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(56) Documents Cited:
US 479672 A1 US 4249726 A1
US 20130190143 A1 US 20070072750 A1
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(54) Title of the Invention: **Weight training apparatus**
Abstract Title: **Weight training apparatus with drop limiting safety feature**

(57) A weight training apparatus 10 for use with a bench 14, the apparatus 10 comprising support arms 16, 18 connected to a frame 12 for arrangement on either side of the bench, adjustment means 20 connected to the support arms for adjusting vertical positions of the arms, and a control means 60 for operating the adjustment means, wherein the support arms are adapted to slide along the frame via the adjustment means, and the adjustment means includes locking means engageable to secure the arms at a fixed height. The adjustment means may include a ratchet and gear arrangement 58 with a drive shaft, drive chains and two pawls which provide the locking means. The control means may comprise a handle and lever arrangement operable to move the support arms in both directions, depending on the position of the lever. Alternatively, the adjustment means may comprise hydraulic or pneumatic jacks and the control means may comprise a pedal or foot switch.

Figure 1

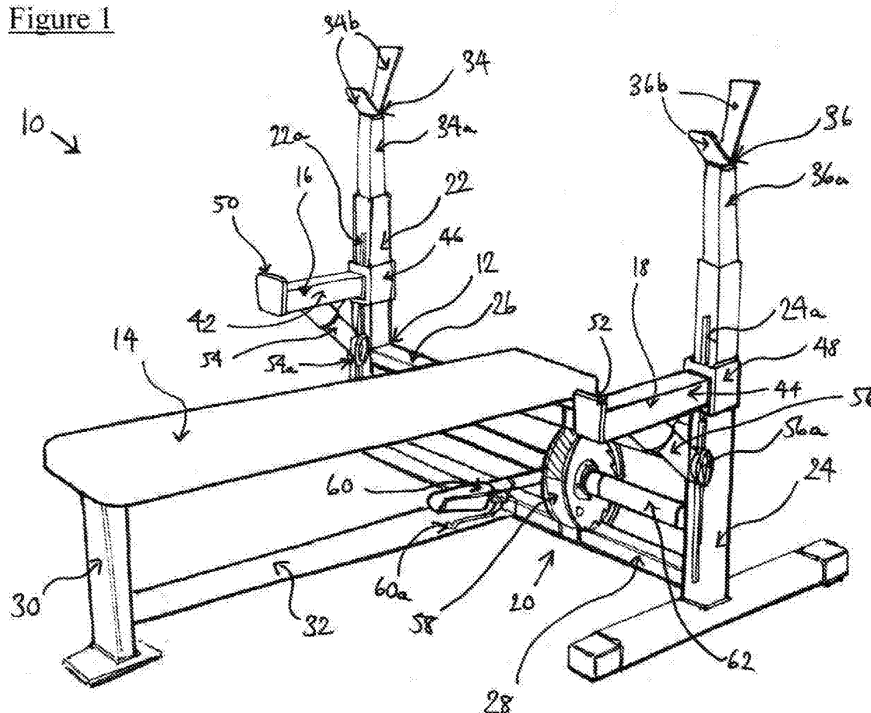


Figure 5

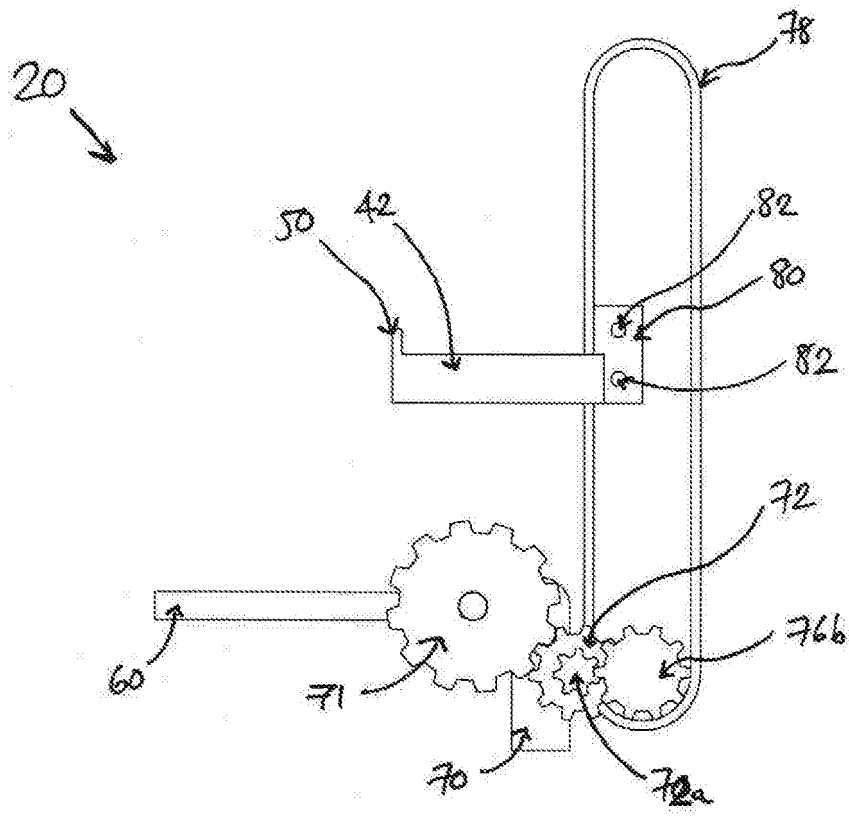


Figure 6

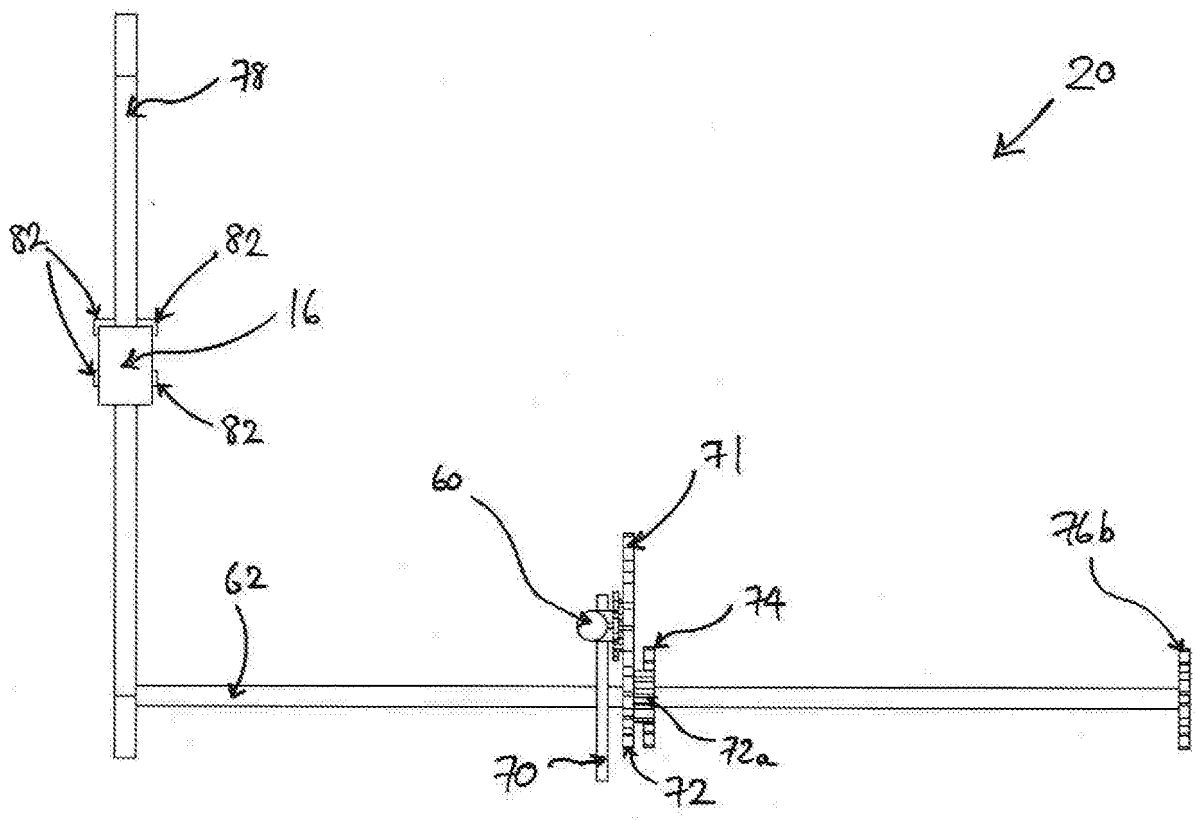


Figure 7

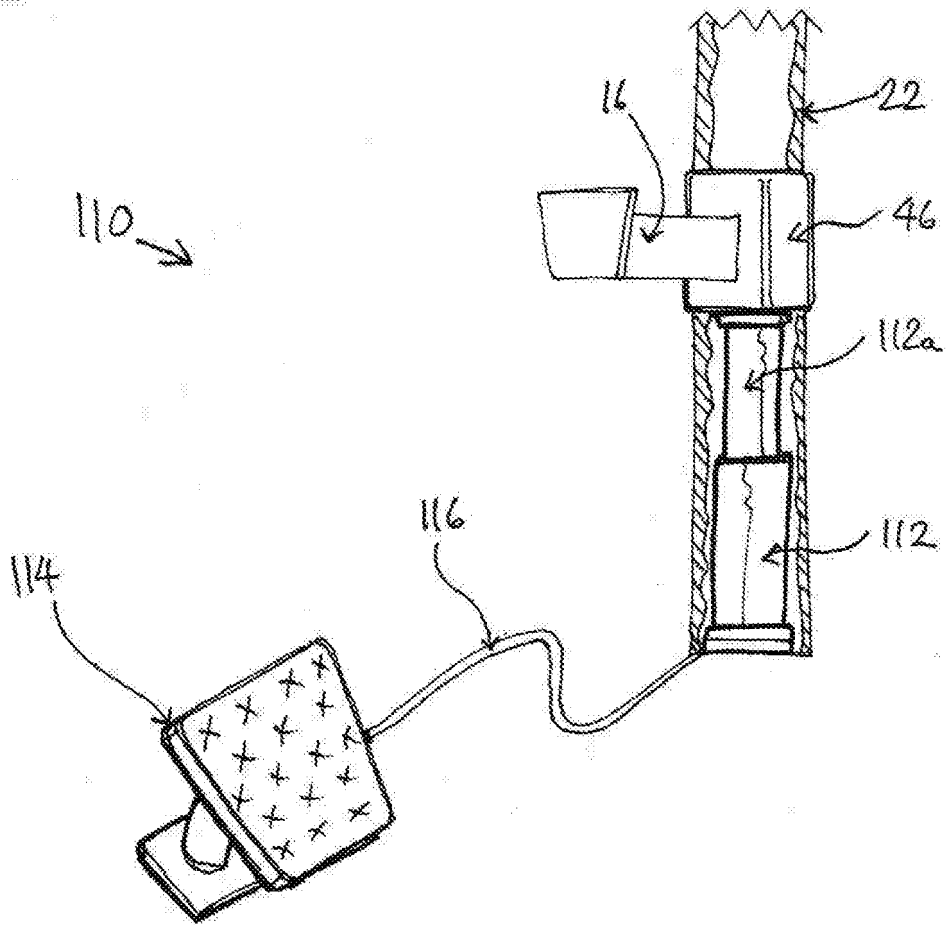
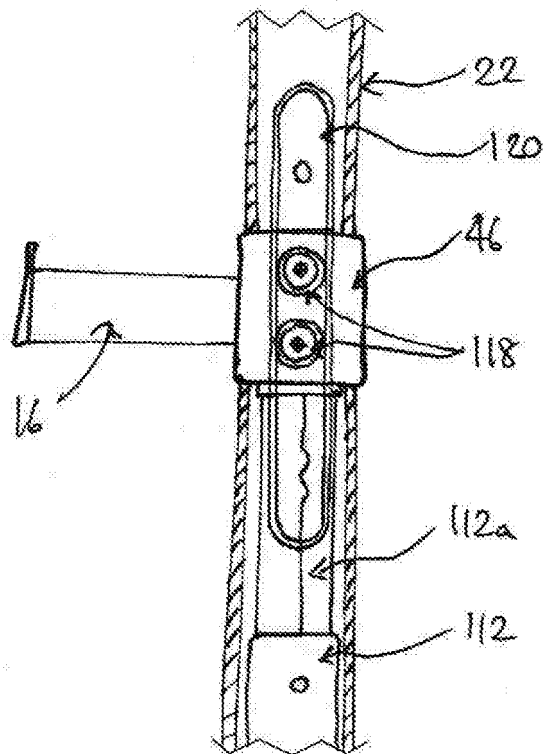


Figure 8



WEIGHT TRAINING APPARATUS

The present invention relates to a weight training apparatus, and more particularly to a bench press apparatus.

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BACKGROUND TO THE INVENTION

Weight lifting is an exercise used in bodybuilding to increase muscle mass and in the sport of powerlifting, as well as for general fitness routines. Bench pressing a barbell with weights at either end is used to train pectoral muscles, amongst others. Repeated lifting of a weighted barbell is typically done until 'maximum fatigue' is reached, for optimum training results.

Weight training is often carried out in commercial gyms, although it has become common for weight lifting equipment to be used at home in a personal gym. This can be more convenient than travelling to a gym, but means that weight lifting may be carried out in solitude. Weight lifting (such as bench pressing) can be a dangerous activity, particularly given that the weights must be raised onto a rack at the end of a session or series of repetitions, which is typically when a user is most fatigued.

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In commercial gyms, bench pressing is often carried out with a partner (or 'spotter') for safety reasons, because the spotter can assist in raising the barbell onto the rack at the end of a series of repetitions. The risk of serious or even fatal injury is much greater if a weightlifter chooses to bench press alone. There are still risks even when supervised, because a spotter may be slow to react when assistance is needed, for example.

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To mitigate the risk, some people bench press with the weights loose on the barbell (i.e. without collars) so that barbell can be tilted in an emergency and the weights will slide off. However, this can damage the floor and/or weights, and the weights can move during repeated lifts, which is distracting. Following a failed lift, it is sometimes also possible for the user to roll the barbell to their hips and then stand as though deadlifting the weight, before lowering it to the floor. However, this requires good technique, the presence of mind to do so, and sufficient energy to still manipulate the barbell, and may still cause injury if particularly heavy weights are being used.

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It is an object of the present invention to reduce or substantially obviate the aforementioned problems.

5 STATEMENT OF INVENTION

According to the present invention, there is provided a weight training apparatus for use with a bench, the apparatus comprising a frame, first and second support arms connected to and extending outwardly from the frame for arrangement on either side of the bench, adjustment means connected to the first and second support arms for adjusting vertical positions of the first and second support arms, and a control means for operating the adjustment means, wherein the first and second support arms are adapted to slide along the frame via the adjustment means, the adjustment means includes locking means engageable to secure the first and second support arms at a fixed height, in use, operation of the control means enabling simultaneous vertical adjustment of the first and second support arms, and the first and second support arms being locked at a substantially similar height to each other.

Advantageously, this enables a person to bench press weights in a relatively risk-free manner, mitigating the likelihood of serious injury in the case of a failed lift, because the arms will catch the weights and prevent the user being crushed. The adjustment means enables the user to slide the arms to the desired position on the frame quickly and easily, ensuring that the equipment is properly customised before beginning to exercise. This enables safe training, whether or not supervised by a spotter, and avoids the need for panicked countermeasures such as dumping weights off a barbell. A user can therefore always train under optimal conditions, pushing for maximum repetitions with weights securely attached to a barbell, without compromising their safety.

Typically, the height of the arms is adjusted to suit a weightlifter before exercising, taking account of the height of the bench used, by raising or lowering the arms accordingly. Synchronised adjustment of the arms ensures that the arms are not set at different heights, which would not support a barbell as evenly or safely if loaded onto the arms. Depending on the relative proportions of a given user, it may also be useful to adjust the displacement of the arms from each other and/or from the frame.

The apparatus may include a bench extending to one side of the frame. Preferably, the bench is connected to the frame.

5 The frame may include first and second upstands to which the first and second support arms are respectively connected. Each upstand may include an elongate aperture. Preferably, each of the first and second support arms includes at least one portion engageable with and adapted to pass along the length of the respective elongate aperture.

10

The upstands allow the arms of the support to be provided at a wide range of heights, customisable to suit the needs of a given user. Portions of each arm can engage and run along their respective elongate apertures to prevent either arm from twisting relative to the frame, whether stationary or being adjusted to a custom height.

15

The adjustment mechanism may include a ratchet and gear arrangement, a drive shaft connected to the ratchet and gear arrangement, and first and second drive chains connected to the driveshaft and to the first and second support arms respectively. Each upstand may include a cavity containing the respective drive chain.

20

Using a ratchet and gear arrangement provides a robust mechanism for supporting weights above the user, because the ratchet prevents downward motion of the weights. The mechanism also allows the arms to be adjusted in numerous small increments to customise the position of each arm, so that the support is provided at the optimal height for performing a full bench press, without compromising on user safety if the user needs to make use of the support. Locating the drive chains in cavities within the upstands of the frame protects the chains from becoming inadvertently caught whilst moving, mitigating the likelihood of the mechanism becoming jammed and potentially damaged.

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The locking means may include a first pawl connected to the handle and engageable with the ratchet, and a second pawl engageable with the ratchet opposite the first pawl, for securing the first and second support arms at a given height.

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The pawls prevent the first and second arms from lowering of their own accord, especially when load-bearing. The second pawl acts as a non-return pawl, preventing the arms slipping down when the first pawl is disengaged from the ratchet; for example, during the process of ratcheting the arms upwards via the handle.

5

The control means may include a handle connected to the ratchet. The handle may include a lever connected to the first and second pawls. The handle may be operable to raise the first and second support arms. The handle and lever may be operable together to lower the first and second support arms.

10

When the lever is not engaged, ratcheting the handle corresponds to an incremental increase in the height of the arms. Repeated subsequent ratcheting of the handle further raises the arms. When the lever is engaged, the first and second pawls are reversed, and ratcheting the handle corresponds to an incremental decrease in the height of the arms.

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Repeated subsequent ratcheting of the handle whilst the lever remains engaged allows the arms to be lowered further.

The adjustment mechanism may include first and second jacks connected to the first and second support arms respectively for raising and lowering the support arms.

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Preferably, the jacks are hydraulic or pneumatic.

The weights involved in weightlifting typically exceed 100 kg, and the jacks are capable of holding heavy weights at a fixed height above the user. Also, jacks have fewer components than a mechanical arrangement, and are simple to operate and maintain. If pneumatic jacks are used, there is no risk of hydraulic oil spilling.

25

The control means may include at least one pedal connected to the jacks. The pedal may at least be operable to extend the first and second jacks and raise the first and second support arms.

30

The pedal can be floor-mounted, and used to customise the height of the arms according to the extension of the jacks, providing innumerable potential positions for the arms. This is also advantageous when setting the initial height of the arms, because the pedal can be used hands-free whilst holding a barbell in the desired bench press position, to

correctly judge the desired height of the arms. Pressing the pedal raises the jacks, and the first and second arms, to the ideal height for a user to perform a full bench press, whilst providing a 'safety net' in case of emergency.

- 5 Each of the first and second support arms may have a distal lip. Together, the lips prevent a barbell from rolling off the distal end of each arm if knocked or on a slope, for example, thus avoiding potential damage to the weights or injury to the user.

Where a bench is provided, the bench may include at least one of a slidable top and a
10 collapsible leg system. The slidable top may be slid out or extended from the bench on rails, for example, so that the user can extricate themselves from the apparatus if the barbell is on the support arms. The collapsible leg system may include a hinge (or joint) and corresponding lever so that, when the lever is pulled, the joint folds and the distal end of the bench is lowered, causing the bench to slope and allowing a user to slide out
15 from beneath the barbell.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention, and to show more clearly how it
20 may be carried into effect, reference will now be made by way of example only to the accompanying drawings, in which:

Figure 1 shows a perspective view of a weight training apparatus according to a first
25 embodiment of the present invention;

Figure 2 shows a front perspective view of the weight training apparatus of Figure 1;

Figure 3 shows a perspective view of a ratchet and gear arrangement within the weight
30 training apparatus of Figure 1;

Figure 4 shows a side view of the ratchet and gear arrangement of Figure 3;

Figure 5 shows another side view of the opposite side of the ratchet and gear
arrangement of Figure 3;

Figure 6 shows a front view of the ratchet and gear arrangement of Figure 3;

Figure 7 shows a front perspective cutaway view of a portion of a weight training apparatus according to a second embodiment of the present invention; and

Figure 8 shows a side cutaway view of the portion of the weight training apparatus of Figure 7.

10 DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring firstly to Figures 1 and 2, a first embodiment of a weight training apparatus is indicated generally at 10. The apparatus 10 includes a frame 12 and a bench 14 connected to the frame 12 for a user to lie on when bench pressing weights. The apparatus 10 also includes first and second support arms 16, 18 disposed horizontally and positioned on either side of the seat 14, and a ratchet mechanism 20 for adjusting the vertical positions of the arms 16, 18 by sliding them up or down the frame. The top of the bench 14 is not slidable in this embodiment, but may be in others.

The frame 12 includes substantially similar first and second upstands 22, 24. The upstands 22, 24 are spaced apart from one another to either side of the bench 14. The upstands 22, 24 are arranged in substantially parallel planes. Each upstand 22, 24 has an inverted T-shape including an upright portion and a bar. The bar of each 'T' is the base of each upstand 22, 24. The upright portions of each upstand 22, 24 are connected together by two cross-beams 26, 28. The cross-beams 26, 28 are provided substantially in the lower half of each upstand 22, 24. The second cross-beam 28 is provided substantially near the base of the upstands 22, 24.

The bench 14 extends outwardly to one side of the frame 12. The bench 14 is substantially horizontal in this embodiment. One end of the bench 14 is secured to the top of the first cross-beam 26. The bench 14 includes a padded upper surface and a foot 30. The foot 30 is located at the opposite end of the bench 14 to the first cross-beam 26, furthest from the frame 12. The foot 30 extends downwardly away from the padded upper surface. The foot 30 is T-shaped, having a broad ground-engaging portion for

stability. The foot 30 is connected to the second cross-beam 28 by an elongate member 32, to prevent the bench 14 twisting relative to the frame 12 in use. The second cross-beam 28 and the elongate member 32 together form another T-shaped element of the frame 12. In an alternate embodiment, the foot may include a hinged joint and a release lever, allowing the foot to be collapsed, lowering one end of the bench. As a further alternative, the foot may be telescopically collapsible in another embodiment, by including a pneumatic piston and a lever, for example.

The upright portion of each upstand 22, 24 is hollow. In other words, each upstand 22, 24 has an internal cavity within its upright portion. Each upstand 22, 24 includes an elongate slot 22a, 24a on one side of the respective upright portion. In this embodiment, the slots 22a, 24a are provided on the same side of the frame 12 as the bench 14. Each slot 22a, 24a extends substantially along the length of each upright portion.

The uppermost part of each upstand 22, 24 includes a rack element 34, 36. Each rack element 34, 36 is substantially Y-shaped, with a main stem 34a, 36a extending upwardly from the upstand 22, 24 and branching into a fork having two diverging upper elements 34b, 36b. Each main stem 34a, 36a is extendible relative to its upstand 22, 24. The upper elements 34b, 36b diverge substantially in the plane of their upstands 22, 24. This means that the forks of the rack elements 34, 36 mirror each other, together forming a rack for receiving a barbell. For each rack element 34, 36, the upper element nearest the bench 14 is truncated. This minimises the height for successfully racking the barbell when bench pressing weights on the apparatus 10.

Multiple sets of lateral apertures 38, 40 (not shown in Figure 1, partially shown in Figure 2) are provided near the upper end of each upstand 22, 24. The apertures 38, 40 extend through each side of each upstand 22, 24. A corresponding pair of apertures (not shown) is also provided in each of the main stems 34a, 36a, which can align coaxially with the lateral apertures 38, 40 of the upstands 22, 24. In this embodiment, three sets of lateral apertures 38, 40 extend along axes substantially parallel to the cross-beams 26, 28, at substantially the same height on each upstand 22, 24. Locking pins 38a, 40a are provided for locking the main stems 34a, 36a, to the upstands 22, 24 via the apertures on each, i.e. through four individual apertures in total at a given moment. This enables the main stems 34a, 36a to be telescopically extended from and locked in fixed

extended positions relative to the upstands 22, 24. For example, the rack elements 34, 36 are not substantially extended in Figure 2, but are in Figure 1.

5 The first and second arms 16, 18 are each mounted on the frame 12 at substantially equal heights, spaced apart from each other to either side of the bench 14. Each of the arms 16, 18 includes a main support bar 42, 44 connected to the respective upstand 22, 24 by a bracket 46, 48. Each support bar 42, 44 extends substantially horizontally outward from its respective upstand 22, 24 without leaving a gap. The distal end of each support bar 34, 36 has an upwardly extending lip (or ridge) 50, 52 to prevent a barbell
10 from rolling off the arms 16, 18.

Each arm 16, 18 further includes a secondary support bar 54, 56 extending beneath the respective main support bar 42, 44 to the respective upstand 22, 24. Each secondary support bar 54, 56 terminates in a roller 54a, 56a. The secondary support bars 54, 56
15 prevent the main support bars bending towards the upstands 22, 24 under load, and the rollers 54a, 56a ensure that the arms 16, 18 move smoothly up and down when adjusted.

The ratchet mechanism 20 includes a gear system and housing 58, a handle 60 connected to the gear system, and a driveshaft 62 extending outwardly from the gear
20 system to each upstand 22, 24. The housing 58 for the gear system is secured to the cross-beams 26, 28 by fixing means 59, e.g. bolts. The driveshaft 62 runs substantially parallel to the cross-beams 26, 28 and enters the upstands 22, 24 through respective apertures, to connect to the arms 16, 18. The handle 60 is shown on opposite sides of the housing 58 in Figures 1 and 2 because both arrangements are feasible.

25 Referring now to Figures 3 to 6, selected components of the ratchet mechanism 20 from within the housing 58 are shown in detail. The handle 60 (partially shown) is connected to a ratchet 64. A first pawl 66 is pivotally mounted to the handle 60 in engagement with the ratchet 64. The first pawl 66 has two prongs 66a, 66b, the first prong 66a of which is engaged with the ratchet 64. Also within the housing 58, a second pawl 68 is
30 pivotally mounted to a support 70 (shown as transparent in Figure 3 for illustrative purposes only). The support 70 is connected to the housing 58. The second pawl 68 also has two prongs 68a, 68b, the first prong 68a of which is engaged with the ratchet 64

opposite the first pawl 66. Ratcheting of the handle 60 in this arrangement gives rise to downward motion of the first and second arms 16, 18.

5 The handle 60 includes a lever 60a (seen in Figures 1 and 2). The lever 60a is linked to the first and second pawls 66, 68. Each pawl 66, 68 is biased about its pivot. Operating the lever 60a works against the bias of each pawl 66, 68 to reverse their engagement with the ratchet 64. In other words, operating the lever 60a pivots the first and second pawls 66, 68 such that the first prongs 66a, 68a are disengaged from the ratchet 64 and the second prongs 66b, 68b are engaged with the ratchet 64. This allows the arms 16, 10 18 to be raised, instead of lowered, by ratcheting the handle 60 when the lever 60a is engaged. Releasing the lever allows the pawls 66, 68 to spring back into their normal positions, where the first prongs 66a, 68a engage the ratchet 64.

Note that the pawls can be normally sprung in the opposite sense in alternate 15 embodiments. This would allow upward ratcheting without engaging the lever, and downward ratcheting when the lever is engaged.

The ratchet 64 is coaxially mounted to a primary gear 71. The handle 60 connects to the primary gear 71 via a 90° elbow 71a which allows free rotation of the handle 60 20 relative to the primary gear 71, so the handle 60 can be ratcheted back and forth. The primary gear 71 is connected to a secondary gear 72 which includes an auxiliary coaxial gear 72a. The auxiliary gear 72a is in turn connected to a tertiary gear 74, which is fixedly mounted about the driveshaft 62. Rotation of the primary gear 71 therefore causes the tertiary gear 74 to rotate in the same sense. Each of the primary and 25 secondary gears 71, 72 is mounted for rotation about a corresponding axle (not shown) within the housing 58.

The driveshaft 62 includes fixedly mounted terminal gears 76a, 76b at either end, disposed within the upstands 22, 24. Each gear 76a, 76b is connected to its own drive 30 chain 78 (only one drive chain is shown in Figures 3 to 6 for clarity). Each drive chain 78 is arranged within the respective upstand 22, 24. Rotary support gears (not shown) are provided at the opposite end of each drive train to the respective terminal gears 76a, 76b to feed the drive chain 78 round in use. The drive chains 78 are synchronised so

that the first and second arms 16, 18 are moved substantially simultaneously when the handle is operated, ensuring that the arms 16, 18 are both adjusted by the same amount.

Each drive chain 78 includes a slider 80 (only illustrated for the drive chain shown) fixedly mounted to a linear portion of the drive train 78. Each slider 80 is connected to its respective arm 16, 18. Operation of the gear system and driveshaft 62 causes vertical movement of the respective arms 16, 18 via the respective slider 80. Each slider 80 includes two lugs 82 extending laterally on either side. These lugs 82 fit into and slide in an internal track (not shown) provided within each of the upstands 22, 24. The lugs 82 bear against the internal tracks to ensure that the arms 16, 18 do not twist or bend relative to the frame 12 when their heights are adjusted or weight is loaded onto them.

In use, the user can ratchet the handle 60 upwardly when the lever 60a is pressed to raise the arms 16, 18 relative to the bench 14, optimising their height for performing a series of full bench presses. If raised too high, the arms 16, 18 can be lowered by releasing the lever 60a and ratcheting the handle 60 downwardly. As an example, the arms 16, 18 could be positioned just above the height of the bench 14 as in Figure 2. With a weighted barbell on the rack, the user can lie on the bench 14, grip the barbell and perform bench presses. If the user is unable to complete the series of bench presses and/or lift the barbell to the rack, he can simply lower it onto the arms 16, 18 beside him, and slide out through the gap between the barbell and the bench.

Referring now to Figures 7 and 8, a second embodiment of an adjustment mechanism is shown. The apparatus of this second embodiment has similar features to the first embodiment described above except as discussed below, and the same reference numerals are used with respect to equivalent features.

A hydraulic mechanism for raising the arms 16, 18 of the apparatus is indicated generally at 110. The hydraulic mechanism 110 includes a first hydraulic jack 112 disposed substantially vertically within the first upstand 22, and a second hydraulic jack (not shown) disposed substantially vertically within the second upstand 24. It will be appreciated by one skilled in the art of hydraulics that a reservoir of hydraulic oil is required. Alternatively, if a pneumatic mechanism with air pistons is used, no reservoir is needed. Instead, an air pump may be used to extend the pistons using compressed air.

Each jack 112 includes an extendible portion 112a that slides telescopically outwards from the rest of the jack 112. The first jack 112 is disposed beneath the first arm 16, such that extension of the jack 112 causes it to bear up against the lower surface of the bracket 46 to raise the first arm 16. The same applies to the second jack for raising the second arm 18.

A pedal 114 is provided for operating a pump (not shown) for the hydraulic fluid reservoir (not shown). The pedal 114 is linked to the first jack 112 by a hydraulic hose 116, forming a closed system. The pedal 114 is floor-mounted in this embodiment. The same pedal 114 is also linked to the second jack, although the connection is not shown.

An elongate track 120 is provided in the side of each upstand 22, 24 (only illustrated for one upstand). Rollers 118 inside the bracket 46 of the first arm 16 engage the track 120 to guide the motion of the arm 16 and prevent it from twisting or sagging. Similar features are provided for the second arm 18 (not shown). This functions similarly to the slider of the first embodiment.

On pressing the pedal 114, pressure forces hydraulic fluid from the reservoir to extend the jacks 112 upwards. Releasing the pedal 114 closes the reservoir, and the jacks 112 remain extended. Release valves (not shown) are provided for each jack 112, to allow the jacks 112 to be compressed using a weighted barbell, for example.

As an example, if the jacks 12 are fully compressed, the height of the arms 16, 18 can be set by lying on the bench 14 with an unweighted barbell on the arms 16, 18, and pressing the pedal 114 until the jacks 112 have been raised to the desired bench press height, relative to the bench. This simultaneously extends both jacks 112, raising the arms 16, 18 together so that they maintain substantially equivalent heights.

The embodiments described above are provided by way of example only, and various changes and modifications will be apparent to persons skilled in the art without departing from the scope of the present invention as defined by the appended claims.

CLAIMS

1. A weight training apparatus for use with a bench, the apparatus comprising a frame, first and second support arms connected to and extending outwardly
5 from the frame for arrangement on either side of the bench, adjustment means connected to the first and second support arms for adjusting vertical positions of the first and second support arms, and a control means for operating the adjustment means, wherein
10 the first and second support arms are adapted to slide along the frame via the adjustment means,
the adjustment means includes locking means engageable to secure the first and second support arms at a fixed height,
in use, operation of the control means enabling simultaneous vertical adjustment of the first and second support arms, and the first and second support arms being
15 locked at a substantially similar height to each other.
2. A weight training apparatus as claimed in claim 1, in which the frame includes first and second upstands to which the first and second support arms are respectively connected.
20
3. A weight training apparatus as claimed in claim 2, in which each upstand includes an elongate aperture, and each of the first and second support arms includes at least one portion engageable with and adapted to pass along the length of the respective elongate aperture.
25
4. A weight training apparatus as claimed in any of claims 1 to 3, in which the adjustment mechanism includes a ratchet and gear arrangement, a drive shaft connected to the ratchet and gear arrangement, and first and second drive chains connected to the driveshaft and to the first and second support arms respectively.
30
5. A weight training apparatus as claimed in claim 4, when dependent on claim 2, in which each upstand includes a cavity containing the respective drive chain.

6. A weight training apparatus as claimed in claim 4 or 5, in which the locking means includes a first pawl engageable with the ratchet and a second pawl engageable with the ratchet opposite the first pawl, for securing the first and second support arms at a given height.

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7. A weight training apparatus as claimed in claim 6, in which the control means includes a handle connected to the ratchet, and the handle includes a lever connected to the first and second pawls.

10

8. A weight training apparatus as claimed in claim 7, in which the handle is operable to raise the first and second support arms, and the handle and lever are operable together to lower the first and second support arms.

15

9. A weight training apparatus as claimed in any of claims 1 to 3, in which the adjustment mechanism includes first and second jacks connected to the first and second support arms respectively for raising and lowering the support arms.

10. A weight training apparatus as claimed in claim 9, in which the jacks are hydraulic or pneumatic.

20

11. A weight training apparatus as claimed in claim 9 or 10, in which the control means includes at least one pedal connected to the jacks, the pedal at least being operable to extend the jacks and raise the first and second support arms.

25

12. A weight training apparatus as claimed in any preceding claim, in which each of the first and second support arms has a distal lip.

13. A weight training apparatus comprising substantially as described herein, with reference to and as illustrated in Figures 1 to 8 of the accompanying drawings.



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Examiner: Mr Ben Hampson

Claims searched: 1-13

Date of search: 29 February 2016

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-2, 4, 6-8, 9-12	US 4249726 A1 (FAUST) See whole document, particularly column 4 line 3-column 5 line 24 and figures
X	1-5, 9-12	US 4799672 A1 (BARRETT) See whole document, particularly column 2 line 40-column 4 line 17 and figures
X	1-2, 9-12	US 2013/190143 A1 (GREENHILL et al.) See whole document, particularly paragraphs 53-57 and figures
X	1-5, 9-12	US 2007/072750 A1 (ANDREWS) See whole document, particularly paragraphs 17-24 and figures
X	1-3, 9-12	US 2006/194678 A1 (TURNER) See whole document, particularly paragraphs 18-28 and figures

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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

A63B

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

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
A63B	0021/078	01/01/2006