscles to be mistaken for that obtainable in actual walking (or running) is provided merely in the posture of lying and without applying forces by users themselves. Thus, the mechanism for lifting up and moving down alternately right and left legs of user lying on the bed-shaped exerciser and facing upward, and the mechanism for swinging rightward and leftward the body of user lying on the exerciser and facing upward with legs being fixed are not at all defined here minutely. The above adjustment of those mechanisms may be carried out in such manner that several patterns of combinations of cycles and amplitudes with respect to movement of the two mechanisms are previously set and any one of a plurality of corresponding switch buttons is chosen by users to switch on. Due to large
difference among specific individuals the two mechanisms are preferably adjusted separately or individually to have desired exercises depending upon specific occasions. The adjustment may be made specially to realize or reproduce muscular expansion and contraction exercise resembling to “soma or trunk exercise” in swimming and “twisting exercise” in dancing.

[0013] By using the present invention exercise is enabled with power of a driving source housed in the apparatus. Thus, the present invention is applicable to rehabilitation of patients after recovery from injuries or diseases to show a sufficient effect. Also, people living in everyday ordinary life but worried about lack of exercise may use the present invention in order to eliminate lack of exercise. Furthermore, the present invention may be provided in air planes, buses, or trains in their long distance routes to prevent the foregoing “economy class syndrome” and show sure and absolute effects.

[0014] The present invention further proposes a structure that fine adjustment corresponding to states of users (patients) is able to be carried out simply and sufficiently. For example, in use for rehabilitation exercise after recovery from injuries and diseases, it is necessary to synthetically judge kinds of diseases, degree of recovery, figures of human bodies of patients, or the like, determine optimum patterns of exercise, and reflect the determined exercise patterns in the movement patterns of the exercisers. This problem is also solved by the present invention.

[0015] In detail, the second invention is a bed so constructed that: there are arranged at one end side of an upper surface of a bed body a pair of foot-holding elements for legs exercise for lifting up and moving down alternately right and left feet of user lying on the bed and facing upward; the bed body comprising a separately provided part including the foot-holding element; and the separately provided part of the bed body being adapted to be able to move up and down or rotate with respect to the other part of the bed body, or, a part of the bed body except the separately provided part being able to move up and down with respect to the separately provided part.

[0016] A member for movement of moving up and down is separate from the bed body and is fixed at a proper position set by turning or shifting up and down this member so as to be usable as an exerciser. By this, a delicate and complicated movement of legs, which is not at all provided merely by changing amplitude and cycles, is able to be reproduced, thereby providing an ideal exerciser that finely deals with kinds and degree of injuries and diseases, degree of recovery therefore, figures of human bodies of patients, etc.

[0017] The above second invention also essentially comprises the mechanism for “alternately lifting up and moving down right and left feet”. The movement of moving up and down contains as its concept the movement with rotation such as pedaling in a bicycle as well as the movement of mere moving feet up and down.

[0018] In the present invention, right and left feet are “moved” through a driving force of an electric motor, etc. That is, the present invention has a driving source which may be an electric motor usually or alternatively employ other mechanisms. Power for the electric motor may employ alternating current for domestic use or from stringing for electric cars or direct current from batteries used in automobiles.

[0019] Furthermore, in the present invention, the second invention may be also provided with a function allowing an exercise other than the legs exercise which function is essential in the first invention. Minutely, a bed member, i.e. an upper surface part of the part of the bed body not including the foot-holding element (i.e. the part on which the body from head to waist of user lying on the bed and facing upward is positioned) may be mounted to a bed base in capable of being rotated so as to swing around a longitudinal axis of the bed body, so that exercise of swinging (horizontal movement) rightward and leftward the body with head and feet being fixed. Right and left legs with feet are alternately lifted up and moved down and the movement of legs is coupled with the movement of swinging (the body rightward and leftward, thereby providing a movement complicatedly combining contraction of muscles, bending and stretching of joints, and twisting movement of body.

[0020] The feature of the twisting movement may be modified in such manner that the upper part of the body and the waist part of user are each twisted oppositely to each other, thereby providing a more optimum exercise. The construction for this purpose comprises the bed member (a mattress means) which is an upper surface part of the bed body and divided into many parts of the longitudinal direction of the bed body, the two halves of bed member being adapted to be swung with the swinging phases being displaced about ½ cycle, so that such exercise may be enabled as both shoulders of user being directed to the right side while the waist to the left side with the head and legs being directed upward.

[0021] At the stage of trial experiments the exerciser with the above construction according to the present invention was tried by a man of 67 years old who is not at all able to walk by himself since he suffered from cerebral infarction seven years ago to have the right side of the body paralyzed. We obtained such result that after 30 minutes of use of the present invention he was enabled to walk several steps by himself although using a walking stick, and then, the number of steps he walks has gradually increased. Mechanism of recovery of his walking function (medical theories) in this case has not yet been clarified, but it is inferred from that trial by the man that the present invention has a possibility including capacities providing effects not expected from the conventional apparatuses for rehabilitation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] FIG. 1 is a schematic perspective view showing an example of a bed-shaped exerciser according to the present invention.

[0023] FIG. 2 is a schematic perspective view showing another example of the bed-shaped exerciser according to the present invention.

[0024] FIG. 3 is a schematic perspective view showing a further example of the bed-shaped exerciser according to the present invention.

[0025] FIGS. 4(a) and 4(b) are schematic side views each showing motions of separately provided parts of the bed-shaped exerciser according to the present invention.
FIG. 5 is a schematic perspective view showing another example of a bed member.

DETAILED DESCRIPTION OF THE INVENTION

Embodiments

Next, the present invention will be detailed with referring to the attached drawings.

FIG. 1 shows an example of an exerciser according to the present invention (called the exerciser hereunder). As seen in FIG. 1, the exerciser 1 is in a shape of a therapeutic bed as a whole and has several members projecting from the bed body. A mattress part 2 forms an upper part of the bed body. A pillow member 3 for rest of user's head is fixed on a pillow lever 31 projecting from the inside of the bed body near one end of the mattress part 2. The pillow lever 31 extends through an elongated bore 21 on the mattress part 2 and is fixed detachably to a bed body frame so that the pillow lever 31 is independent from movement of the mattress part 2 and is able to be detached. Although not shown, without providing the pillow lever 31 or the elongated bore 21, an ordinary pillow may be employed to be placed directly on the mattress part 2, naturally making the construction of the bed body simple and readily lowering occurrence rate of troubles and cost to produce.

The mattress part 2 is partially divided at the other end to form a stationary mattress part 22 which is fixed to the bed body frame. The other part of the mattress part 2 is adapted to be vibrated or swung leftward and rightward in the horizontal direction by means of a driving device (not shown) mounted inside the bed body. The vibration (swing) is adjustable in frequency and amplitude.

Two cylinders 4 project from the stationary mattress part 22 and communicate with a driving device (not shown) provided inside the bed body to be controlled to be alternately lifted up and moved down. A foot-holding element 41 is fit and fixed onto utmost end of the cylinder 4.

Accordingly, user goes up the exerciser 1 and lies thereon using the pillow member 3, facing upward and placing feet on the foot-holding elements 41. All the driving devices are driven to cause user's feet to be alternately lifted up and moved down and cause user's waist to be swung leftward and rightward with user's head being kept in a predetermined position.

An example of this exercise is referred to here. Legs undergo exercise of going to and coming back in the range 2-20 cm height with respect to the surface of mattress 2 (as a standard height "0 cm"). Waist does "go to and come back" exercise between left and right sides in 3 cm amplitude. A cycle for these exercise is adjusted to be 1.5 sec. And configurations or patterns of vibration (swinging) in legs and waist exercises have been controlled and adjusted so that waist is placed at the utmost right side end when the left cylinder 4 is in a highest position. At this time the left leg is stretched or expanded and the right leg bent, and they may be reversed in operation with the right cylinder 4 being in a highest position. Although not illustrated, height, amplitude, cycles, etc. are each adjustable and so constructed to flexibly deal with human bodies figures and physical strength of users. Furthermore, a feature of driving may employ an intermittent driving using an electrical or mechanical means but not the foregoing feature of continuous vibration (swinging).

As said above, the present invention has the unique motion that waist of user is swung leftward or rightward while legs are alternately lifted up and moved down. Upon the trial experiments carried out by the inventor, most of the participants in the trial (13 persons among the total 18) showed such results as their feeling of suitability in use of the present invention, for example, their sensing of expansion and contraction of muscles resembling to that of actual walking upon a slope of smaller slant, or, with their eyes being closed the participants being brought into a mood of actual walking. The other 5 people did not include an aged person (older than 65 years old) but included thirty 3, forties 1, and one person of 52 years old. We judged that even if user has complaints, it would be not those causing troubles on physical conditions, as typically seen in an opinion (from a man of forties) that too less quantity of exercise leads to a feeling of quite little fatigue, in consideration of "trial experiment of an exerciser".

Furthermore, the exerciser according to the present invention is classified as those that has less consumption of physical strength and does not force users to perform severe movement, in comparison with a general physiotherapeutic apparatuses and instruments hitherto proposed for recovery of muscles. In other words, there is mere less possibility of occurrence of a harmful effect even if specialists such as doctors, physiotherapists, trainers, etc. do not always observe specific situations. Hence, the present invention, which is basically to be provided in a rehabilitation center, a surgical therapeutic room, a bonesetter's office or the like, may be applied to various cases as a readily managed useful apparatus. For example, the exerciser according to the present invention, at least one or several, may be provided in air planes in a long distance route so as to be usable by any passengers who complain of a sense of incongruity on legs, whereby enabling to prevent the "economy class or long flight syndrome (Pulmonary Thromboembolism)" with secured and absolute effects. The exerciser shows the same effect in buses and trains in a long distance route (e.g. "Shinkansen"). And the exerciser, when provided in offices, for example, of a taxi company wherein workers, i.e. taxi drivers in this case have to long keep a posture of sitting in service, is able to recover stagnant blood flow in legs vein in a short time. The exerciser is suitable for supplementing lack of exercise for those people.

FIG. 2 shows another example of the present invention, wherein a foot-holding element 41 is removed from the utmost end of a cylinder 4 and a pedal member 5 is fit thereto. The pedal member 5 comprises an axis 51 fixing at both ends a crank 52 with a pedal 53 having a foot-holder. The pedal member 5 is mounted to and stretched between the two cylinders 4 when projecting in the same height from the bed. The axis 51 is driven to be rotated in such manner that a belt 55 stretched on a pulley 54 fixed at the middle of the axis 51 is pressed against and contacted with a rotation roller 6 of a drive device (not shown) inside the bed, thereby allowing rotation of the rotation roller 6 to be transmitted through a frictional force. The pedal member 5 is in a cassette-like structure comprising a housing accommodating the pulley 54 and the belt 55 and is detached and re-mounted as or when required. In the drawing, only one of
the foot-holding elements 41 is removed and illustrated. Naturally, both of the foot-holding elements 41 are, practically, first removed and the pedal member 5 is then mounted there.

[0036] FIG. 3 shows an example of a bed-shaped exerciser 1 according to the present invention (called "the exerciser 1" hereunder). As clearly seen in the drawing, the exerciser 1 is in the form of a bed as a whole. User lies on the bed, faces upward and put feet on the foot-holding elements 41 at the end of the bed, and turns on a drive switch (not numbered) arranged on a control panel 17. The foot-holding elements 41 are then each lifted up and moved down in such manner as the phase being shifted or displaced a half (½) with the cycle being the same, thereby providing user with a motion like the flutter kick in swimming. A separately provided part 11 is a member comprising the foot-holding elements 41 and a motor (not shown) as a driving means for the foot-holding elements 41. The separately provided part 11 is separated in construction from the other part, i.e. a bed body part 12. That is, the exerciser 1 is an exerciser formed with the bed body part 12 and the separately provided part 11.

[0037] The bed body part 12 is provided with a bed member 23 (a mattress) and a bed base 24 supporting the bed member 23. The bed member 23 and the bed base 24 are connected with each other through a swing mechanism (not seen in FIG. 3) so that the bed member 23 only is able to do swinging movement (shown in the drawing by thick arrows) around a longitudinal axis of the bed member 23. Furthermore, similarly to that of FIG. 1, a pillow member 3 in this example is also provided on a support or a prop 31 which is fixed at one end to the bed base 24 so as to prevent user’s head from swinging following the swing movement of the bed member 23. The bed member 23 is provided with an elongate bore 32 through which the prop 31 extends, the elongate bore 32 not interfering with the swing movement of the bed member 23. By this construction a “twisting movement or exercise” is enabled at the neck, i.e., between the head and shoulders, upon the swing movement.

[0038] The separately provided part 11 may be rotated or lifted up and moved down with respect to the bed body part 12 as shown in the examples illustrated in FIGS. 4(a) and 4(b). Shown in FIG. 4(a) is the construction that the separately provided part 11 and the bed body part 12 are connected in such manner of capable of being rotated around between their upper end edges so as to allow the separately provided part 11 to be rotated. Preferably there is provided a retaining function for retaining the separately provided part 11 at a desired position in the rotating although not shown in the drawing.

[0039] FIG. 4(b) shows the construction that the separately provided part 11 in the state of almost contacting with the bed body part 12 expands and contracts in the vertical direction to change in height. Mechanism for expanding and contracting the separately provided part 11 may properly employ known techniques such as a telescopic structure using hydraulic cylinder and therefore is not detailed and illustrated here. In case of lifting up and moving down the separately provided part 11, the separately provided part 11 is to be provided in the inside with a mechanism for lifting up and moving down the foot-holding elements 41 and a mechanism for lifting up and moving down the separately provided part 11 itself, whereby making hard manufacturing and maintenance depending upon occasions. Thus, alternatively, the bed body part 12 or its components may be adapted to be lifted up and moved down (not shown).

[0040] FIG. 5 shows a further example of the bed member 23 which is divided in two in the longitudinal direction of the bed, the two halves being shifted or displaced from each other about a half cycle in the swing movement phase. User lies on the bed, facing upward with both shoulders being placed on one half of the bed member 23 and waist on the other half, while the head of user is put on the pillow and feet on the foot-holding elements 41, thereby providing the twist movement on the various parts of the whole body.

EFFECTS OF THE INVENTION

[0041] The exerciser according to the present invention has the following advantages.

[0042] (1) Exercise of expanding and contracting muscles of the body and legs of patients can be performed by patients lying on the bed. For patients long bedridden such as those being long in a hospital, contraction and contracture of muscles are mitigated. And exercise in place of rehabilitation or preliminary exercise to be carried out prior to start of rehabilitation are provided.

[0043] (2) In use of the exerciser, user does not apply a force by himself/herself to expand and contract muscles. Usually, in case that people worrying their lack of exercise try to make exercise for eliminating lack of exercise, and long continue it, they often feel “bitterness” which is a hazard. According to the invention, without feeling the bitterness people can continue such exercise, therefore, for a long time, and obtain a larger effect from the exercise in comparison with the conventional exercise including severe exercise to be performed in a short time.

[0044] (3) According to the feature that the part causing legs to be lifted up and moved down is separate from the bed body, rotation and lifting up and moving down movements are made with respect to the bed body. Hence, adjustment of instruments is enabled for reproducing optimum exercises for specific patients who desire and require different patterns of exercises.

[0045] (4) The present invention may be mounted or arranged in air planes and trains or the like to be used by passengers properly in order to simply and surely prevent the “economy class syndrome or long flight pulmonary thromboembolism” caused mainly by keeping posture of sitting for many hours.

What we claimed is:

1. A bed-shaped exerciser comprising a mechanism for lifting up and moving down alternately right and left legs of user lying on the bed-shaped exerciser and facing upward and a mechanism for swinging the body of user leftward and rightward with the feet being fixed.

2. A bed-shaped exerciser comprising a bed wherein there are arranged at one end side of an upper surface of a bed body a pair of foot-holding element for legs exercise for lifting up and moving down alternately right and left feet of user lying on the bed and facing upward, the bed body consisting a separately provided part including the foot-holding element, and the separately provided part of the bed
body being adapted to be able to move up and down or rotate with respect to the other part of the bed body.

3. A bed-shaped exerciser as set forth in claim 2 wherein a bed member of said the other part of bed body is mounted to a bed base in capable of being rotated to make swing movement around a longitudinal axis of the bed body.

4. A bed-shaped exerciser as set forth in claim 3 wherein a bed member of said the other part of bed body is divided in two in the longitudinal direction of the bed body, the two halves being shifted with each other about a half cycle in the swing movement phase.

5. A bed-shaped exerciser comprising a bed wherein there are arranged at one end side of an upper surface of a bed body a pair of foot-holding elements for legs exercise for lifting up and moving down alternately right and left feet of user lying on the bed and facing upward, the bed body consisting a separately provided part including the foot-holding element, and a part except the separately provided part of the bed body being adapted to be able to move up and down with respect to the separately provided part.

6. A bed-shaped exerciser as set forth in claim 5 wherein a bed member of that part except the separately provided part is mounted to a bed base in capable of being rotated to make swing movement around a longitudinal axis of the bed body.

7. A bed-shaped exerciser as set forth in claim 6 wherein a bed member of that part except the separately provided part is divided in two in the longitudinal direction of the bed body, the two halves being shifted with each other about a half cycle in the swing movement phase.

* * * * *