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(54) **SELF SPOTTING BARBELL PRESS**

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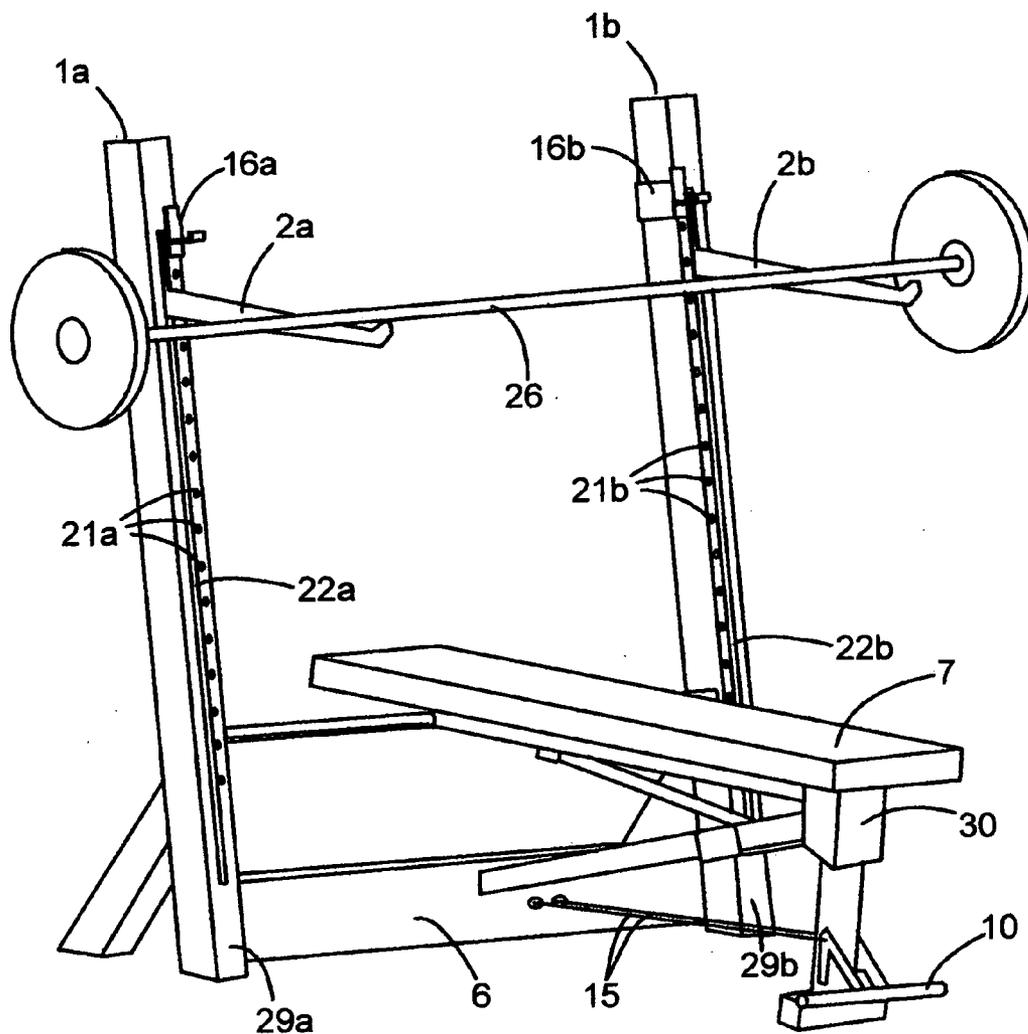
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(57) **ABSTRACT**

A self-spotting safety bench press is composed of an adjustable bench and uprights located on either side of the bench adjacent the lifters upper body. Lifting arms extend from the uprights into the barbell's pathway and have the ability to slide up and down to contact the barbell and decrease the weight exerted on the exerciser. A single hydraulic cylinder in conjunction with a pulley system provides force to each lifting arm, which is depressed below the barbell's path before use. When assistance is needed, the exerciser releases a hydraulic restrictor valve causing the arms to ascend removing a user-determined amount of weight from the barbell. If the total amount of weight is not chosen to be removed the user can continue performing repetitions with machine assistance. A second restrictor valve allows only upward movement should the exerciser fail. A third flow restrictor valve adjusts the rate of arm travel. An air charged hydraulic accumulator provides the hydraulic pressure to the cylinder.



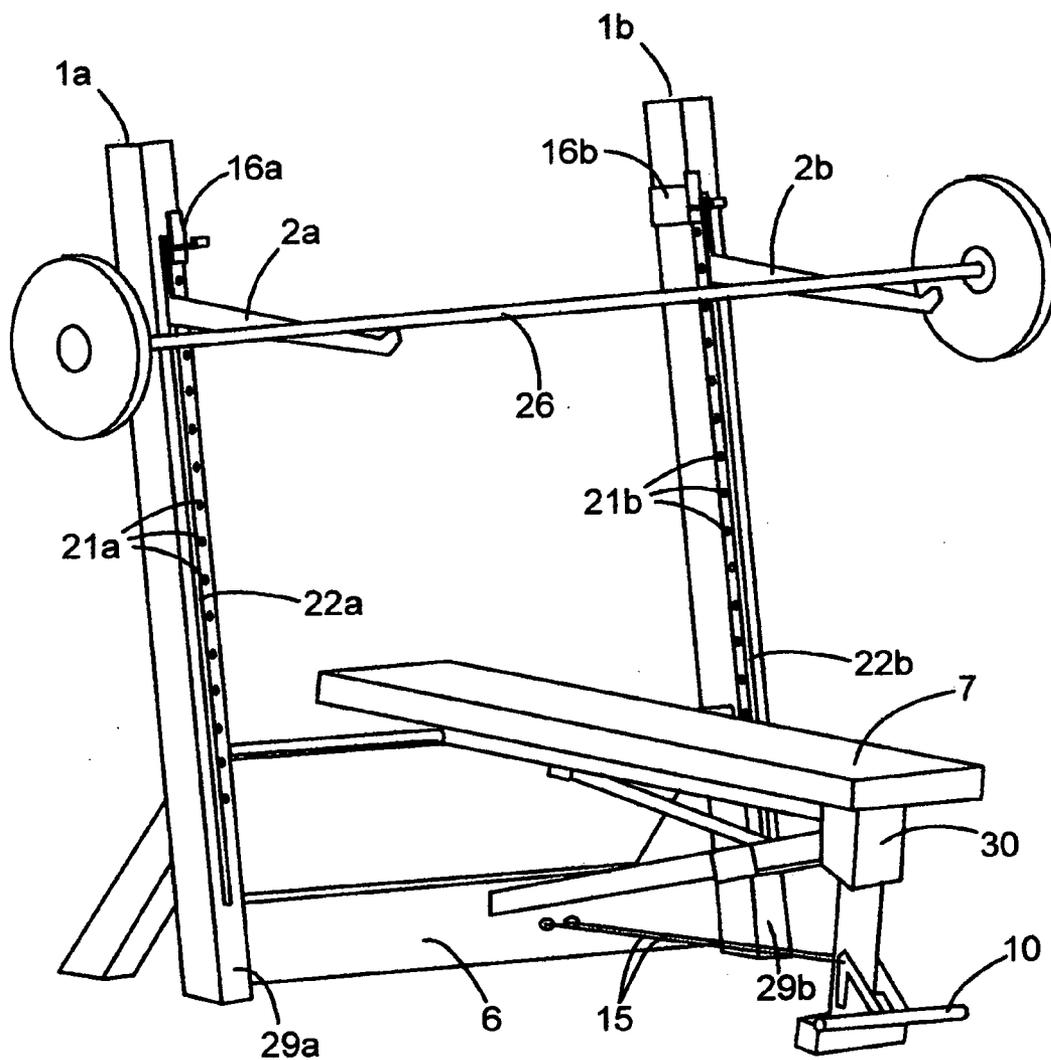


FIG. 1

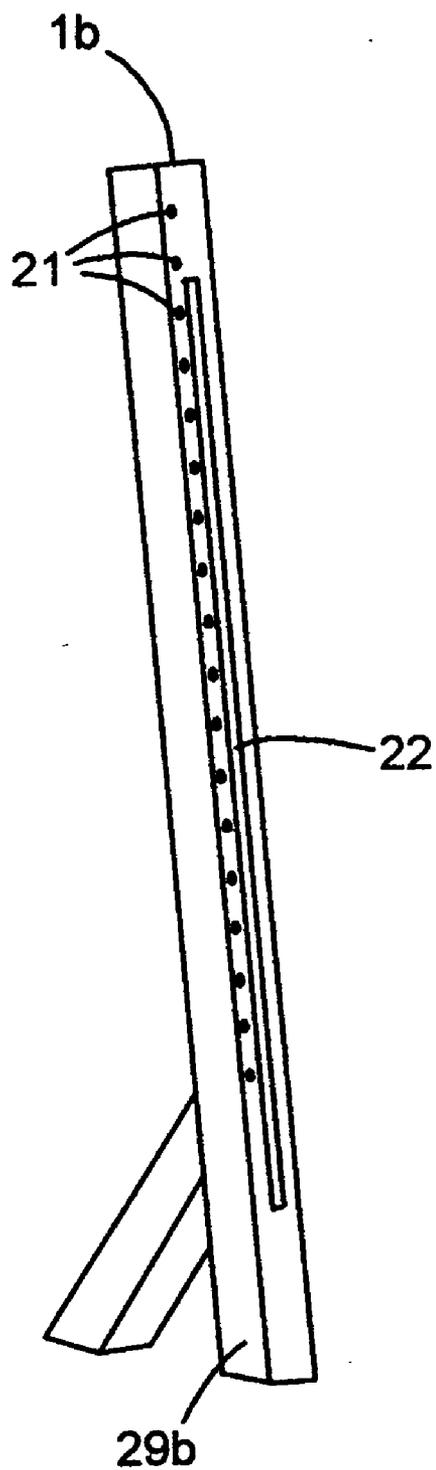


FIG. 2

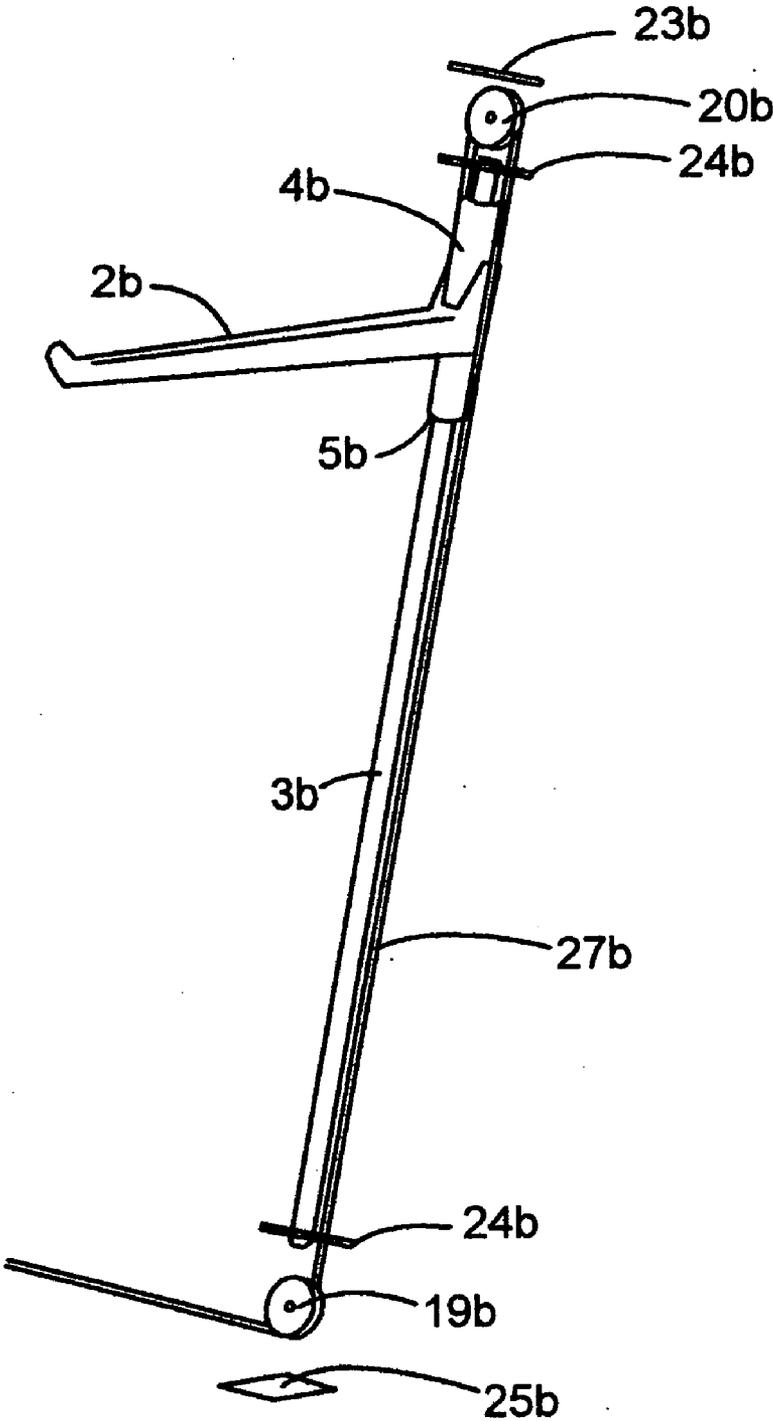


FIG. 3

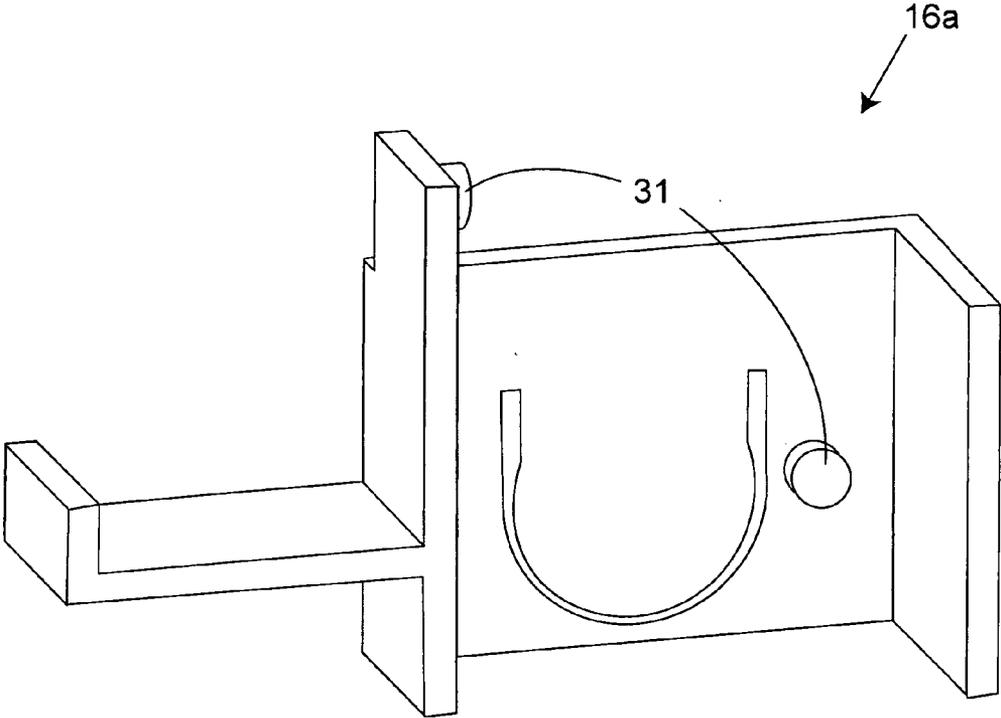


FIG. 4

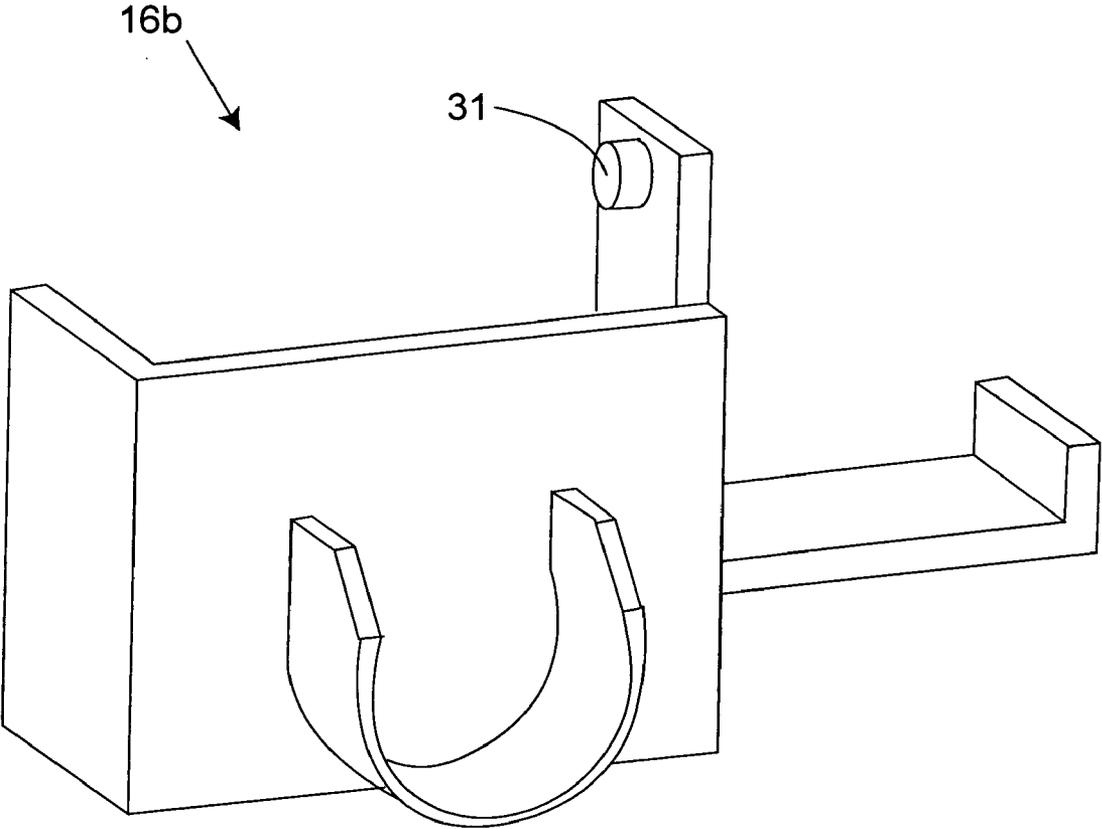


FIG. 5

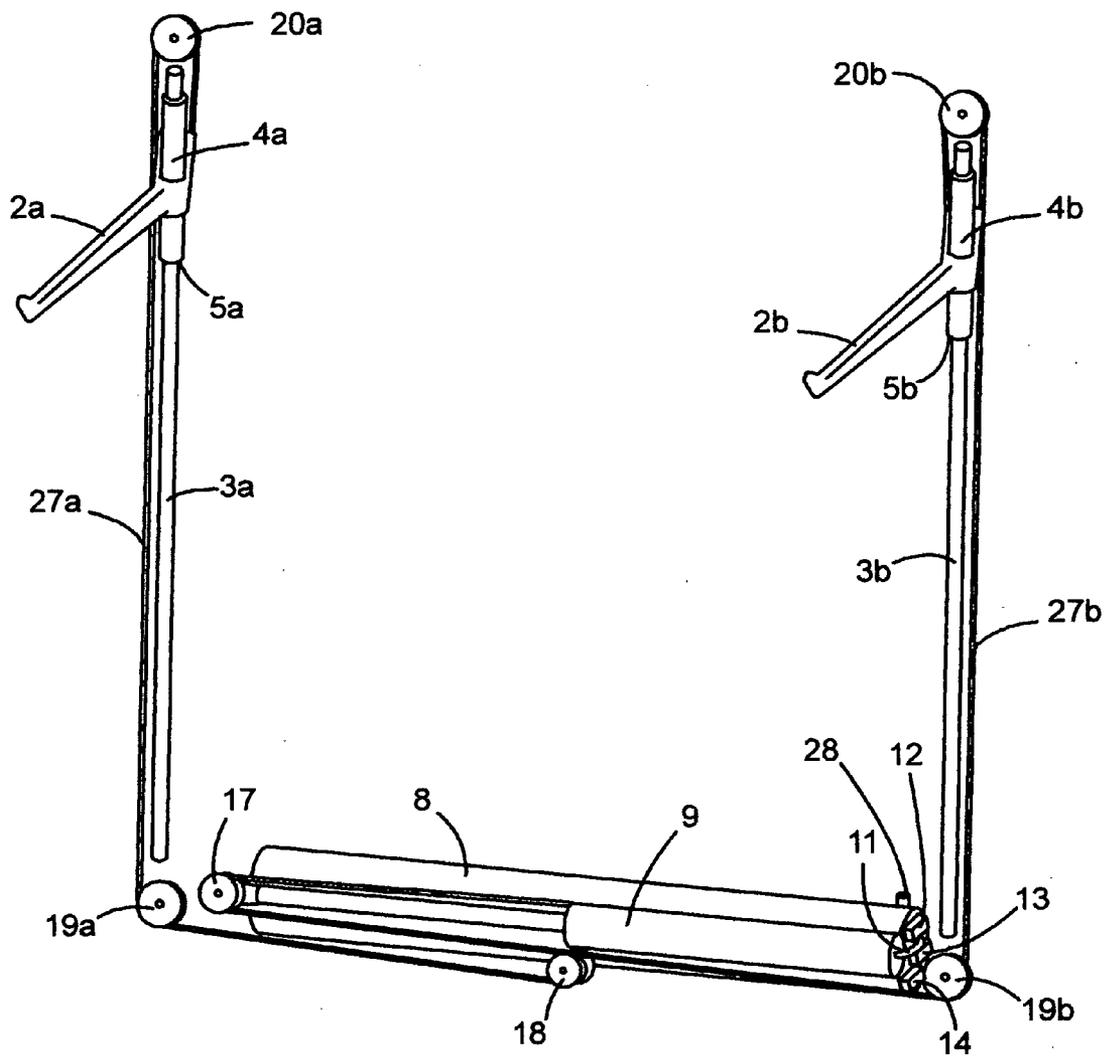


FIG. 6

SELF SPOTTING BARBELL PRESS**BACKGROUND OF THE INVENTION**

[0001] (1) Field of the Invention

[0002] The present invention generally relates to free weight exercise equipment, and in particular to an improved self-spotting bench press.

[0003] (2) Description of the Prior Art

[0004] The use of barbells, i.e., free weights, for conditioning and enhancement of the body's musculature is widely practiced by a variety of people. Often, these people prefer to weight lift in the privacy of their home, and when they feel like weight lifting.

[0005] Most often weight training is executed with a spotter, i.e., someone who can assist the lifter when they become fatigued or are having difficulty or are about to drop the weight. Style, communication, consistency and reaction time are all factors that vary when being spotted. These factors are major deterrents to using a human spotter. However, to weight lift without a spotter may be dangerous to the weight lifter. There is a significant danger of serious injury due to fatigue or improper technique unless a spotter is present to grab the barbell to prevent the barbell from dropping on the weight lifter. This danger exists in situations from private to professional weight lifting.

[0006] The danger of crushing ones chest performing the bench press exercise is a great concern. U.S. Pat. No. 6,746,379 to Brawner (2004) shows a device that lifts the weight from the lifters chest using multiple hydraulic cylinders. While this device removes the weight it does so at considerable cost since multiple cylinders and the hydraulic components to support them are required. U.S. Pat. No. 5,989,164 to Kullman et al (1999) shows a device that lifts the weight from the lifter's chest. While this device removes the weight from the lifter's chest, it utilizes cables attached to the lifting weight that increase setup time and can cause increased or decreased resistance due to contact with the barbell. U.S. Pat. No. 6,926,648 to Capizzo (2005) shows a device that also lifts the weight from the lifter's chest using a motor. This device lacks the ability to adjust the amount of assist, and rate of lift to each lifter's preference. U.S. Pat. No. 6,632,159 to Slattery (2003) describes a spotting machine that requires power to operate an electric motor that limits the machine to an area supplied with a power source.

All the machines heretofore known suffer from one or more of the following disadvantages:

[0007] a. Using multiple hydraulic cylinders. The lifting functionality of U.S. Pat. No. 6,746,379 to Brawner (2004) can be achieved without the use of multiple cylinders.

[0008] b. When using multiple hydraulic cylinders connected to the same pressure supply the cylinders don't always ascend at the same rate.

[0009] c. Exercisers regularly lean weight plates against the uprights of the exercise bench. Prior art using upright mounted hydraulic cylinders risk cylinder damage and hydraulic leaks due to this tendency.

[0010] d. Require lifting mechanism adjustment such that the lifting range of the mechanism is consistent with the lifting range of the exerciser.

[0011] e. Not being adjustable to suit each individual lifter's spotting preference, such as whether the spotting mechanism should assist the lifter by removing a fraction of the weight, remove all the weight, or not be used at all, and rate at which the spotting mechanism lifts the weight.

[0012] f. Not enabling the lifter to continue repetitions while being assisted by the spotting device and still having the ability to lock the spotting device preventing the weight from falling on or crushing the lifter.

[0013] g. Requiring electrical power.

[0014] h. Using barbell attachments such as cables that impede motion.

[0015] i. Using a greater quantity of material and being significantly larger and therefore heavier than traditional bench presses. This is more costly and discourages their use in private homes.

[0016] j. Not enabling the lifter to use the device with a human spotter.

SUMMARY OF THE INVENTION

[0017] The present invention relates to a safety device for supporting a weight bar (barbell) above an exerciser, and to an apparatus comprised of the safety device in combination with free-weight exercise equipment (such as, but not limited to a bench press or squat rack).

[0018] Generally, the apparatus is comprised of first and second placed elongated uprights positionable on opposite sides of the head or upper end of the weightlifting bench, or of the squatting area. Note that the weightlifting bench position within the plane of the uprights is the position from which the squat exercise is performed should the apparatus not be fitted with a bench. Each of the uprights includes a slotted, elongated outer housing, an elongated slide bar that is longitudinally aligned within the housing, and a sleeve slideable on the slide bar between raised and lowered positions. The slideable sleeve and slide bar can be replaced by a shuttle type slide that does not require a slide bar/ball bushing slide. Such a shuttle type slide would have wheels and traverse up and down the upright using the upright as a track. Affixed to the slideable assembly of each upright is a cable of sufficient strength and flexibility to convey hydraulic cylinder force to the slide assembly. In other words, a first cable is included for the first upright and a second cable is included for the second upright. For the purposes of this disclosure, the term cable includes straps, cords and wires.

[0019] Conventional pulley wheels located at each end of the uprights are for directing the cables in a plane parallel with the uprights and then in the direction of the hydraulic cylinder push-rod. This pulley and cable arrangement allows the conversion and relocation of linear push-rod movement into linear slide assembly movement in each upright. A horizontal barbell support arm is attached to the sleeve and extends outwardly from the housing through the first slot in the direction of the bench or perpendicular to the vertical plane that passes through the barbell. The support arms are parallel and lie in a horizontal plane above the bench or squatting position, with the arm intersecting the path of the barbell when it is lifted.

[0020] A single hydraulic cylinder is positioned between the first and second uprights. The hydraulic cylinder is of

conventional design and is comprised of a tubular section with a hydraulic fluid inlet at one end. At the other end a push-rod having inner and outer ends projects outwardly from the cylinder. The inner end of the push-rod is connected to a piston within the cylinder. When hydraulic fluid enters the interior of the tubular section, the push-rod extends outwardly from the cylinder. The outer end of the push-rod includes a pulley wheel with axle of sufficient strength and size to accommodate the cables having their first ends attached to the slideable assembly. The second ends of the cables are attached to the distal end of the cylinder. However, the cable second ends could be fastened to other locations and achieve the same result of providing an anchor point for each cable. An idler pulley is mounted to the distal end of the cylinder. The idler pulley is free to rotate within a plane parallel to the extendable push-rod such that the cable originating from the upright in the direction that the cylinder push-rod extends can be redirected. From their anchor point on the distal side of the cylinder, each cable will extend in the direction of, and around the pulley wheel on the extendable push-rod, then extend back in the direction of, and parallel to the cylinder. At this point, the first cable will round the pulley wheel on the distal end of the cylinder and be directed toward the pulley wheel at the lower end of the first upright in the direction that the cylinder push-rod extends. The second cable will extend past the cylinder and be directed toward the pulley wheel at the lower end of the second upright. Preferably, the tubular section of the hydraulic cylinder is attached at each end to a cross member adjoining the first and second uprights. Thus, as the push-rod is extended under pressure of hydraulic fluid, the slideable sleeves and attached support arms are urged to move in an upward direction.

[0021] The combination of cables and pulleys with the single hydraulic cylinder and push-rod provides a unique mechanical advantage over the prior art. For example, the number and arrangement of pulleys can be selected to provide a fixed ratio of travel between the barbell supports and the stroke length of the push-rod. The preferred embodiment uses a cable and pulley arrangement that yields a two-inch travel for every inch of push-rod stroke. This allows for a shorter and less expensive hydraulic cylinder to be used as the system's actuator. Other travel ratios such as 3:1 could be selected. In fact, dependent upon the number and arrangement of pulleys used as well as their diameter, a practical travel ratio of push-rod travel to barbell support travel can be implemented from about 1:10 to 10:1.

[0022] Hydraulic fluid is stored in an accumulator of conventional design. Basically, the accumulator or "gas-oil" tank is comprised of a pressure housing containing an air inlet above the hydraulic fluid level, and a hydraulic outlet beneath the hydraulic fluid level. Valves along the hydraulic fluid outlet stream and air inlet control the flow of hydraulic fluid and air respectively. Hydraulic fluid is stored under pressure within the accumulator due to the compressed air also in the accumulator. When the hydraulic fluid valve is opened, fluid flows from the accumulator to the hydraulic cylinder. The accumulator can be pre-charged with gases other than air could be used in place of air. For example, nitrogen gas would provide extended system life due to its inertness. Moreover, the accumulator can include a gas pressure relief valve and a connection above the hydraulic fluid level that allows the accumulator tank to be pressurized

or charged with gas. There is also a hydraulic line connection below the lowest fluid level of the tank.

[0023] The apparatus may include a user support bench, which is preferably of sufficient length to support the user's head and torso. When combined with the safety device, the head of the bench can be raised and lowered. For example, a vertically adjustable bench support bar may extend from the frame of the bench, with the head of the bench being supported on the support bar. An additional horizontal mounting bar may be used to attach the uprights to each other. The uprights may also include barbell rests attachable at various locations along the upright housings.

[0024] When combined with the safety device, the apparatus may further include a sufficiently vacant area between the uprights for giving the user space or weight lifting area to perform squat exercises. This space is also available for placing detached seats, benches, or other exercise enabling supports. An additional horizontal mounting bar may be used to attach the uprights to each other in such a way that it does not interfere with the squat exercise, or placement and use of exercise enabling devices. The uprights may also include barbell rests attachable at various locations along the upright housings.

[0025] The apparatus may further include the incorporation of the upright supports into a cage that prevents the lifting weight from moving outside the area above the lifting arms. When combined with the safety device, the lifting arms may extend into the lifting cage with sufficient depth and movement to support the squat exercise or any other bar based exercises performed within the cage.

[0026] In order to control the position of the support arms, the apparatus includes a controller or actuator accessible by the user when reclined on the bench or standing between the uprights. This actuator, which may be foot or hand operated, is used to open the hydraulic valve, thereby causing hydraulic fluid to enter the hydraulic cylinder. As a result, the push-rod of the hydraulic cylinder is extended, raising the support arms and lifting the barbell away from the user. The valve may be partially opened to release a limited volume of fluid to slowly raise the barbell, or fully opened to raise the barbell quickly. If the actuator is hand operated, it is preferred that it be a trigger type actuator. This trigger is important because anyone doing squats on the bench is required to stand between the uprights, thereby making foot operation of the actuator impractical.

OBJECTS AND ADVANTAGES

Accordingly, several object and advantages of the present invention are:

[0027] a. To provide a new and novel safety device or apparatus for an individual engaged in the activity of weight lifting.

[0028] b. To provide a new and novel device that acts instead of a spotter (eliminates need for spotter).

[0029] c. To provide a device that enables the lifter to easily adjust the rate at which the device assists (raises the weight from) the lifter.

[0030] d. To provide a device that enables the lifter to easily adjust the amount of assistance provided by the machine.

- [0031] e. To provide a device easily set up that can either assist in lifting the weight or lift the weight in its entirety.
- [0032] f. To provide a device that when actuated, enables the lifter to continue performing repetitions while being assisted.
- [0033] g. To provide a device that when actuated by the lifter, does not allow any downward movement of the weight.
- [0034] h. To provide a device that does not require electrical power.
- [0035] i. To provide a device that can be used with a traditional human spotter.
- [0036] j. To provide a device with a shape, weight and size similar to traditional manual machines.
- [0037] k. To provide a device that enables the user to exercise with the seat in incline, flat, and decline positions.
- [0038] l. To provide a device that enables the user to perform a squatting or 'box squat' exercise.
- [0039] m. To provide a device with improved lifting arm motion and a less complex design than prior art offering the same functionality.
- [0040] Further objects and advantages of the present invention will become apparent from a consideration of the drawings and ensuing description.

BRIEF DESCRIPTION OF THE DRAWINGS

- [0041] FIG. 1 Self Spotting Safety Bench Press Composite
- [0042] FIG. 2 Inner Front Side of Upright
- [0043] FIG. 3 Upright Internal Attachments
- [0044] FIG. 4 Adjustable Weight Rest
- [0045] FIG. 5 Adjustable Weight Rest
- [0046] FIG. 6 Hydraulic & Pneumatic Power System with Transmission

LIST OF REFERENCE NUMERALS

- [0047] 1. Upright
- [0048] 2. Lifting Arm
- [0049] 3. Slide Bar
- [0050] 4. Slide
- [0051] 5. Slide Bearing
- [0052] 6. Cross Bar
- [0053] 7. Seat
- [0054] 8. Accumulator
- [0055] 9. Hydraulic Cylinder
- [0056] 10. Actuator
- [0057] 11. Hydraulic cylinder fluid supply line.
- [0058] 12. Adjustable Hydraulic Fluid Flow Valve
- [0059] 13. One way hydraulic flow valve (to cylinder)
- [0060] 14. One way flow valve (to accumulator)

- [0061] 15. Actuator Cables
- [0062] 16. Adjustable Weight Rest
- [0063] 17. Pulley 1 (End of cylinder piston shaft)
- [0064] 18. Pulley 2 (Near cylinder)
- [0065] 19. Pulley 3 (At base of uprights)
- [0066] 20. Pulley 4) (at top of Uprights)
- [0067] 21. Weight Rest Support Holes
- [0068] 22. Lifting Arm Slot
- [0069] 23. Cap
- [0070] 24. Centering Plate
- [0071] 25. Floor Plate
- [0072] 26. Barbell
- [0073] 27. Cable
- [0074] 28. Valve
- [0075] 29. Upright Support
- [0076] 30. Seat frame (Adjustable)
- [0077] 31. Weight Rest Mounting Pins

[0078] When reference numerals identify multiples of similar parts those parts will be labeled with the coinciding number followed by a letter. For example there are two Uprights, 1a and 1b.

DETAILED DESCRIPTION OF THE INVENTION

[0079] In the following description, terms such as horizontal, upright, vertical, above, below, beneath, and the like, are used solely for the purpose of clarity in illustrating the invention, and should not be taken as words of limitation. The drawings are for the purpose of illustrating the invention and are not intended to be to scale.

[0080] FIG. 1 shows a composite drawing of the device. There are two uprights (1a, 1b) parallel to each other and tilted slightly away from the longer side of the seat (7). Two adjustable weight rests (16a, 16b) are located on the inner side of each upright. Protruding from the front of each upright (1a, 1b) is a lifting arm (2a, 2b) that extends perpendicular to gravity, and in the direction of the seat (7) and adjustable seat frame (30). Each upright (1a, 1b) has a support (29a, 29b) and is connected to the other via a cross bar (6). Mounted to the cross bar (6) is an accumulator (8) (see FIG. 6) and a hydraulic cylinder (9) (see FIG. 6). Attached to the center of the cross bar (6) is the upper end of the adjustable seat (7) frame. Attached close to the floor at the foot end of the seat (7) is an actuator (10).

[0081] FIG. 2 focuses on upright (1b). The inner side and front side of upright (1b) contains weight rest support holes (21) extending partially down the upright. The front of the upright (1b) to the right of the holes contains a lifting arm slot (22). Contained within the upright are centering holes for holding the slide bar (3b) (please see FIGS. 3 and 6).

[0082] FIG. 3 shows the parts an upright (1b) contains without the upright itself included. The slide bar (3b) nearly extends the full length of the upright (1b) and is held in place by centering plates (24b). Mounted on the slide bar (3b) is

the slide (4b) that contains bearings (5) at either end. Attached to the slide (4b) is a cable (27b) and lifting arm (2b). An upright base Pulley (19b) and top pulley (20b) are located at the extents of the upright (1b). The upright cap (23b) and floor plate (25b) are at opposing ends of the upright.

[0083] FIGS. 4 and 5 show the adjustable weight rest (16b). This piece is "u" shaped to partially wrap around an upright (1b). It contains two mounting pins (31). The first pin is located on the backside of the front plate containing the barbell support extension. The second pin is located on the side plate to extend into the inner weight rest support holes (21). Pin location coincides with the weight rest support holes (21). Pin location allows the front pin to slide into the rest support hole (21) when the adjustable weight rest (16b) is rotated clockwise ninety degrees. Once the first pin is seated in the support hole, rotation of the adjustable weight rest (16b) ninety degrees counter clock wise (with the front pin within the support hole (21) being the axis of rotation) seats the inner pin in the inner rest support hole (21).

[0084] FIG. 6 shows the Hydraulic and Pneumatic system that powers the self-spotting bench along with the cable (27) and pulley (17, 18, 19, 20) system for transmitting the power to the lifting arms (2a, 2b). The accumulator (8) is connected to a hydraulic line (11) that exits the accumulator (8) and leads to three valves; one way valve to cylinder (13), one way valve to accumulator (14), and the flow rate valve (12). The hydraulic line then leads to the hydraulic cylinder (9). One end of the cable (27a, 27b) is attached to the hydraulic cylinder, it then rounds the hydraulic cylinder piston shaft pulley (17) then proceeds toward the cylinder pulley (18). At the cylinder pulley (18) cables (27a, 27b) separate to serve each of the uprights (1a, 1b). One cable (27a) proceeds towards the bottom of its respective upright (1a) and one cable (27b) rounds the cylinder pulley (18) then proceeds toward its respective upright (1b). The cables (27a, 27b) then round the upright base pulley (19a, 19b), round upright top pulley (20a, 20b), then connect with the slide (4a, 4b).

Operation

[0085] FIG. 1 shows the barbell (26) free weight starting point held on the adjustable weight rest (16). The distance of the weight from the seat (7) (and therefore the lifter) can be adjusted by rotating each adjustable weight rest (16) ninety degrees away from the upright (1a, 1b) using the front pin as a pivot point. After being rotated the adjustable weight rest (16) can be separated from the upright (1) by moving it perpendicular to the upright in the direction the lifting arm (2) extends. The adjustable weight rest (16) can be reattached in other locations performing the reverse of these instructions in any other weight rest support hole (21).

[0086] Once the barbell is held on the adjustable weight rest (16a, 16b) the lifter can now set the one-way flow valve (to accumulator) (14) to be active. This will allow the lifting arms (2a, 2b) to only move downward. The lifter has two options as to how to depress the lifting arms (2a, 2b). The first option is to get in the exercising position, remove the barbell (26) from the adjustable weight rests allowing the weight to lower and depress the lifting arms (2a, 2b), and then start repetitions from the lowest point the bar traveled. The second option is to depress each lifting arm (2a, 2b) by hand to a point where it will not interfere with the exercise until released.

[0087] If the lifter desires an increased or decreased assisting force exerted on the barbell by the lifting arms, an air adjustment can be made to the accumulator by adding air using a conventional air compressor or releasing air through the accumulator tank valve (28). If the rate at which the lifting arm ascends is too slow or fast the adjustable hydraulic fluid flow valve (12) can also be manipulated to suit user preference.

[0088] Repetitions are started once the lifting arms are depressed and the equipment is adjusted to suit lifter's preferences. When the lifter needs a "spot" the one way flow valve (to accumulator) is released. The compressed air in the accumulator (8) acts as a spring and forces hydraulic fluid through the hydraulic cylinder fluid supply line (11) and into the hydraulic cylinder (9). The cylinder shaft then extends pulling the cable (27) and causing the attached lifting arm to also rise. The lifting arms contact the barbell and assist (spot) the lifter. The opposite of this action occurs when the lifting arms are being depressed (i.e. the hydraulic fluid in the hydraulic cylinders (11a, 11b) is forced back into the accumulator where potential energy is stored in the form of compressed air).

[0089] Once the one-way flow valve (to accumulator) (14) is released, the lifting arms (2) will be permitted to move up and down while still asserting an assisting force on the barbell (26). This allows the lifter to continue by performing assisted repetitions when he/she could no longer lift the original weight unassisted. Should the upward force desired by the lifter exceed the weight of the barbell the entire weight will be lifted by the machine, not permitting assisted repetitions.

[0090] When the lifter is no longer able to perform the assisted repetitions (or whenever else the lifter desires) the one way flow valve (to cylinder) (13) can be engaged. This will only allow hydraulic fluid to flow toward the cylinder (9) thus allowing the lifting arms to raise but not be lowered. This will allow the lifter to lift the barbell with assistance, and then prevent the barbell (26) from falling on the lifter when failure occurs.

[0091] The manipulation of the one way flow valves (13, 14) mentioned above is accomplished by use of an actuator (10) the exerciser manipulates with his/her lower leg or foot. The actuator (10) is connected to the hydraulic valves via actuator cables (15) and pulley transmission system. When the actuator (10) is kicked once in the direction of the accumulator (8) the one way valve to the accumulator (14) will be released. When kicked a second time the one way valve to the cylinder (13) will be engaged. The system can then be reset by either kicking the actuator (10) a third time or manually resetting the one way flow valves (13,14).

[0092] Due to the stress the exerciser is experiencing during failure the exercisers leg or foot is likely to contact the actuator with significant force. The actuator therefore has a limited range of motion and does not transfer all of this energy to the valves. For the same reason the actuator is constructed with suitable smooth surface area as to not injure the exerciser when kicked. The design of the actuator (10) shown in FIG. 1 is not intended to limit the scope of this invention. A lanyard that attaches to the exerciser's leg or foot, or a switch that is mounted on the barbell is also feasible.

[0093] Thus the reader will see that the self-spotting safety bench press of this invention provides a dependable spotting

machine that increases user safety with a minimum of components. The spotting speed and force exerted is fully adjustable to suit user preferences, as is weight rest position, and seat position. This machine has two spotting modes. The first mode allows the lifter to continue repetitions (up and down) assisted by the machine. The second mode only allows upward movement, preventing the weight from falling on the lifter. Furthermore this machine requires no electrical power and is of a weight and size similar to traditional non-spotting bench presses. These attributes make this machine likely to be used in private and public gyms alike.

[0094] While the above description contains many specifics, these should not be construed as limitations on the scope of the invention, but rather as an exemplification of one preferred embodiment thereof. Many other variations are possible. For example, the uprights described above do not have to be tilted away from the seat extension of the bench. Still another example is that the spotting device used with this machine is not to be limited to use with only one type of seat. A seat adjustable to various incline, decline and flat positions and seats in fixed positions are all types that can be used with this device.

[0095] Accordingly, the scope of the invention should be determined not by the embodiments illustrated, but by the appended claims and their legal equivalents.

1. An apparatus for safely supporting a barbell comprising:

- a) first and second spaced uprights, each of said uprights including a barbell support having a raised position and a lowered position, said uprights each having a top end with a pulley wheel;
- b) a single hydraulic cylinder having a push-rod with extended and retracted positions;
- c) first and second cables, each cable extending around a pulley from an anchored end to an opposed end in communication with a barbell support, whereby movement of said push-rod between its extended and retracted positions raises and lowers each barbell support;
- d) at least one pre-charged accumulator tank having a pressure housing for storing hydraulic fluid under pressure; and
- e) at least one actuator for controlling the flow of fluid between said at least one pre-charged accumulator tank and said hydraulic cylinder, whereby flow of fluid into said hydraulic cylinder urges said supports toward their raised positions.

2. The apparatus of claim 1, wherein each of said uprights includes a slotted outer housing, a slide bar longitudinally aligned within said housing, and a sleeve slidable on said slide bar, said barbell support being attached to said sleeve and extending outwardly from said upright through said slot.

3. The apparatus of claim 1, wherein the ratio between the range of push-rod travel, and the range of either barbell support travel is from about 10:1 to 1:10.

4. The apparatus of claim 1, further including a horizontal attachment member joining said uprights.

5. The apparatus of claim 1, wherein said at least one actuator is positioned for access by a user's hand when the user is in a squat exercise position.

6. The apparatus of claim 1, wherein said at least one actuator is positioned for access by a user's foot.

7. The apparatus of claim 1, wherein said uprights include barbell weight rests attached to said uprights at selected vertical positions.

8. An apparatus for safely supporting a barbell during weight lifting comprising:

- a) a weight bench having a head end and a lower end;
- b) first and second spaced, elongated uprights positioned on opposite sides of said bench head end, each of said uprights including a barbell support having a raised position and a lowered position, said uprights each having a top end with a pulley wheel;
- c) a single hydraulic cylinder having a push-rod with extended and retracted positions;
- d) first and second cables, each cable extending around a pulley from an anchored end to an opposed end in communication with a barbell support, whereby movement of said push-rod between its extended and retracted positions raises and lowers each barbell support;
- e) at least one pre-charged accumulator tank having a pressure housing for storing hydraulic fluid under pressure; and
- f) at least one actuator for controlling the flow of fluid between said at least one pre-charged accumulator tank and said hydraulic cylinder, whereby flow of fluid into said cylinder urges said supports toward their raised positions.

9. The apparatus of claim 8, wherein the ratio between the range of push-rod travel, and the range of either barbell support travel is from about 10:1 to 1:10.

10. The apparatus of claim 8, wherein said at least one actuator is positioned adjacent the lower end of said bench.

11. The apparatus of claim 8, further including a bench support extending between said uprights, the head end of said bench being supported on said bench support.

12. The apparatus of claim 8, wherein each of said uprights includes a slotted outer housing, a slide bar longitudinally aligned within said housing, and a sleeve slidable on said slide bar, said barbell support being attached to said sleeve and extending outwardly from said upright through said slot, said at least one hydraulic cylinder first end being in communication with said sleeve.

13. The apparatus of claim 8, wherein said uprights are tilted rearwardly.

14. The apparatus of claim 8, further including a horizontal attachment member joining said uprights.

15. An apparatus for safely supporting a barbell during weight lifting comprising:

- a) a tiltable weight bench for supporting a user's head and torso, said bench having a head end and a lower end;
- b) first and second spaced, elongated uprights positioned on opposite sides of said bench head end, each of said uprights including a slotted outer housing, a slide bar longitudinally aligned within said housing, a sleeve slidable on said slide bar between a raised position and

- a lowered position, and a horizontal barbell support attached to said sleeve and extending outwardly from said housing through said slot;
- c) a single hydraulic cylinder having a push-rod with extended and retracted positions;
 - d) first and second cables, each cable extending around a pulley from an anchored end to an opposed end attached to a slidable sleeve, whereby movement of said push-rod between its extended and retracted positions raises and lowers each slidable sleeve and barbell support;
 - e) at least one pre-charged accumulator tank having a pressure housing for storing hydraulic fluid under pressure; and
 - f) at least one actuator for controlling the flow of fluid between said at least one pre-charged accumulator tank and said at least one hydraulic cylinder, whereby flow of fluid into said cylinder urges said supports toward

their raised positions, said at least one actuator including a valve and a valve controller operable by said user when said user is positioned on said bench.

16. The apparatus of claim 15, wherein said valve controller is positioned for access by a user's hand when the user is in a squat exercise position.

17. The apparatus of claim 15, wherein the ratio between the range of travel of each barbell support and the range of push-rod travel is from about 10:1 to 1:10.

18. The apparatus of claim 15, further including a horizontal attachment member joining said uprights.

19. The apparatus of claim 15, further including a vertically adjustable, horizontal bench support extending between said uprights, the head end of said bench being supported on said bench support.

20. The apparatus of claim 15, wherein said valve controller is positioned for access by a user's foot when the user is on said bench.

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