Abstract Title: Exercise/physiotherapy platform

An exercise/physiotherapy apparatus comprises a platform 11 on whose surface a user stands and drive means 12 to tilt and/or yaw the platform surface repeatedly so that when the user stands on the platform and the drive means is operating the platforms tilting movements will tend to counteract the user's attempts to maintain an upright position.
EXERCISE/PHYSIOTHERAPY PLATFORM

Field of the Invention

The present invention relates to an exercise platform suitable for use in physiotherapy.

Review of the Art known to the Applicant

Following surgery to replace hip joints or knee joints, patients are usually given a series of specific exercises designed to rebuild muscle strength following the operation. Similarly, patients who have had a long period of inactivity following the breakage of a leg are also given similar exercises to rebuild their muscle tone and strength after the plaster cast is removed. It would therefore be advantageous if apparatus could be provided which would assist recuperating patients to recover the necessary muscle strength in the comfort of their own home in a way that the exercises carried out by the patient are optimised to maximise recuperation. Such a device is described and claimed herein.
Summary of the Invention

In its broadest aspect the invention provides exercise/physiotherapy apparatus comprising a platform on whose surface a user stands and drive means to tilt and/or yaw the platform surface repeatedly so that when the user stands on the platform and the drive means is operating, the platforms tilting movements will tend to counteract the user's attempts to maintain an upright position. The tilting of the platform is controlled such that the respective muscles that need strengthening are suitably exercised by the tilt of the platform as a user stands on the platform whilst trying to maintain an upright position. In this way, the exercise regime provided by the platform for a recovering patient can be optimised to suit the individual patient. Rotational (yaw) movement of the platform is particularly useful for exercising patients who are recovering from hip replacement operations. The device is intended for use by both people and animals.

Preferably, the apparatus further comprises one or more poles which insert into the platform to provide a support means for a user or attachment points for a harness. The poles can thus be used to assist the user when standing on the platform when the platform is tilting, such that only part of the patient's body weight is supported by the patient's legs. Alternatively, a harness may be suspended from the poles such that the majority of the weight of the user is supported by the harness and so a reduced amount of the patient's body weight is carried by the patient's legs. In this way damage to the muscles due to over exercising may be reduced to a minimum or avoided completely.

Preferably the platform further comprises indentations shaped to engage with the user's feet. This assists a user in maintaining their position on the platform during its use.

Preferably the platform further comprises straps, i.e. to assist a user in maintaining their position on the platform. The provision of straps helps a user of the device to maintain their position on the platform as it tilts.

Preferably means are provided to adjust the height of the platform. Thus the platform may be lowered to its minimum height to facilitate a user stepping on to and off the platform before and after use respectively.
Preferably the apparatus further comprises one or more poles which insert into a section of the apparatus other than the platform. In this way a support is supplied which is more stable than one which is attached to the platform itself. Additionally this assists a person using the device to rotate their upper body relative to their legs when the platform is yawing thus exercising hip joints more effectively.

Preferably indication means are provided to indicate the degree by which the platform is tilted or yawing. In this way, the use of the apparatus by a user may be supervised by a second person to ensure the platform does not tilt to a point where the muscles and/or joints of the patient are over exerted.

Preferably there is provided a safety cut-off mechanism such that if the user falls off the platform, it ceases to tilt or yaw. The provision of such a mechanism may be used to automatically inactivate the platform if a user falls off the platform to prevent the user being injured by further movement of the platform.

Preferably the apparatus further comprises an adjustment mechanism to allow adjustment of the rate and/or extent of movement of the platform. In this way, a person using the apparatus may limit the tilt and/or yaw of the platform to levels with which they are comfortable or a person supervising a user may set the tilt and/or yaw at pre-set rates suitable for the particular user.

Included within the scope of the invention is an exercise/physiotherapy apparatus substantially as described herein with reference to and/or as illustrated by any appropriate combination of the accompanying drawings.

**Brief Description of the Drawings**

The invention will be described by reference to the accompanying drawings in which:

Figure 1 is a schematic perspective view of a preferred embodiment of the invention.
Figure 2 is a schematic side view of a preferred embodiment of the invention.

Figure 3 is a schematic view of a meter which may be used to indicate the degree of tilt or yaw of a platform of the invention.

Figure 4 is a perspective view of foot-shaped indentations and straps for use with the platform of the invention.

Figure 5 is a perspective view of an indentation shaped for a person to sit on.

Figure 6 is a schematic side view of the invention with support means attached to a first platform.

Figure 6A is a schematic side view of the invention with support means attached to a second platform.

Figure 7 is a perspective view of a harness for use with the invention.

Figure 8 is a control means for use with the invention.

Figure 9 is an alternative means for tilting and rotating the platform.

Figure 9A is a schematic view of the inverted platform from figure 9.

Figure 9B is a schematic perspective view of the alternative tilting and rotating means with the platform removed.

Figure 10 is a schematic perspective view of a tilting platform forming the entire floor of an animal stall.
Description of the Preferred Embodiment

Referring initially to figure 1, there is shown an exercise/physiotherapy apparatus according to the present invention as generally indicated by 10. The apparatus comprises an upper platform 11 supported by three hydraulic rams 12 (it will be appreciated by the skilled person that alternatives to hydraulic rams are available, for instance, electronic actuator rams could be utilised for the same purpose). The drive mechanism (not shown) for the rams 12 being contained within a first sealed unit 13. The apparatus incorporates a second sealed unit 14, the upper surface which further comprises two apertures 15 into which supports for a user can be inserted.

Pairs of apertures 18A, 18B, 18C are provided in the platform 11 also for the insertion of supports. The first sealed unit 13 is mounted on the upper surface of the second sealed unit 14 using rotational means (yaw means) 16, as shown in figure 2, which allow the platform 11, hydraulic rams 12 and their associated drive mechanism in the sealed unit 12 to be rotated in the plane of the platform. The drive mechanism (not shown) for the rotational means is contained in unit 16.

Control means in the form of a hand-held unit 17 are provided to allow a person using the platform or a supervisor to operate the hydraulic rams 12 and the rotational means 16, such that the tilt and/or rotation of the platform can be set appropriately for the patient. Alternatively, pre-set programs may be chosen using the unit 17 which automatically set the tilt and rotation of the platform to settings appropriate for the recovery point of the patient.

Reference is now made to figure 3 of the drawings which show an indicator 30 which may be used to indicate the degree of tilt or yaw of the platform. Deflection of the needle from the vertical position shown being indicative of the degree of rotation or tilt of the platform 11 as appropriate. Known means are used to determine the degree of tilt or rotation of the platform and to transmit the data to the meter. Two separate indicators may be used simultaneously, one to indicate the degree of rotation of the platform 11 and the second to indicate the degree of tilt.
Panels which attach to the platform 11 may be provided, figure 4 shows such a panel 40 incorporating indentations 41 which are shaped to fit the feet of a user of the apparatus. A number of panels incorporating indentations of appropriate size to different users may be provided. The indentations may be shaped and sufficient in number to fit non-human users of the apparatus, such as dogs and the like. The panels may also incorporate apertures 42 into which supports for a user may be inserted. The panel may incorporate straps 43, as shown, to assist a user in maintaining their position on the platform. Alternative means may be provided which actually attach to the feet or lower legs of a user of the apparatus to prevent animals from slipping off the platform. The panels may be sized to fit over the top of the platform 11 and so be held in place by the weight of a user or, known attachment means may be used to connect the panels and platform together.

Figure 5 shows a panel 45 incorporating an indentation 46 shaped to fit a person sitting on the panel when it is in position on the platform 11. This provides a means by which the muscles in the upper body of a user may be exercised by the tilting and/or yawing of the platform.

The apertures 18A, 18B or 18C, as shown in figure 1, in the platform 11, enable poles 61 to be attached to the platform 11 such that a person using the platform can use the poles to maintain their balance and/or reduce the load exerted on their legs while using the platform, as shown in figure 6.

Alternatively, a harness 70 as shown in figure 7, may be used to further reduce the load exerted on the legs of the person. Two attachment points 71 are provided to enable the harness 70 to be attached to suitable engagement means, not shown, provided on the poles 61. Openings 72 are provided in the harness 70 into which a user’s legs are inserted.

If the platform is to be used with animals then two pairs of poles 61 are inserted into corresponding pairs of the apertures 18, such that two appropriately sized and shaped harnesses can be used in conjunction to help support the weight of the animal.
The apertures 15 in the second sealed unit 14, as shown in figure 1, enable a pair of suitably shaped poles 65, as shown in figure 6A, to be attached to the second unit 14. In this way, the hip joints of a person can be exercised by the person holding the poles 65 whilst the first platform 11 rotates (yaws) to a degree set by the person or supervisor, such that the legs of the person rotate relative to their upper body. The load exerted on the hips may be reduced by the use of a harness of the type previously described which attaches to a suitably adapted portion of the poles 65.

Means to control the tilt and/or rotation (yaw) of the device may be incorporated into the poles 61 in the form of handles incorporated into the uppermost (in use) ends of the poles. A control means in the form of a twistable handle 81, rotatable in the directions of arrow A, as shown in figure 8 may be used. The control means for the degree of rotation (yaw) may be incorporated into a first handle and control means for the degree of tilt incorporated into a second handle. An emergency cut-off may therefore be built into the handles such that, if either handle is released, the apparatus ceases to tilt and/or rotate (yaw).

In use, a user stands on the first platform 11 and the hydraulic rams 12 are elevated and lowered such that the platform 11 tilts. The use of three hydraulic rams 12 allows the platform 11 to be tilted in a plurality of directions. The user of the apparatus 10 attempts to maintain an upright position as the platform tilts. The first platform 11 may also be rotated (yawed) by use of the rotational means, either as the platform tilts or alternatively the platform may be rotated alone. Thus exercising the muscles utilised by a user of the apparatus to maintain an upright position. This type of exercise is particularly beneficial to users recovering from knee and hip replacement operations. As previously mentioned, support in the form of poles 61 can be provided to assist persons using the device to maintain their upright position and/or a harness can be provided to decrease the load exerted on the legs of a user.

The apparatus can also be used to exercise the hips of a person by the use of poles 65 as previously described, i.e. such that the legs of a persons body are rotated relative to their upper body, thus exercising their hips.
The use of hydraulic rams 12 to control the tilt and rotation (yaw) of the platform has the additional benefit that the platform 11 may be lowered such that it abuts an upper surface (in use) of the sealed unit 13 when not in use, thus facilitating the access to the platform 11 by a user. The apparatus may be produced with the tilt or rotational mechanism above.

It will be appreciated that the platform 11 may be rotated and simultaneously tilted in order to exercise hip joints and appropriate muscle groups at the same time.

Alternative embodiments of the tilting platform may be provided. Figure 9 shows a platform generally indicated by 91, mounted on a central pivot. The lower surface (in use) of the platform 91 incorporates an undulating track 92 which can be seen more clearly in figure 9. Two spheroidal bodies 93 which are pivotally mounted on arms 94 and run in the track 92 which can be seen more clearly in figure 9A. The two spheroidal bodies 93 also run on a second flat platform generally indicated by 95. The surface of the track 92, which interacts with the spheroidal bodies 93, may be hemispherical in cross-section in order to ensure that the spheroidal bodies remain within the track. In use, the spheroidal bodies are moved around the track 93 by known drive means, in one of the directions indicated by the arrows B on figure 9B. The undulations in the track cause the platform 91 to tilt whilst a user standing on the platform 91 and attempts to maintain in an upright position.

Alternatively, the platform 91 may be rotated backwards and forwards to a specified degree by known means while the spheroidal bodies 93 remain stationery, a person holds poles, not attached to the platform, such that the platform both tilts and rotates (yaws) as previously described, such that the hips of the person are also exercised.

Referring now to figure 10, in a preferred embodiment of the invention, the device comprises a platform 111 which tilts the platform being sized such that it forms the entire floor for an animal's stall generally indicated by 112. The stall incorporates a door 113 and a drive mechanism to tilt the platform 111 is incorporated into a sealed unit 114 below the platform.
In use, an animal is led into the stall 112 and the door 113 shut. The platform 111 then tilts, according to the degree of tilt set by a supervisor using an appropriate control unit which may be built into the exterior of the stall, thus exercising the animal. This particular embodiment of the device would be particularly suitable for exercising horses recovering from tendon injuries and the like or to exercise large animals, such as sperm bulls, which are normally reluctant to exercise.
CLAIMS

1. Exercise/physiotherapy apparatus comprising a platform on whose surface a user stands and drive means to tilt and/or yaw the platform surface repeatedly so that when the user stands on the platform and the drive means is operating the platforms tilting movements will tend to counteract the user’s attempts to maintain an upright position.

2. Apparatus as claimed in claim 1 further comprising one or more poles which insert into the platform to provide a support means for a user or attachment points for a harness.

3. Apparatus as claimed in either one of the preceding claims wherein the platform further comprises indentations shaped to engage with the user’s feet.

4. Apparatus as claimed in any one of the preceding claims wherein the platform further comprises straps, i.e. to assist a user in maintaining their position on the platform.

5. Apparatus as claimed in any one of the preceding claims wherein means are provided to adjust the height of the platform.

6. Apparatus as claimed in any one of the preceding claims further comprising one or more poles which insert into a section of the apparatus other than the platform.

7. Apparatus as claimed in any one of the preceding claims wherein indication means are provided to indicate the degree by which the platform is tilted or yawing.

8. Apparatus as claimed in any one of the preceding claims further comprising a safety cut off mechanism such that if the user falls off the platform it ceases to tilt or yaw.

9. Apparatus as claimed in any one of the preceding claims further comprising an adjustment mechanism to allow adjustment of the rate, and/or extent of movement of the platform.
10. Apparatus substantially as described herein with reference to and/or as illustrated by any appropriate combination of the accompanying drawings.
Application No: GB0525171.5  Examiner: Paul Makin
Claims searched: 1-10  Date of search: 14 May 2007

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

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<th>Category</th>
<th>Relevant to claims</th>
<th>Identity of document and passage or figure of particular relevance</th>
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<tr>
<td>X</td>
<td>1,3,7,9</td>
<td>US 4452447 A (LEPLEY) see particularly figures 6 and 7</td>
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<tr>
<td>X</td>
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<td>US 5941807 A (CASSIDY) whole document</td>
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<td>JP 06254178 A (NAKAMURA) see the figures and abstract</td>
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Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X^:

Worldwide search of patent documents classified in the following areas of the IPC

A61H; A63B

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC