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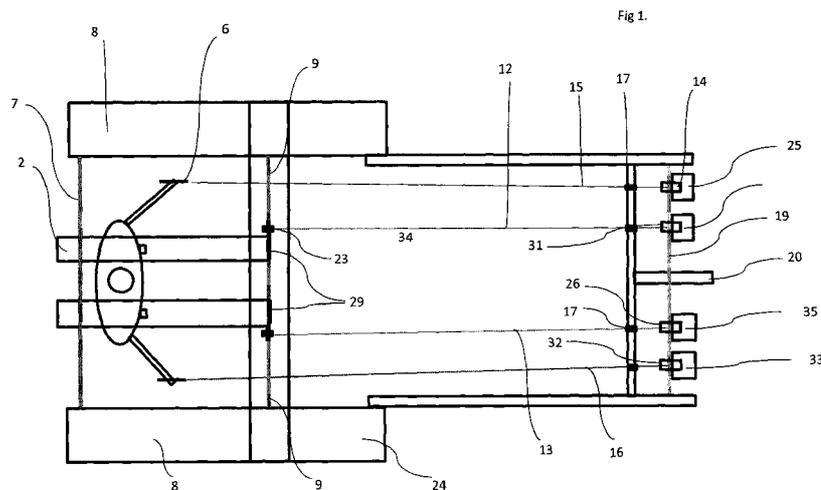
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(54) Title: CROSS COUNTRY SKIING MACHINE



(57) Abstract: The purpose of the invention is to construct a device for physical training that mimic the full motion at classical skiing on snow, a device for poling, double poling and diagonal skiing. The resistance of poling and push off with the skis are also linked. This allows using a computer controlling the resistance creating track profiles and thus get movement patterns that mimic reality of classic cross country skiing as much as possible. This is achieved with a device as defined in the appended claims. The device consists of two front swing arms (1) and two rear swing arms (5) connected with two skis (2). The practitioner stands on the skis (2) which are able to commute into the air. The skis (2) is together with the ski handles (8) connected to a common resistance device providing resistance at poling and commuting with skis (2). This is to simulate actual skiing as much as possible.

Technical field

The invention relates to a device for physical training for cross country skiers and other athletes.

Background

Skiing is a popular and gentle exercise method that provides great workout for the whole body. The problem is that when there is no snow no exercise method except roller skis mimics the entire skiing movement. Skiing is based partly on poling where the skier uses the ski poles to move forward, but also the so called diagonal skiing and double poling where the skier with the help of the skis and poles moves forward. Roller skiing is an exercise method that is regularly used by cross-country skiers and other athletes. Roller skiing however has many shortcomings, one is that it is dependent on road conditions, weather, terrain, etc. In a big city it can be difficult to find good roads for roller skiing and all intersecting roads and cars it can be downright dangerous to ride roller skis. Additionally, poling on hard asphalt cause unwanted strain on back, shoulders and arms.

Many exercise devices today simulate poling with more or less good imitation. There is no exercise equipment on the market that mimic the entire skiing movement with poling, diagonal and double poling. Some specialized training centers have large treadmill that is possible to ride with roller skis, these machines are so large and expensive that they are not suitable for individuals or ordinary gym. These devices are additionally powered by electricity which is both expensive and may even be difficult to access in some locations.

Today there are, as I said some products on the market that simulate the poling technique of cross-country skiing. One example is "Concep2 SkiErg" (www.motion.se) which is constructed with fan resistance. This is primarily a weight training machine. The similarity to the cross-country skiing is not very high.

Another example is "Thorax Trainer" (www.thoraxtrainer.com). Here, the rods are fastened on a carriage rolling on rails. The rods cannot be lifted from the rails and thus the correct movement pattern of skiing is not achieved.

Ercolina is an exercise equipment similar to the SkiErg but with a magnetic resistance.

None of these poling machines simulates skiing on snow particularly good as they are very monotonous and rigid. The feet are completely still and the practitioner are unable to get the

same forward-leaning position on the body as when skiing on snow, where the body and the feet moves forward. The forward movement simply makes the practitioner naturally leans more forward than that of practitioner standing still on a floor.

A device that provides both arm and leg training is NordicTrack Ski (www.nordictrack.com). The practitioner pulls a cord with his arms at the same time he moves the legs attached to the sliding skis back and forth. The downside is that this machine is best suited for diagonal skiing, not poling or double poling. There are also some other similar ski training machines, but today there is no machine that all the classic ski techniques can be practiced on. There is no exercise machine where the poling movement results in a forward movement of the entire body similar to when skiing on snow. The arm and leg resistance connected is important to mimic classic skiing on snow. At classic skiing the poles are most often used when the terrain is easy and when you come to an uphill you put on strides with the legs.

Drawings

The invention will now be described in detail with reference to the accompanying drawings in which:

Figure 1 is a perspective view of the invention from above.

Figure 2 shows the embodiment of the invention from the side when performing diagonal skiing.

Figure 3 shows the embodiment of the invention from the side when the practitioner performs double poling.

Figure 4 is a close up illustrative view of the drive and return mechanism.

Figure 5 shows a schematic view of how the cord elements can be placed.

Figure 6a shows an alternative embodiment of the invention seen from the side where the skis are replaced with stand plates.

Figure 6b shows a schematic view of the construction explained in Figure 6a.

Figure 6c shows a schematic of how stand-plate may be mounted to the swing arm.

Figure 6d shows a schematic of how stand-plate may be mounted to the swing arm.

Figure 7 illustrates an alternative embodiment of the invention where the two cords from the skis merge in to one cord.

Detailed description

The device of the invention shown in the drawings where Figure 1 shows the device seen from above when the practitioner and the skis are in the starting position. Figure 2 shows the device seen from the side when the practitioner performs diagonal skiing. Figure 3 shows the invention from the side when the practitioner performs double poling, the resistance that occurs in the cords makes the skis and the practitioner gets a forward motion. Figure 4 shows the "driving mechanism" and "recoil mechanism" whose function is with the cord element to power the flywheel and the recoil mechanism returns the cord element to starting position. Figure 5 shows a schematic of how the cord element can be mounted. Figure 6a, 6b, 6c and 6d show an embodiment of how the stand-plates can be mounted only in the front swing arm. Figure 7 shows how the cord elements for skis can be mounted.

The invention consists of two parallel skis 2 which are connected to respective front swing arm 1 and rear swing arm 5. The structure of the apparatus consists of bottom plate 24 with frame 8 and intersecting support element 9 which supports the front swing arms 1 and rear support element 7 which supports two rear swing arms 5. Arms 1, 5, have rotation axes in the supporting elements 7, 9 and are each rotatably connected to the skis 2. The practitioner can stand on two skis and move them back and forth in an oscillating movement. A brake is connected to the skis so that there is resistance when the skis 2 are pushed apart. It is important that the resistance has the desired effect and therefore it is constructed as follows. Two cord elements 12, 13 connects the swing arms 1 with the flywheel 20 and it's first and second drive mechanisms 26,

31 with associated recoil mechanisms 34, 35. Recoil mechanisms consists for example of a spring, elastic cord or similar which at one end is attached to the loop 28 and in the other end connected to a chain 21. The drive mechanisms in turn consists of a freewheel 18 powered by chain 21 connected to cord elements 12, 13, 15, 16, 27 which runs to the two swing arms 1 or pole handles 6. The freewheels 18 and the flywheel 20 is mounted on shaft 19 which is rotatably mounted on the bottom plate 24. When the skis 2 is pushed apart from the starting position the rope elements 12, 13 powers chain 21 (driving mechanisms 26, 31) turning freewheel 18, shaft 19 and flywheel 20. The spring, elastic cord (the return mechanisms 34, 35) then returns the cord element 12, 13 and chain 21 back to starting position. Thanks to the freewheel the shaft 19 and flywheel 20 is only powered in one direction. Cord elements 12,13 may be mounted so that they go directly from swing arms 1 to flywheel 20, drive mechanisms 26, 31 and return mechanisms 34, 35 or that cord elements 12, 13 runs from its attachment on the swing arms 1 along the arms 1 up between pulleys 10,11 mounted on frame 8 located vertically below the swing arms 1 rotation axes 29, then up through the pulleys 23 at the swing arms axes 29 and preferably from there to the flywheels 20 first and second drive mechanism 31, 26, and first and second recoil mechanism 34, 35. As the cord elements 12, 13 runs true pulleys 10, 11 the cord elements 12, 13 are pulled out when skis 2 are shuttled back and forth. The cord elements 12, 13 attachment on the swing arm 1 is height adjustable also the pulleys 10, 11 attachment on the frame 8 is height and laterally adjustable. The pole handles 6 are true rope elements 15, 16 directly coupled to the flywheel 20 and its third and fourth drive mechanisms 32, 14 and respective recoil mechanisms 25, 33. When the practitioner performs a poling motion and pulls cord elements 15, 16 backward the drive mechanism 32, 14 increases the flywheels 20 speed and when the arms and pole handles 6 are moved forward for a new pole stroke the cord element 15, 16 are with help of recoil mechanism 25, 33 returned to starting position without affecting the speed of the flywheel 20. By making both skis 2 and ski handles 6 individually power the flywheel with drive mechanisms 26, 32, 14, 31 with associated individual returning mechanism 25, 33, 34, 35 gives an operating feeling that is very similar to classic skiing on snow. Each ski handles 6 and swing arm 2 individual effects the flywheel 20 and its rotational speed. For example, the practitioner can drive the flywheel 20 by commuting the two skis 2 and at the same time pull the ski handles 6 so called diagonal skiing but he can also stand still with the skis 2 and just drive the flywheel 20 by poling with ski handles 6. The resistance that occurs during poling automatically makes the skis 2 moves forward a bit (see Figure 3). This allows the practitioner to get a more forward leaning position compared to standing still and practice on a regular poling machine where the feet are still on the ground. The design also makes it possible

for example to stand still on two skis and drive the flywheel 20 by simply pole with one of the ski handles 6. Another possibility is to drive the flywheel 20 by commuting with skis 2 without mowing the ski handles 6. Cord elements 12, 13, 15, 16, 27 are releasable attached to the reversal mechanism 25, 33, 34, 35 which means that they can be disconnected, for example cord elements 12, 13 of the swing arms 1 and then get a clean swing without resistance when poling. The flywheels 20 resistance can be varied in that it is associated with a magnetic brake, band brake, reverse brake, air brake, water brake or any other type of brake. The resistance can then be connected to a computer which can be programmed so that the resistance level is varied automatically, and thus create track profiles similar to reality when skiing outdoor. The design can to save space be built without rear swing arms 5 with only the front support elements 9 with swing arms 1. The practitioner stands on the stand plate 30 which is attached on one side of each front swing arm 1 as in Figure 6a, 6b, 6c, 6d.

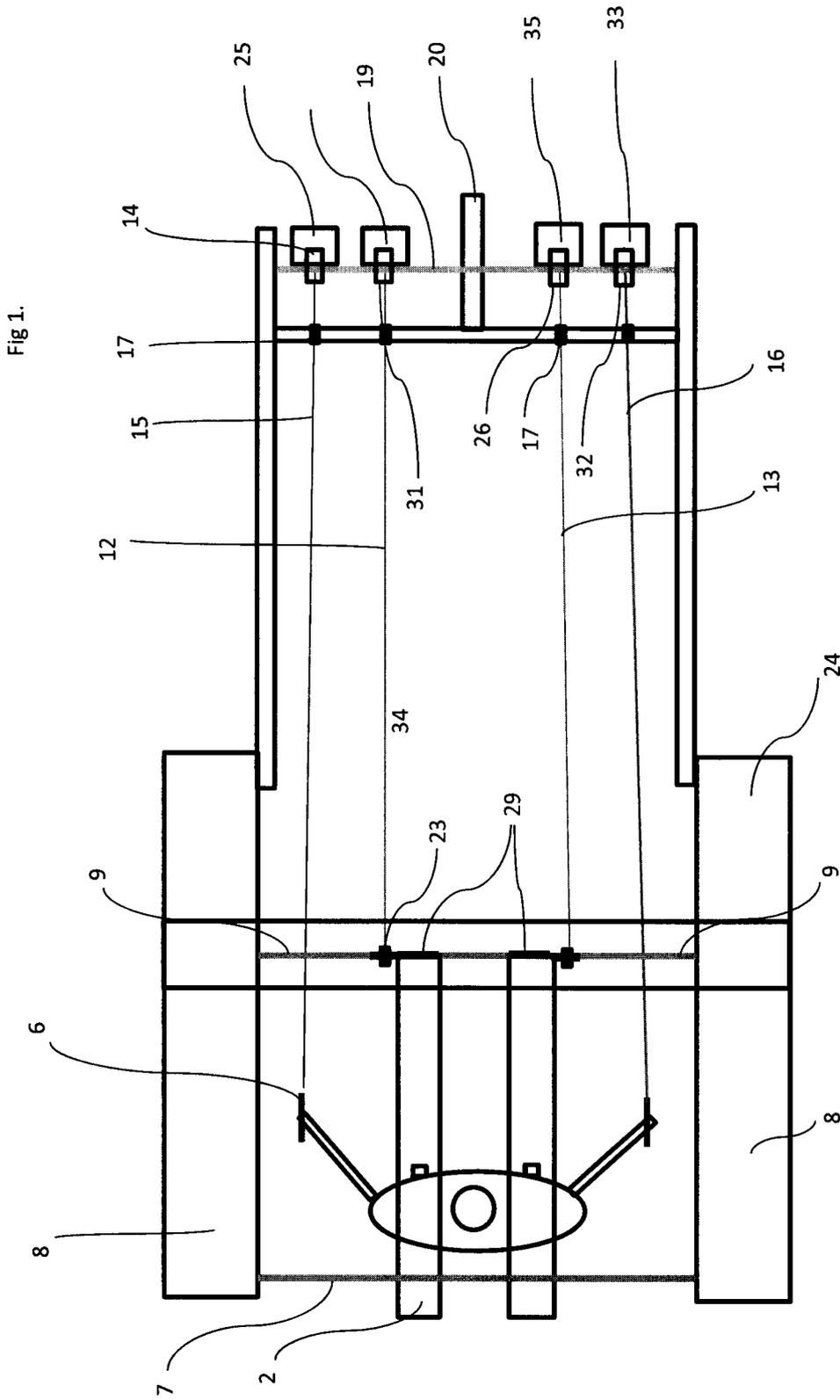
Another alternative construction is that the cord elements 12, 13 are merged to a common cord element 27 and a common drive mechanism 31 and returning mechanism 34. See Figure 7. When the skis 2 oscillates the right ski moves forward as much as the left ski moves backwards. This makes the cord elements 12, 13 can join together and form cord element 27. Cord element 27 is then coupled to the drive mechanism 31 and the recoil mechanism 34.

Stop blocks (3, 4) are attached under ski/stand-plate (2, 30) and on the baseplate under the skis. Stop blocks (3, 4) are located so that when the ski/stand-plate (2, 30) is moving backwards the stop block (4) under the ski/stand-plate (2, 30) hits the stop block mounted on the solid baseplate (3). The friction that occurs between the blocks (3, 4) allows the sliding can be performed by pushing up the ski/stand-plate (2, 30) moving forwards. The blocks (3, 4) consists of a suitable material for the right friction. Angle of the stop blocks and the distance between blocks in ski swing direction can be varied. The angle contact area of the blocks can be varied, if the blocks 3, 4 are both placed with a vertical hypotenuse a 100% contact area is obtained. If the blocks 3, 4 is rotated so that the hypotenuse is more horizontal the practitioner got less contact at the push off. The skier can also practice without using the stop blocks just using oscillating skies. On skis/stand plate 2, 30 are mounted bindings, either in the form of clips or straps to attach, for example, running shoes, but it can also be traditional ski bindings ski boots.

- 1) An apparatus for exercising the human body comprising a baseplate (24), a stiff frame (8), two skis/stand plates (2, 30), two ski handles (6). The apparatus is characterized that the frame (8) carries a crossbar (9) which holds two front swing arms (1) which in the upper ends are connected to the crossbar (9) with rotation axes (29) and the lower ends rotatably connected to the respective skis/stand-plate (2,30). A flywheel (20) is mounted on a shaft (19) rotatably attached to the baseplate (24). The flywheel (20) is powered through first and second drive mechanism (31, 26) driven by a first and second cord element (12,13). Two ends of mentioned cord element (12, 13) is away from the flywheel connected to the swing arms (1) and two ends connected to the cord elements first and second recoil mechanism (34, 35). When the cord element (12,13) is effected by a force the drive mechanism makes the flywheel starts to rotate, then the cord element (12,13) is returned to the initial position by the recoil mechanism (34, 35).
- 2) The device of claim 1 wherein cord elements (12, 13) runs from its attachment on the swing arms (1) along the arms (1) up between pulleys (10,11) mounted on frame (8) located vertically below the swing arms (1) rotation axes (29), then up through the pulleys (23) at the swing arms axes (29) and preferably from there to the flywheels (20) first and second drive mechanism (31, 26), and first and second recoil mechanism (34, 35).
- 3) The device of claim 1 wherein cord elements (12, 13) runs from its attachment on the swing arms (1) along the swing arms (1) up between pulleys (10,11) mounted on frame (8) located vertically below the swing arms (1) rotation axes (29), then up through the pulleys (23) at the swing arms axes (29). Cord elements (12, 13) then becomes a common cord element (27) attached to the flywheels (20) drive mechanism (31) and the recoil mechanism (34).
- 4) The device of claim 1, 2 or 3 characterized that the ski handles (6) through cord elements (15,16) are connected to the flywheels (20) third and fourth drive mechanism (14, 32). The flywheel is rotated when the ski handles is pulled backward then the third and fourth recoil mechanism (25, 33) returns ski handles (6) and cord element to the initial position.
- 5) The device of claim 1, 2, 3 and 4 wherein said drive mechanisms (31, 26, 14, 32) comprises a one-way clutch assembly/freewheel that with help of cord element (12, 13, 15, 16) powers the flywheel (20) in one direction and where retraction of cord element does not result in driving the shaft 19 and flywheel (20).
- 6) Device according to claim 1, 2, 3 and 4 wherein said recoil mechanisms (25, 33, 34, 35) is mounted on said bottom plate (24). The reversal mechanism comprising spring-biased

spooling assembly or elastic cord (22) for maintaining a predetermined tension in the cord element (12, 13, 15, 16, 27) and return to initial position.

- 7) The device of claim 1, 2 and 3 characterized that the frame (8) carries a rear cross bar (7) which holds two rear swing arms (5) in the upper ends connected to the crossbar with rotation axes and in the lower ends ratably connected the ski/stand plate (2, 30).
- 8) The device of claim 1, 2, 3 and 7 consisting of skis/stand-plate (2, 30) with bindings for shoes or ski boots.
- 9) The device of claim 1, 2, 3 and 7 where stop blocks (3, 4) are attached under ski/stand-plate (2, 30) and on the baseplate under the skis. Stop blocks (3, 4) are located so that when the ski/stand-plate (2, 30) is moving backwards the stop block (4) under the ski/stand-plate (2, 30) hits the stop block mounted on the solid baseplate (3). The friction that occurs between the blocks (3, 4) allows the sliding can be performed by pushing up the ski/stand-plate (2, 30) moving forwards. The blocks (3, 4) consists of a suitable material for the right friction. Angle of the stop blocks and the distance between blocks in ski swing direction can be varied.
- 10) The device of claim 1, 2, 3 and 4 where the flywheel (20) is coupled to a variable resistance of any kind like magnetic brake, air/fan resistance, band brake or similar.
- 11) A device of claim 2 and 3 where cord elements (12, 13) attachment on the swing arm (1) is height adjustable and pulleys (10, 11) attachment on the frame (8) is height and laterally adjustable.



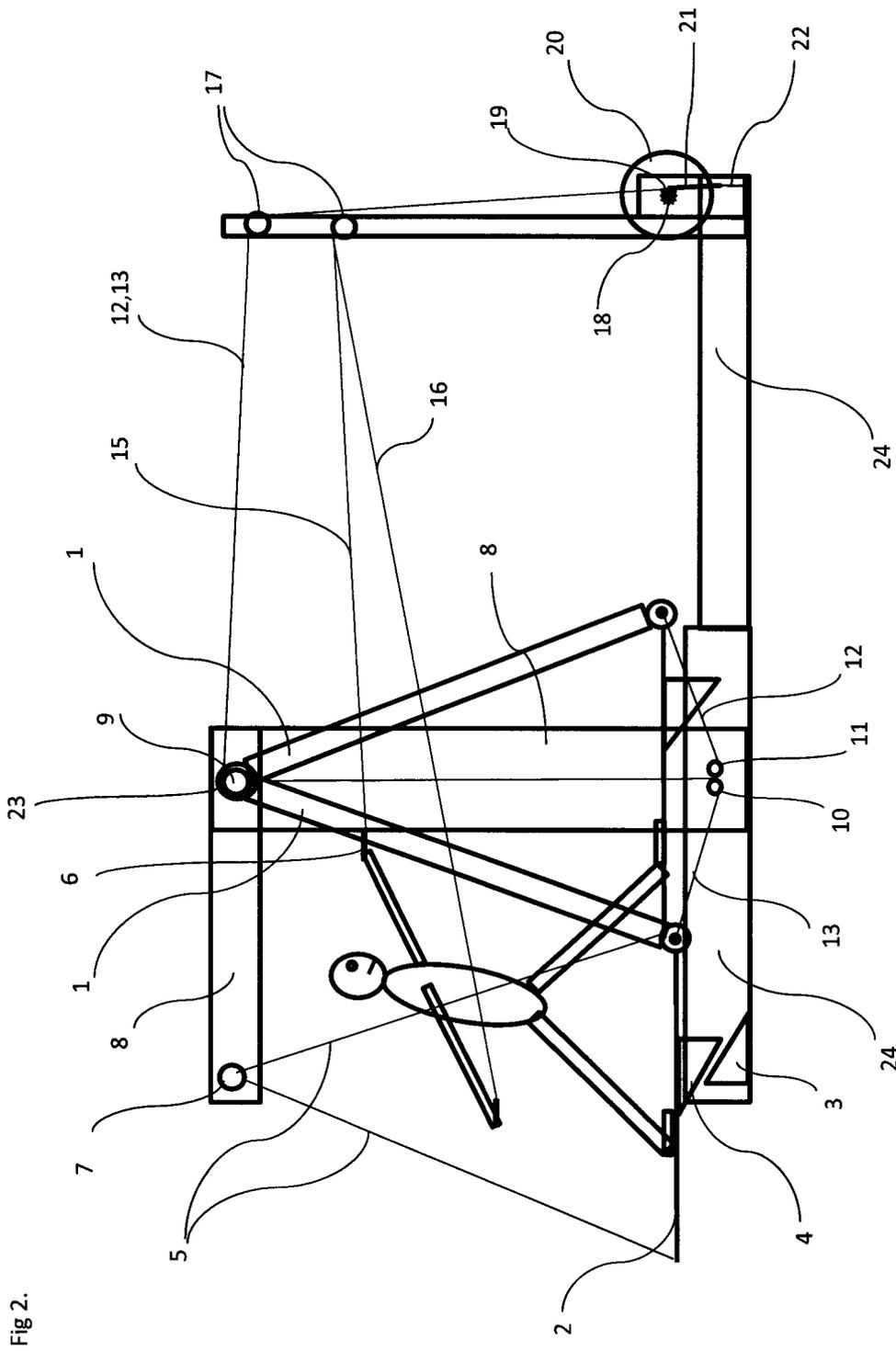


Fig. 2.

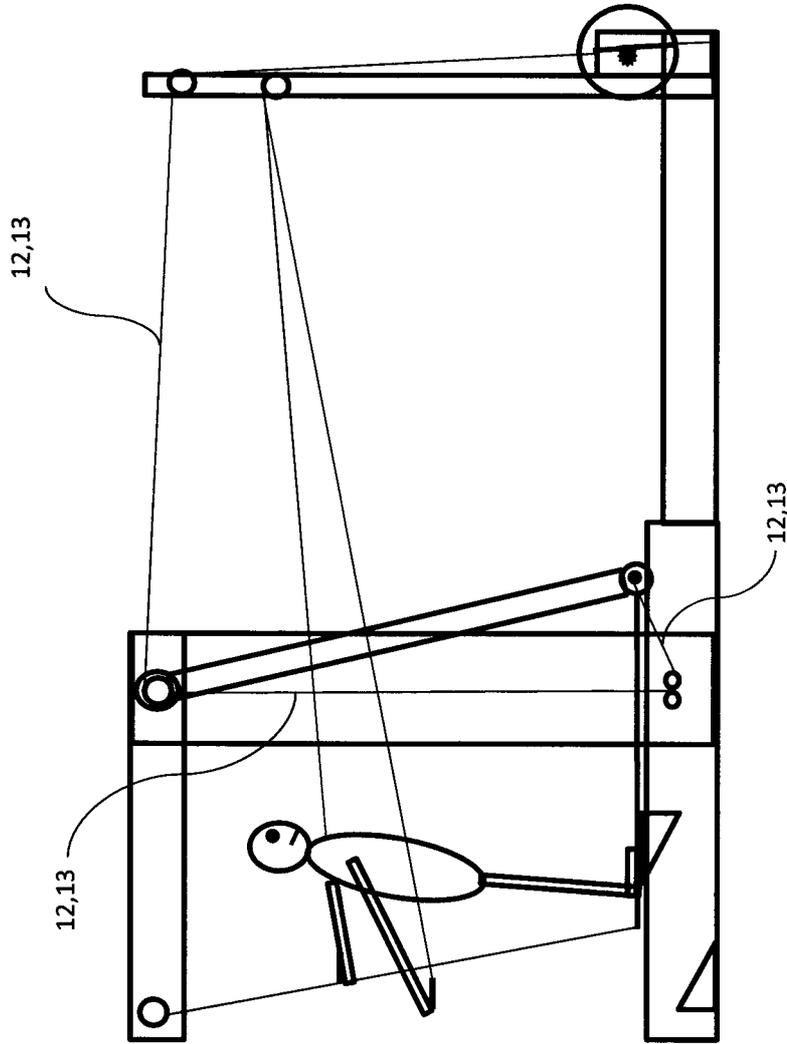
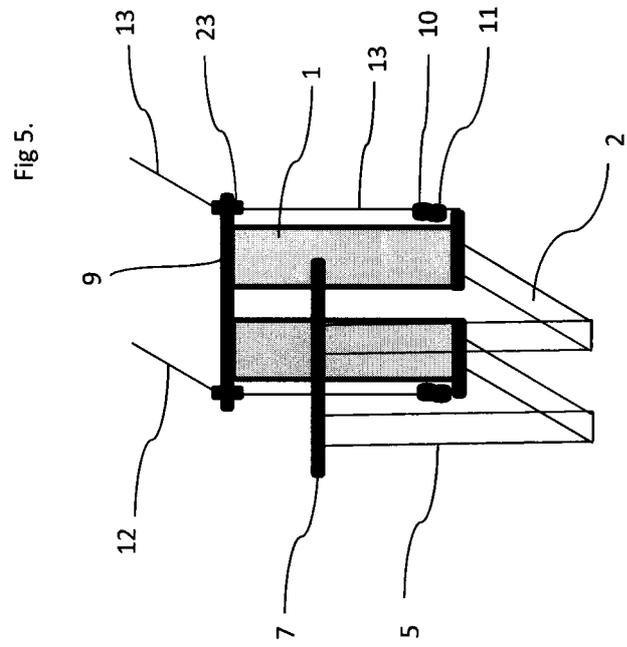
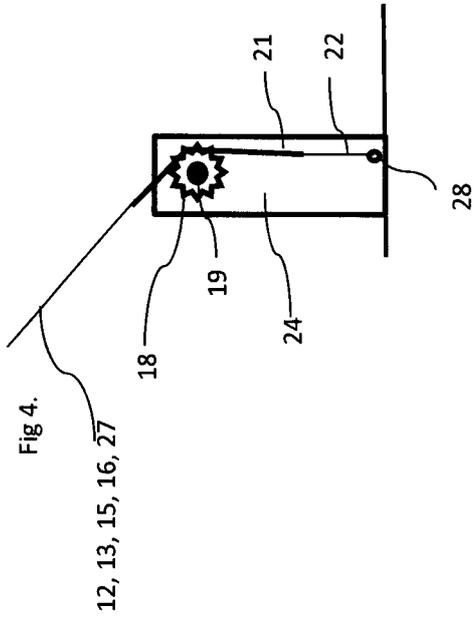
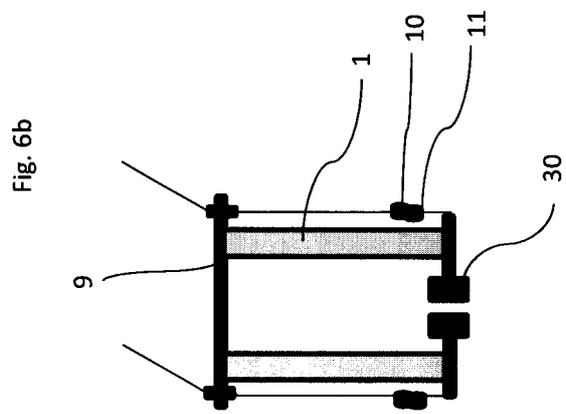
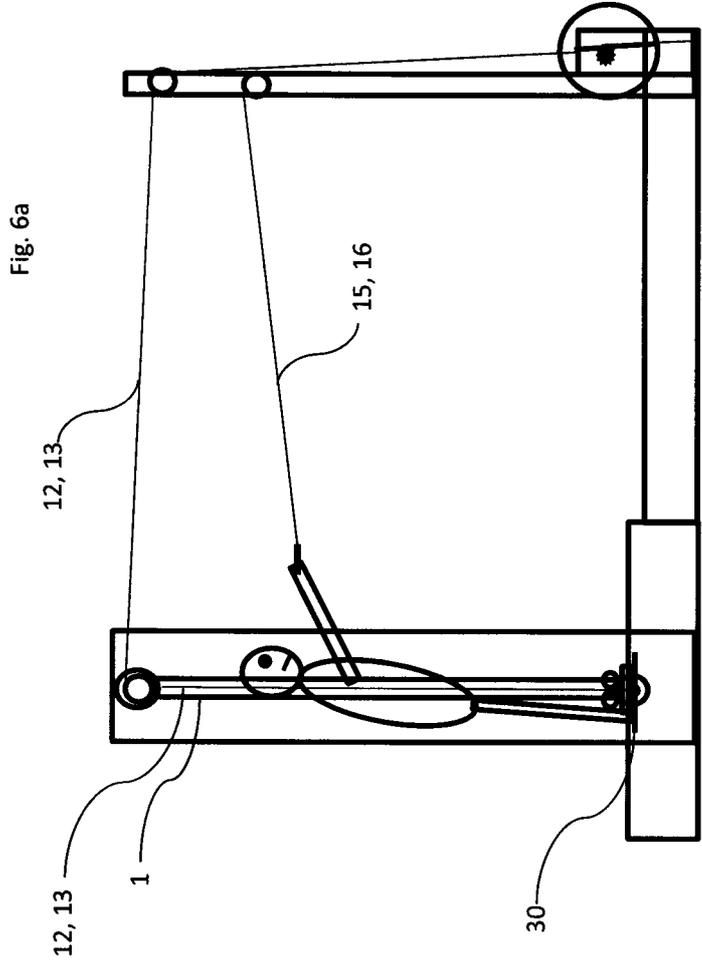


Fig. 3





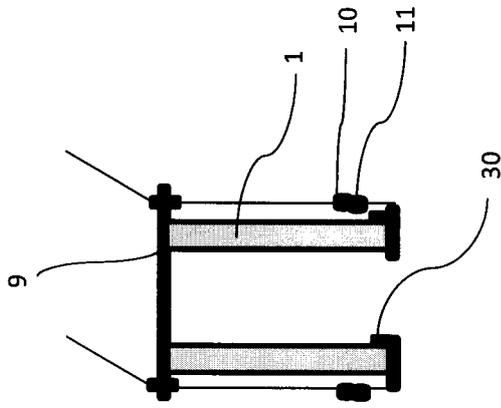


Fig. 6c

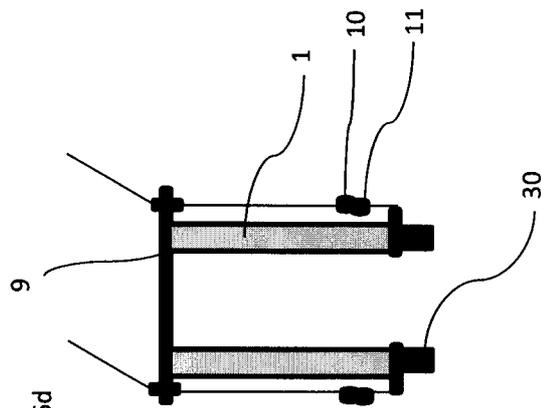


Fig. 6d

INTERNATIONAL SEARCH REPORT

 International application No.
 PCT/SE201 7/000004

A. CLASSIFICATION OF SUBJECT MATTER		
IPC: see extra sheet According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) IPC: A63B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched SE, DK, FI, NO classes as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, PAJ, WPI data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category' *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2006021 7234 A 1 (RODGERS ROBERT E JR - (B2) RODGERS JR ROBERT E [US]), 28 September 2006 (2006-09-28); abstract; paragraphs [0025]-[0049]; figures 1-8 --	1-11
A	US 8608626 B2 (CAMPBELL MARK), 7 February 2013 (2013-02-07); abstract; column 6, line 61 - column 7, line 33; figures 7-9 --	1-11
A	US 20090203502 A 1 (NEUBERG GERALD W ET AL), 13 August 2009 (2009-08-13); abstract; paragraph [0056]; figure 1 -- -----	1-11
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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US	2006021 7234 A1	28/09/2006	US	201 00173754 A1	08/07/201 0
			US	20090156370 A1	18/06/2009
			US	781 1208 B2	12/10/201 0
			US	7708668 B2	04/05/201 0
			US	75071 84 B2	24/03/2009
us	8608626 B2	07/02/201 3	US	201 3003521 6 A1	07/02/201 3
us	20090203502 A1	13/08/2009	US	7887463 B2	15/02/201 1