Featured is a rowing simulation machine including a single base having a first pair of spaced apart rails; a carriage having a second pair of spaced apart rails and engaged with the first pair of rails and moveable therealong in a generally horizontal translation; a seat engaged with the second pair of rails and moveable therealong in a generally horizontal translation. Also included is an energy dissipating unit fixed to the carriage. The energy dissipating unit includes a frame for supporting a flywheel, the flywheel being rotatably mounted on a flywheel shaft; a handle; a drive device connected to the handle, for converting a translation of the handle into a flywheel rotation; and a take up device for rewinding and maintaining a predetermined tension on the drive device. The carriage includes a foot rest assembly disposed therein between the second pair of spaced apart rails.
DYNAMIC ROWING MACHINE

TECHNICAL FIELD

[0001] The present invention relates to rowing simulation machines and in particular to dynamic rowing machines.

BACKGROUND

[0002] Rowing machines are well-known for the purposes of building up general fitness and/or for training specifically for rowing and related sports. Rowing machines allow the user to exercise both upper body and lower body strength by simulating roughly the movement required to propel a row boat through the water.

[0003] There is a variety of prior art rowing machines, including stationary rowing machines used in gymnasiums, rowing clubs and the like. In many instances these stationary rowing machines are used as ergometers. One such prior art stationary rowing machine is shown in U.S. Pat. No. 4,396,188 (Dreissigacker et al.). This machine has a monorail beam upon which a seat with rollers is able to slidably move therealong. A second beam (or arm) supporting a flywheel/fan mechanism is connected at the front end of the monorail beam. The beam has footrests on either side thereof. A rowing handle is connected to the flywheel/fan mechanism via a drive cable. The flywheel/fan mechanism acts as an “energy dissipating system” and is stationary relative to the frame. A rower (user) seated in the movable seat and with feet secured to the footrests, is able to exercise by holding the rowing handle. Typically the user will start in a “catch position”, then drives backwards by extending his legs and swinging his torso through the vertical position, and finishes the stroke by drawing the handle into his abdomen. The user then uses his legs to draw his body back to the catch position.

[0004] There are also variations on similar machines where drag mechanisms acting on air or water provide resistance to the rower.

[0005] There are also known rowing machines that simulate or attempt to simulate the movement of oars such as U.S. Pat. No. 4,743,011 (Coffey), U.S. Pat. No. 5,092,581 (Koz) and Publication No. WO2005/025685 (Roach). Most of these machines have oars or other components simulating the movement of oars, and generally require more space than the machines of the type shown in U.S. Pat. No. 4,396,188. These rowing machines that simulate oars are generally more complex and costly than stationary rowing machines, and occupy more space when in use.

[0006] As such, there has been a preference in many rowing clubs to use the stationary rowing machines similar to those shown in U.S. Pat. No. 4,396,188, particularly where cost and space are of importance. However, these known stationary rowing machines are acknowledged by health professionals as being potentially detrimental to the rower, by increasing the likelihood of injury to the rower’s knee, back and shoulders due to the increased loading on the body. Another disadvantage is that they cause rowers to develop improper coordination patterns.

[0007] A number of attempts have been made to provide a dynamically balanced rowing machine, which more closely simulates the power distribution characteristics of rowed boats, to overcome the disadvantages and health risks associated with stationary rowing machines.

[0008] U.S. Pat. No. 5,382,210 (Rekers) describes a dynamically balanced rowing simulator with an independently moving energy dissipating system and seat mounted on a substantially horizontal monorail beam frame. At least one end of the monorail is curved to prohibit the moving energy dissipating system and seated rower from hitting the end stops of the monorail beam frame during use, and to operate in the centre of the monorail beam length.

[0009] Another attempt to provide a dynamic rowing simulator, is to mount a stationary rowing machine of the type described in U.S. Pat. No. 4,396,188 on a sliding track system as is offered by Concept 2, Inc. as a “Concept 2 Slide”. The sliding track system comprises two slides. Each slide comprises a base with two tracks and a carriage with wheels that runs on the tracks. Light shock cord tension keeps the carriage centered on the base. It takes two slides aligned aft to form to “float” or “dynamically support” a prior art stationary rowing machine. By mounting the complete stationary rowing machine on a fore and aft sliding track system the rowing machine converts to a dynamic rowing machine whereby the seat and the energy dissipating system can now move independently of each other.

[0010] The disadvantage of the prior art stationary machine being mounted on sliding tracks to convert to a dynamic rowing simulator, is that the substantial length of floorspace area it uses and the risk to the rower getting on and off the machine, and to others in close proximity of the moving tracks at floor level. Also the sliding tracks are large accessories that have to be stored separately when not in use. The sliding tracks also make it difficult/practical to maintain the hygiene of the floorspace below the machine after active use of the machine, particularly important in public gyms and rowing clubs.

[0011] The “Concept 2 Slide” system is also designed to allow two or more machines to be connected end to end to simulate a crew boat. The space required to connect these machines in a room is significant.

[0012] Whilst these prior art dynamic simulators provide a realistic motion and the benefits are widely publicised, the foot plate where the rower attaches his feet are mounted either side of a monorail beam or energy dissipating unit, and increase the width position of the feet further apart than would be found in a conventional rowing boat. This is a disadvantage, as to correctly simulate the biodynamics of the rower’s leg drive during the rowing stroke it is preferable that the rower’s feet be positioned closer together, than can be achieved with his feet on either side of a monorail beam, as is the case with the Concept 2 machines.

[0013] Because the power distribution character of a dynamic rowing machine is closest to the power distribution profile of what is produced in a rowing boat, it is then important that the use of rowing machines for training to be utilised and maximised to achieve the optimum performance from the rower. Studies have found that the foot position of the rower can affect the efficiency, effectiveness and maximum power output of the rowers. Therefore the ability to use on a dynamic rowing machine the same efficient foot plate system as used on row boats, would ameliorate rowing simulation machines and the training of rowers using them.

SUMMARY OF INVENTION

[0014] According to a first aspect the present invention consists in a rowing simulation machine comprising: a single base having a first pair of spaced apart rails; a carriage having a second pair of spaced apart rails is engaged with said first pair of spaced apart rails of said base and moveable therealong in a generally horizontal translation; a seat engaged with said second pair of spaced apart rails of said carriage and moveable therealong in a generally horizontal translation;
an energy dissipating unit fixed to the carriage, said energy dissipating unit comprising: a frame for supporting a flywheel, said flywheel rotatably mounted on a flywheel shaft; a handle; a drive means connected to said handle, for converting a translation of said handle into a rotation of said flywheel; a take up means, for rewinding and maintaining a predetermined tension on said drive means; and wherein said carriage has a foot rest assembly disposed therein between said second pair of spaced apart rails.

0015 Preferably in use said seat and carriage move relative to each other and relative to said base.

0016 Preferably the length of each rail of said first set of rails is longer than the length of each rail of said second set. Preferably the length of each rail of said first set of rails is about 500 mm longer than the length of each rail of said second set.

0017 Preferably said carriage comprises rollers, which engage with said first set of spaced apart rails of said base.

0018 Preferably said seat comprises rollers, which engage with said second set of spaced apart rails of said carriage.

0019 Preferably a bias means is used to centre the carriage relative to said base.

0020 Preferably the footrest assembly is adapted to receive a foot plate system of the type used in a rowing boat.

0021 Preferably said base has a plurality of legs.

0022 Preferably said legs are height adjustable.

0023 Preferably a like machine can be connected thereto in an end to end relationship to simulate crew rowing.

0024 Preferably a like machine can be connected thereto in side by side relationship.

0025 Preferably said carriage can be locked to said base so that no relative movement occurs therebetween.

0026 Preferably said flywheel is mounted to one side of said frame.

0027 Preferably said base comprises wheels that can be used to assist moving said machine, when machine is stood up so that its aft-end is above its fore-end.

0028 Preferably each of said rails of said second set of rails is curved or inclined at least one end thereof.

0029 Preferably said take up means comprises an elastic cord and plurality of pulleys.

0030 Preferably said rails of said second pair of spaced apart rails having opposed internal side walls facing each other, and wherein when in use the feet of user are seated within said foot rest assembly, and the heels of said user are disposed between said side walls.

0031 According to a second aspect the present invention consists in a rowing simulation machine comprising:

a base having a first pair of spaced apart rails elevated above the ground;
a carriage having a second pair of spaced apart rails is engaged with said first pair of spaced apart rails of said base and moveable therealong in a generally horizontal translation, said rails of said second pair of spaced rails having opposed internal side walls facing each other;
a seat engaged with said second pair of spaced apart rails of said carriage and moveable therealong in a generally horizontal translation;
an energy dissipating unit fixed to the carriage, said energy dissipating unit comprising:
a frame for supporting a flywheel, said flywheel rotatably mounted on a flywheel shaft;
a handle;
a drive means connected to said handle, for converting a translation of said handle into a rotation of said flywheel;
a take up means, for rewinding and maintaining a predetermined tension on said drive means; and wherein said carriage has a foot rest assembly disposed therein between said second pair of spaced apart rails, said foot rest assembly comprising mounts for the removable attachment of a row boat foot plate system, and wherein in use the feet of a user are seated within said row boat foot plate system such that the heels of said user are disposed between said opposed internal side walls.

BRIEF DESCRIPTION OF DRAWINGS

0032 A preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

0033 FIG. 1 is a front perspective view of a rowing simulation machine according to a first preferred embodiment.

0034 FIG. 2 is a rear perspective view of the rowing simulation machine of FIG. 1.

0035 FIG. 3 is an enlarged aft end view of the rowing simulation machine of FIG. 1.

0036 FIG. 4 is an elevation view of the rowing simulation machine of FIG. 1.

0037 FIG. 5 is an elevation view of the rowing simulation machine of FIG. 1, with the carriage moved rearwardly so that it overhangs the aft-end of the base.

0038 FIG. 6 is an elevation view of the rowing simulation machine of FIG. 1, with the carriage moved forwardly so that carriage is centrally positioned relative to the base.

0039 FIG. 7 is an elevation view of the rowing simulation machine of FIG. 1, with the carriage moved forwardly so that it overhangs the fore-end of the base.

0040 FIG. 8 is an elevation view of a rower using the rowing simulation machine, with the rower shown in two distinct positions.

0041 FIG. 9 is an exploded front perspective view of rowing simulation machine.

DESCRIPTION OF PREFERRED EMBODIMENT

0042 FIGS. 1 to 9 depict a rowing simulation machine 1 on which a user (rower) simulates a rowing motion. The rowing simulation machine 1 imparts a resistance to the rowing.

0043 Rowing simulation machine 1 comprises a single base 2, a carriage 3, a seat 4, and an energy dissipating unit 5. Rowing simulation machine 1 has a fore-end 6, and aft-end 7.

0044 Base 2 has a first pair of spaced apart rails 8 held in parallel relationship to each other by base cross-members 9. Base 2 also has ground engaging legs 10 which are height adjustable. Wheels 25 are attached to leg(s) 10 near the fore-end 6 of machine 1. Wheels 25 are provided so that they can be used to assist moving of machine 1, when machine is stood up so that its aft-end 7 is above its fore-end 6, for storage, space saving and cleaning of the floor beneath.

0045 Carriage 3 has a second pair of spaced apart rails 11 held in parallel relationship to each other by carriage cross-members 12. Carriage 3 having rollers 14 disposed on the under side of second pair of rails 11 is engaged with first pair of rails 8 of base 2, and moveable therealong in a generally horizontal translation. Rollers 14 which are attached to car-
riage 3 are best seen in FIG. 9. Each rail 11 has an internal side wall 26. The side walls 26 of rails 11 are opposed to and face each other.

[0046] Seat 4 having rollers 15 disposed thereon, is engaged with rails 11 and moveable therealong in a generally horizontal translation. Seat 4 may preferably be attached to a bias means (not shown), such as an elastic cord which is used to centre carriage 3 relative to base 2.

[0047] The length of each rail 8 of the first pair of rails on base 2 is longer than the length of each rail 11 of the second pair of rails on carriage 3. The length of each rail 8 of the first pair of rails is preferably about 500 mm longer than the length of each rail 11 of the second pair.

[0048] Energy dissipating unit 5 is fixed to carriage 3. Energy dissipating unit 5 comprises a frame 16 for supporting a flywheel 17 mounted on a rotatable shaft 18. In this embodiment flywheel 17 is a conventional flywheel that provides resistance by air, however in another not shown embodiments could provide resistance by water or magnetic means.

[0049] A handle 19 is connected to a drive means 20 for converting a translation of handle 19 into a rotation of flywheel 17. In this embodiment drive means 20 is a bicycle type chain, however in other not shown embodiment cable, belt or rope may be substituted for the chain.

[0050] Chain 20 passes through a take up means that allows chain 20 long enough to permit a normal stroke of about 1.6 meters to be housed in a relatively small compartment. The detail of the take up means is not provided here, as it can be of a known type using elastic cord and pulleys, such as that described with reference to FIG. 2 of U.S. Pat. No. 5,382,210.

[0051] Flywheel 17 may have an adjustable resistive load. Details of how the resistive load flywheel can be adjusted by conventional means known in the prior art, including U.S. Pat. No. 5,382,210.

[0052] Energy dissipation unit 5 also includes a conventional monitoring unit 13, including a display panel, tachometer and the like for monitoring training and for ergometer use.

[0053] A foot rest assembly 21 is disposed within carriage 2 between the second set of rails 11. The foot rest assembly 21 may preferably comprise mounts to receive a foot plate system 22, which is provided with the machine 1.

[0054] However, the provided foot plate system 22 may be replaced or interconnected with the foot plate systems used in rowing boats. This allows rowers to use exactly the same foot positioning they use in a boat. This ability to use the same foot positioning as achieved in a boat is achievable because carriage 2 is provided with a sufficient width between rails 11, so that the conventional row boat foot plate systems can be used.

[0055] This feature is important because it allows for correct biodynamic positioning of the feet due to the foot plate system being identical to, or near identical to a rowing boat, which is an advantage over the prior art foot rests which straddle beams or are not set up correctly due to other positioning constraints.

[0056] In use a rower (user) 30 is seated in seat 4, and places his feet in the foot plate system 22 mounted on assembly 21. The heels of the rower’s feet are disposed between the side walls 26 of rails 11, with carriage 3 mimicking or simulating a row boat. This can be seen from the positioning of heel portions 23 of foot plate system 22 in FIG. 2, and by the location of the feet 31 of rower 30 shown in FIG. 8.

[0057] The rower grasps handle 19 and begins to row. As carriage 3 and seat 4 are relatively moveable to each other as well as base 2, the machine 1 allows carriage 2 to move backward and forward under the rower. This action is similar to the movement of a boat on the water.

[0058] FIGS. 4 to 7, show various positions of the carriage as it is moved relative to the base.

[0059] FIG. 8 depicts an overlay view of a “rower 30” in two distinct positions, the first in a “catch position”, shown as A, and the second shown as B with legs extended similar to the end of stroke. The positions A and B are also indicated for the handle carriage 3, handle 19 and feet 31.

[0060] This relative movement between the seat, carriage and base together with the advantageous positioning of the rower’s feet, provides a simulation set-up which is dynamically desirable to mimic row boat rowing. As previously mentioned, a rower could transfer directly to machine 1 their foot plate system from the rowing boat. This is important, particularly at the elite level, where footplate systems have become more sophisticated and specifically tailored to compensate for the rower’s heel flexibility and optimum power output. It makes sense to be able to replicate the rower’s set up in the boat, on a rowing simulation machine relied upon for a significant proportion of alternate training load, if this customised set up is used to maximise performance and also avoid injury from repetitive movement exercise.

[0061] As previously indicated the spacing of rails 11 of carriage 3 allows the mounting of the conventional and modern/customised footplate systems available on the market today. The foot position can be varied to match different boat types where the foot spacings are of different widths.

[0062] Because the power distribution character of a dynamic “rowing simulation machine” is closest to the power distribution profile of what is produced in a rowing boat, it is then important that the use of rowing machines for training be utilised and maximised to achieve the optimum performance from the rower. Studies have found that the foot position of the rower can affect the efficiency, effectiveness and power output of the rowers. Therefore the ability to use the same row boat foot plate system that has been developed for this reason on rowing simulation machine 1 is advantageous.

[0063] It should be understood that the rowing simulation machine 1 of the present invention can also be connected in end-to-end relationship or side-by-side relationship to mimic real on water crew rowing. This is achieved by using simple rod connectors to join the carriages of the machines.

[0064] Another advantage of this embodiment of the present invention is that not only does it achieve “dynamic simulated rowing”, it also uses less floor space than the “Concept 2 Slide” sliding track system by Concept 2, Inc. This is because the overall length of the machine of the present embodiment can be constructed so that it is about 300 mm shorter than the Concept 2 Slide arrangement when stationary, and about 400 mm shorter comparing the extent of the machines when used dynamically.

[0065] The reduced overall length of the present embodiment, by eliminating the need to provide a pair of slides for each machine, improves greatly the floorspace required to connect two or more machines. This allows the possible connection of more machines in the space available. As most gyms and rowing clubs are limited in the space available for the crew simulation option, a reduced overall length and simplified connection method increases the opportunity for this crew simulation option.

[0066] Another advantage of the present embodiment of machine 1, when compared to the “Concept 2 Slide” prior art,
is that as a result of the shape and configuration of base 2 on legs 10, it is relatively easy to maintain the hygiene of the floorspace below machine 1, after active use of the machine. This is particularly important in public gyms and rowing clubs.

[0067] It should be noted that carriage 3 should preferably be lockable to base 2, so that the machine can be used in similar fashion to a stationary rowing machine to perform specific exercises or for coaching purposes.

[0068] In another not shown embodiment each of said rails of said second set of rails is curved or inclined at least one end thereof. This could be used instead of elastic cord centering, to prevent the seated rower from hitting the end stops of carriage 3 during use.

[0069] The term “comprising” as used herein (and its grammatical variations) is used in the inclusive sense of “having” or “including” and not in the exclusive sense of “consisting only of”.

1. A rowing simulation machine comprising:
   a single base having a first pair of spaced apart rails;
   a carriage having a second pair of spaced apart rails is engaged with said first pair of spaced apart rails of said base and moveable therealong in said generally horizontal translation;
   a seat engaged with said second pair of spaced apart rails of said carriage and moveable therealong in a generally horizontal translation;
   an energy dissipating unit fixed to the carriage, said energy dissipating unit comprising:
   a frame for supporting a flywheel, said flywheel rotatably mounted on a flywheel shaft;
   a handle;
   a drive means connected to said handle, for converting a translation of said handle into a rotation of said flywheel;
   a take up means, for rewinding and maintaining a pre-determined tension on said drive means; and
   wherein said carriage has a footrest assembly disposed therein between said second pair of spaced apart rails.
2. A rowing simulation machine as claimed in claim 1, wherein said seat and carriage move relative to each other and relative to said base.
3. A rowing simulation machine as claimed in claim 1, wherein the length of each rail of said first pair of rails is longer than the length of each rail of said second pair.
4. A rowing simulation machine as claimed in claim 3, wherein the length of each rail of said first pair of rails is about 500 mm longer than the length of each rail of said second pair.
5. A rowing simulation machine as claimed in claim 1, wherein said carriage comprising rollers which engage with said first set of spaced apart rails of said base.
6. A rowing simulation machine as claimed in claim 1, wherein said seat comprising rollers which engage with said second set of spaced apart rails of said carriage.
7. A rowing simulation machine as claimed in claim 1, wherein a bias means is used to centre the carriage relative to said base.
8. A rowing simulation machine as claimed in claim 1, wherein the footrest assembly is adapted to receive a foot plate system of the type used in a rowing boat.
9. A rowing simulation machine as claimed in claim 1, wherein said base has a plurality of legs.
10. A rowing simulation machine as claimed in claim 1, wherein said legs are height adjustable.
11. A rowing simulation machine as claimed in claim 1, wherein said legs are lockable.
12. A rowing simulation machine as claimed in claim 1, wherein said legs are height adjustable and lockable.
13. A rowing simulation machine as claimed in claim 1, wherein said carriage can be locked to said base so that no relative movement occurs therebetween.
14. A rowing simulation machine as claimed in claim 1, wherein said carriage is locked to said base so that no relative movement occurs therebetween.
15. A rowing simulation machine as claimed in claim 1, wherein said base comprises wheels that can be used to assist moving said machine, when machine is stood up so that its aft-end is above its fore-end.
16. A rowing simulation machine as claimed in claim 7, wherein said base comprises wheels that can be used to assist moving said machine, when machine is stood up so that its aft-end is above its fore-end.
17. A rowing simulation machine as claimed in claim 7, wherein said base comprises wheels that can be used to assist moving said machine, when machine is stood up so that its aft-end is above its fore-end.
18. A rowing simulation machine as claimed in claim 1, wherein said base comprises wheels that can be used to assist moving said machine, when machine is stood up so that its aft-end is above its fore-end.
19. A rowing simulation machine as claimed in claim 1, wherein said base comprises wheels that can be used to assist moving said machine, when machine is stood up so that its aft-end is above its fore-end.
20. A rowing simulation machine as claimed in claim 1, wherein said base comprises wheels that can be used to assist moving said machine, when machine is stood up so that its aft-end is above its fore-end.
21. (canceled)