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(54) **STATIC - DYNAMIC EXERCISE APPARATUS AND METHOD OF USING SAME**

(57) A static dynamic exercise apparatus is provided. A spatially displaceable object is coupled to a frame and coupled to a force applicator. A resistance system exerts a first level of resistance that prevents the movement of the object by the application of a user-applied force, thereby allowing a user to generate a static, or isometric, force on the force applicator and object. The resistance system may then be released, to allow movement of the object, thereby rapidly transmuting the static force into a dynamic movement. In various embodiments, the object is a plurality of weights, the force applicator is a weight lifting bar, and the resistance system is a pneumatically actuated piston that is capable of releasably holding the weights and weight bar to the frame.

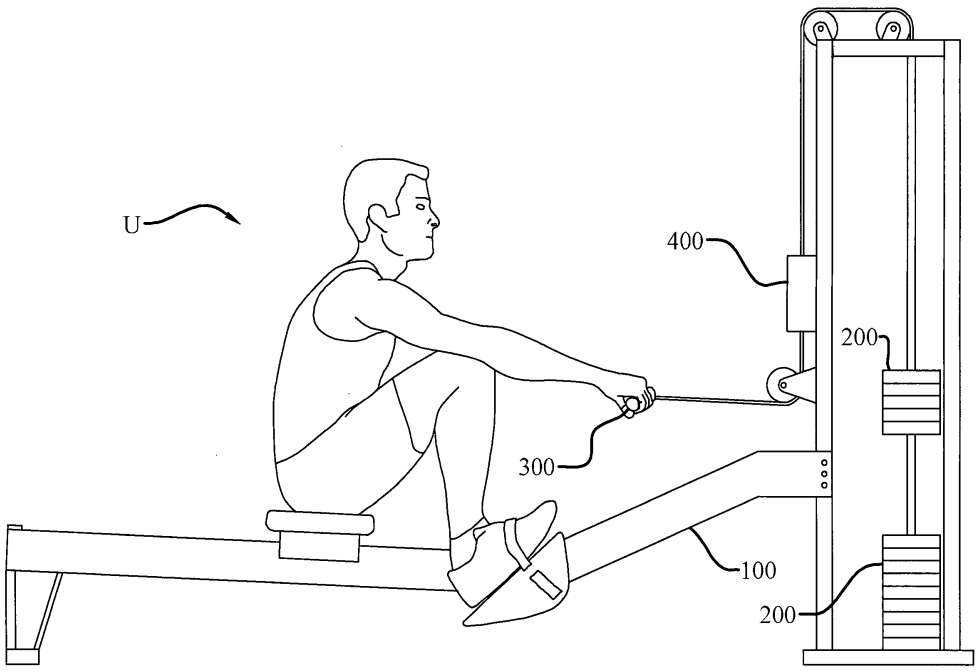

Fig. 1

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Description

[0001] The present disclosure relates generally to an apparatus for static and dynamic exercise training and a method for using the same.

[0002] All bodily movement, including exercise, can be considered as including two broad types of activities; static and dynamic. Static exercise may be generally considered as effort without movement, i.e., the development of a relatively large intramuscular force with little or no change in muscle length, and therefore without significant joint movement. Static exercise is also known as isometric exercise. Dynamic exercise involves changes in muscle length, and therefore joint movement, caused by muscle contractions developing a relatively small intramuscular force. The classifications are to be distinguished from the terms aerobic and anaerobic exercise, which describe the energy metabolism employed in a given exercise, rather than the motion, or lack of motion, produced.

[0003] In practical application, these two types of exercise represent the opposite ends of a continuum of movement, with most physical activity combining aspects of both static and dynamic exercise. As will be described below, the present invention includes a *Static-Dynamic* exercise apparatus, wherein a static exercise is rapidly converted to and continued as a dynamic exercise.

[0004] A static-dynamic exercise apparatus allows the exertion of a static exercise to be rapidly supplanted by a dynamic exercise. Experimentally, it has been found that holding a 2-3 second static or isometric contraction at 80% of an individual's maximum effort capacity; followed immediately by an explosive dynamic work load of 30% of maximum effort capacity, is a highly effective method. Additionally, it has been found that that a dynamic muscle acceleration of 0.8-0.9 meters/sec. is highly effective for speed strength development. For strength speed or slow strength development, a protocol of exerting at least 80% of a user's strength potential statically for 2-3 seconds, followed by the application of force as fast as possible, with a load of 90-95% of the user's maximal capacity, achieving an acceleration of 0.4-0.5 m/sec., is also an effective training method.

[0005] Such a combined static and dynamic system has been referred to as a *quick release technique.* In one embodiment of this method, the athlete develops high force under isometric conditions while the body is locked at a pre-determined body position of a plurality of varying angles, commonly one to six varying angles. Next, the static resistance is released and immediately followed by a dynamic action.

[0006] Until now, a major difficulty has been the practical one of being able to switch between static and dynamic exercise modes quickly enough for maximum benefit.

[0007] Therefore it is an object of the present invention to provide an apparatus via which a switch between static and dynamic exercise modes can be made quickly enough for maximum benefit of the user.

[0008] This object, among others, is solved by various embodiments of the present invention, which is capable of being rapidly alternated between static and dynamic modes of action. Illustrative examples of various embodiments of the invention, all provided by way of example and not limitation, are described.

[0009] The hereby provided static dynamic exercise apparatus comprises

- at least one spatially displaceable object having a predetermined mass movably coupled to a support frame and coupled to a force applicator capable of transmitting a user-applied force to the spatially displaceable object;
- a resistance system coupled to the spatially displaceable object and the force applicator capable of producing a variable resistance to movement of the spatially displaceable object and the force applicator, including at least a resistance to movement equal to or greater than the user-applied force and wherein the resistance system may be reversibly alternated between at least two predetermined levels of resistance.

[0010] According to at least one embodiment of the present invention the at least one spatially displaceable object is at least one metal weight.

[0011] According to at least one embodiment of the present invention the spatially displaceable object further comprises a pressure piston in a pressure cylinder capable of generating a fluid pressure.

[0012] According to at least one embodiment of the present invention the support frame further comprises at least one rail having a length, a rail lower end and a rail upper end, slidably coupled at a first predetermined position to at least one object selected from the objects consisting of the spatially displaceable object and the force applicator, wherein the spatially displaceable object may be displaced to a second predetermined position on the rail length by the application of the user-applied force to the force applicator.

[0013] According to at least one embodiment of the present invention the rail lower end has a rail lower joint rotably coupled to a rotable rail attachment on the support frame and the rail upper end has a rotation channel engagement area movable within a rotation channel on the frame allowing a predetermined degree of rotational movement of the rail relative to the support frame.

[0014] According to at least one embodiment of the present invention the support frame includes at least one lateral support coupled to a base and at least one upper member.

[0015] According to at least one embodiment of the present invention the resistance system further comprises a pressure generator capable of creating a pressure in fluid communication with a resistance interlock, wherein pressure produced by the pressure generator is trans-

missible to the resistance interlock, thereby creating the variable resistance to movement of the spatially displaceable object.

[0016] According to at least one embodiment of the present invention the resistance system further comprises a controller capable of regulating the pressure transmissible to the resistance interlock.

[0017] According to at least one embodiment of the present invention the resistance interlock has a first position in which no resistance is applied by the resistance system and at least a second position wherein a resistance equal to that necessary to prevent movement of the spatially movable object is applied by the resistance system to the spatially movable object.

[0018] According to at least one embodiment of the present invention the pressure generator generates a pressure in fluid communication with an ambient atmosphere through a filter and pressurizes the ambient atmosphere to a predetermined pressure greater than that of the ambient atmosphere, wherein the pressurized atmosphere is pressure regulated by a pressure regulator and transmitted through at least one pressure channel to the resistance interlock.

[0019] Further, a static dynamic exercise apparatus is hereby provided comprising;

- at least one weight having a predetermined mass movably coupled to a support frame and coupled to a weight bar having a gripping area, transmissible of a user-applied force to the weight;
- a pressure generator coupled to the weight and the weight bar, in fluid communication with a resistance interlock having a controller; wherein the resistance interlock is reversibly capable of producing a variable resistance to movement of the weight and weight bar, including at least a resistance in excess of the user-applied force and wherein the resistance interlock may be reversibly alternated between at least two predetermined levels of resistance.

[0020] Therefore, two static dynamic exercise appliances are suggested, however, both are solving the same object.

[0021] According to at least one embodiment of each the static dynamic developer at least one weight having a predetermined mass movably is coupled to a support frame and coupled to a weight bar having a gripping area, transmissible of a user-applied force to the weight. According to at least one embodiment of each the static dynamic developer a pressure generator is coupled to the weight and the weight bar, in fluid communication with a resistance interlock having a controller; wherein the resistance interlock is reversibly capable of producing a variable resistance to movement of the weight and weight bar, including at least a resistance in excess of the user-applied force and wherein the resistance interlock may be reversibly alternated between at least two predetermined levels of resistance.

[0022] According to at least one embodiment the support frame further comprises at least one weight storage attachment.

[0023] According to at least one embodiment the weight bar has at least one weight engager releasably connecting the weight bar to the at least one weight.

[0024] According to at least one embodiment the weight bar further comprises at least one weight bar support engager releasably engageable with at least one weight bar support on the support frame.

[0025] According to at least one embodiment the at least two predetermined levels of resistance comprise a level of no resistance to movement and a level of resistance capable of preventing movement of the spatially movable object by the application of a user-applied force.

[0026] Further, a method of static-dynamic exercise is disclosed, for example, using a static dynamic exercise apparatus according to at least one of the previous described embodiments. That means that any features described in connection of the above mentioned static dynamic exercise apparatus are also disclosed for the hereby described method and vice versa.

[0027] The hereby provided method of static-dynamic exercise comprises the steps of:

- predetermining a maximum achievable user-applied force;
- providing a spatially movable object having a mass and movable with a force equal to a first predetermined percentage of the maximum achievable user-applied force;
- providing a resistance to movement of the spatially movable object 200 at least sufficient to overcome a movement cause by the application of a second predetermined percentage, greater than the first predetermined percentage, of the maximum achievable user-applied force;
- allowing the user to apply the second predetermined percentage of the maximum achievable user-applied force to the spatially movable object 200; and
- releasing the resistance to movement of the spatially movable object 200, thereby allowing the second percentage of the maximum achievable user-applied force to move the spatially moveable object 200.

[0028] According to at least one embodiment of the present method the predetermined percentage of the maximum achievable user-applied force is approximately one-third of the maximum achievable user applied force.

[0029] According to at least one embodiment of the present method the release of the resistance to movement of the spatially moveable object is completed is less than one-half second.

[0030] According to at least one embodiment of the present method the release of the resistance to movement of the spatially moveable object is completed is less than one-tenth second.

[0031] According to at least one embodiment of the present method the step of providing an increased resistance to movement of the spatially movable object after the object has moved a predetermined distance.

[0032] Without limiting the scope of the static-dynamic exercise apparatus as disclosed herein and referring now to the drawings and figures:

FIG. 1 shows an elevation view of an embodiment of a static-dynamic exercise apparatus;
FIG. 2 shows a perspective view of another embodiment of a static-dynamic exercise apparatus; and
FIG. 3 shows a perspective view of a detail of the embodiment of FIG. 2.

[0033] These illustrations are provided to assist in the understanding of the exemplary embodiments of a static-dynamic exercise apparatus design and method of forming the same, as described in more detail below, and should not be construed as unduly limiting the specification. In particular, the relative spacing, positioning, sizing and dimensions of the various elements illustrated in the drawings may not be drawn to scale and may have been exaggerated, reduced or otherwise modified for the purpose of improved clarity. Those of ordinary skill in the art will also appreciate that a range of alternative configurations have been omitted simply to improve the clarity and reduce the number of drawings.

[0034] As seen in FIGS. 1-3, certain embodiments of a static dynamic exercise apparatus 10 are seen, although one skilled in the art would recognize many other embodiments based on the principles taught herein. In its simplest form, illustrated essentially schematically in FIG. 1, the apparatus includes four basic components. The first is at least one spatially displaceable object 200 having a predetermined mass. In several common embodiments, the spatially displaceable object 200 will be one or more weights 210, as seen well in FIG. 2. There is no particular design for a weight 210 to be configured, other than it having a predetermined mass; shape or materials are inconsequential, although in common embodiments, steel weightlifting plates may be utilized. However, it is not necessary for the spatially displaceable object 200 to be a weight 210, and could also be a pressure piston 222 actuated within a pressure cylinder 220not shown, a means of elastic resistance, or any other object, that is capable of generating a static resistance when there is no movement, and with movement, is capable of creating a dynamic resistance.

[0035] The spatially displaceable object 200 may be movably coupled to a support frame 100 to support the components, but again, no special construction of the support frame 100 is required, other than it have the capacity to support the remaining components in a practical and useable manner.

[0036] The spatially displaceable object 200 may be coupled to a force applicator 300 capable of transmitting a user-applied force to the spatially displaceable object 200. Again, no special construction is required, the only necessity being that a user may use the force applicator 300 to apply a force to the spatially displaceable object 200. By way of example only, and not limitation, in FIG. 1 the spatially displaceable object 200 is seen as a stack of steel weight plates riding in a tracked frame 100, and the force applicator 300 is there seen as a cable attached to a handle. In this particular and bare-bones embodiment, a user U may employ a rowing motion to cause the force applicator 300 to transmit the user applied force to the spatially displaceable object 200. In FIGS. 2-3, again by way of example only, the static-dynamic exercise apparatus 10 is configured in an embodiment where the force applicator 300 is a standard weight lifting bar, and the spatially displaceable object 200 is seen as a plurality of steel weightlifting weights.

[0037] Again with reference to FIG. 1, the static-dynamic exercise apparatus may also include a resistance system 400 coupled to the spatially displaceable object 200 that is capable of producing a variable resistance to movement of the spatially displaceable object 200 and the force applicator 300. The resistance system 400 is capable of generating at least a resistance to movement equal to or greater than the user-applied force and the resistance system 400 may be reversibly alternated between at least two predetermined levels of resistance. Again, no particular construction is necessary for the resistance system 400, other than the requirement that it be capable of a first resistance preventing the user-applied force from displacing the spatially displaceable object 200, and that this resistance may be released such that the resistance system 400 generates a second resistance less than the user-applied force, thereby allowing the user to spatially displace the spatially displaceable object 200. The second resistance is optimally as low as can be practically achieved, given the necessary constraints of friction within the mechanism. As detailed above, the term "displace" includes any form of variable resistance, particularly including that which may be provided by pneumatic or hydraulic pressure pistons 222, or by any form of providing elastic resistance. Therefore, in a preferred embodiment, the at least one spatially displaceable object 200 is at least one metal weight 210, as seen in FIGS. 1-3, but in another preferred embodiment, the spatially displaceable object 200 further comprises a pressure piston 222 in a pressure cylinder 220 capable of generating a fluid pressure.

[0038] As seen well in FIG. 2, the support frame 100 may be configured to have at least one rail 170 having a length, a rail lower end 175 and a rail upper end 178. The rail 170 may be slidably coupled at a first predetermined position to an object selected from the objects consisting of the spatially displaceable object 200 and the force applicator 300. Application of a user-applied force may allow the spatially displaceable object 200 to be displaced from the first predetermined position to a second predetermined position along the rail 170 length, when the user-applied force is applied to the force applicator 300.

[0039] In one embodiment, seen well in FIG. 2, the rail lower end 175 has a rail lower joint 176 rotably coupled to a rotable rail attachment 150 on the support frame 100 and the rail upper end 178 has a rotation channel engagement area 179 movable within a rotation channel 140 on the frame 100. This allows a predetermined degree of rotational movement of the rail 170 relative to the support frame 100, which tends to allow, in the apparatus pictured, the correction of any deviation from an application of user-applied force that is not applied plumb to the spatially displaceable object 200. In this embodiment, the support frame 100 includes a base 110, at least one lateral support 120 and at least one upper member 130, but one skilled in the art will understand that these are not necessary in all embodiments.

[0040] In one series of embodiments, the resistance system 400, as seen well in FIGS 2-3, includes a pressure generator 410 capable of creating a pressure in fluid communication with a resistance interlock 420. Pressure produced by the pressure generator 410 is transmissible to the resistance interlock 420, thereby creating the variable resistance to movement of the spatially displaceable object 200. In a common series of embodiments, the pressure interlock 420 creates the variable resistance to movement of the spatially displaceable object by means of a plunger or piston exerting a force against the rail 170. The resistance system 400 may have a controller 422 capable of regulating the pressure transmissible to the resistance interlock 420. In a typical embodiment, as seen in FIGS. 2-3, the resistance interlock 420 may include a pneumatic, hydraulic, or electrically powered piston, such that the resistance interlock 420 has a first position in which little or no force is applied by the resistance system 400 and at least a second position wherein a force equal to that necessary to prevent movement of the spatially movable object 200 by application of a user-applied force is applied by the resistance system 400. Any controller 420 may be capable of rapid alternation between the first and second positions.

[0041] In embodiments utilizing a pneumatic resistance interlock 420, seen well in FIG. 2, the pressure generator 410 may be in fluid communication with an ambient atmosphere through a filter 412 and which pressurizes the ambient atmosphere to a predetermined pressure greater than that of the ambient atmosphere, wherein the pressurized atmosphere is transmitted through at least one pressure channel 416 to the resistance interlock 420. In a typical embodiment, but one intended by way of example only and not limitation, ambient air is filtered and compressed to operate a pneumatic piston in the resistance interlock 420 regulated by the controller 422.

[0042] In yet another embodiment, seen well in FIG. 2 and in part in FIG. 3, and one that will be familiar in concept to traditional weight training practitioners, a static dynamic exercise apparatus 10 may include at least one spatially displaceable object 200 comprising at least one weight 210 having a predetermined mass. The weight 210 may be movably coupled to a support frame 100 and coupled to a force applicator 300 comprising a weight bar 305. In turn, the weight bar 305 may have a gripping area 307, transmissible to a user-applied force to the spatially displaceable object 200.

[0043] Again, and as seen in FIGS. 2-3, a resistance system 400 may be coupled to the spatially displaceable object 200 and the force applicator 300, comprising a pressure generator 410, regulated by a pressure regulator 414, in fluid communication with a resistance interlock 420 having a controller 422. The resistance interlock 420 is reversibly capable of producing a variable resistance to movement of the spatially displaceable object 200 and the force applicator 300, including at least a resistance in excess of the user-applied force and wherein the resistance system 400 may be reversibly alternated between at least two predetermined levels of resistance. The at least two predetermined levels of resistance may include a level of no resistance to movement, other than the necessary constraints of friction within the mechanism, and a level of resistance capable of preventing movement of the spatially movable object 200 by the application of a user-applied force.

[0044] Since the embodiment described above is configured, by way of example only and not limitation, as using weight 210 plates, users may find it convenient for the support frame 100 to include at least one weight storage attachment 160. It may also be convenient to configure the weight bar 305 to have at least one weight engager 310 releasably connecting the weight bar 305 to the at least one weight 210.

[0045] The weight bar 305, as seen in FIG. 2 and in greater detail in FIG. 3, may include at least one weight bar support engager 330 releasably engageable with at least one weight bar support 122 on the support frame 100, thus allowing the frame 100 to provide various positions in which the weight bar 305 may rest.

[0046] Those skilled in the art will understand the relationship between the static-dynamic exercise apparatus 10 and a novel means of strength training. This method may include the steps of first, predetermining a maximum achievable user-applied force. Next, one would provide a spatially movable object 200 having a mass and movable with a force equal to a first predetermined percentage of the maximum achievable user-applied force. Experience has shown that a mass of approximately one-third of the mass movable by the maximum user-applied force produces good results, although there may be considerable variation in that number.

[0047] One would then provide a resistance to movement of the spatially movable object 200 at least sufficient to overcome a movement caused by the application of a second predetermined percentage, greater than the first predetermined percentage, of the maximum achievable user-applied force. In some cases the second predetermined percentage of the maximum achievable user-applied force may be 100%, however in other preferred embodiments, the second predetermined percentage of the maximum achievable user-applied force may be in the

80-90% range. In other embodiments, the second predetermined percentage of the maximum achievable user-applied force may be any percentage greater than the first predetermined percentage.

[0048] Next, one may allow the user U to apply the second predetermined percentage of the maximum achievable user-applied force to the spatially movable object 200; and then release the resistance to movement of the spatially movable object 200. This would allow the second percentage of the maximum achievable user-applied force to move the spatially moveable object 200; converting what had been a static exercise to a dynamic one. In order that the change from static to dynamic exercise be made as quickly as possible, it is generally desirable for the step of releasing the resistance to movement of the spatially movable object 200 be accomplished as quickly as possible, and in a series of preferred embodiments, the resistance is released in less than one-tenth of a second.

[0049] Since the release of resistance results in an explosive movement of the spatially displaceable object 200, as a safety measure, a step of providing an increased resistance to movement of the spatially movable object 200 after the object has moved a predetermined distance may be employed. This may bring the spatially displaceable object 200 to rest in a predetermined controlled fashion.

[0050] In an alternative training method using the static-dynamic exercise apparatus, a user may hold a light load, statically, at one or more predetermined elevated positions, while in a relaxed muscle state. Releasing the static mode allows the load to fall at the speed of acceleration of gravity near earth, approximately 9.8 m/s. At that point the user may catch the bar load, eliciting a stretch reflex response. The load may then be reversed in movement, against gravity, in a concentric action.

[0051] Numerous alterations, modifications, and variations of the preferred embodiments disclosed herein will be apparent to those skilled in the art and they are all anticipated and contemplated to be within the spirit and scope of the disclosed specification. For example, although specific embodiments have been described in detail, those with skill in the art will understand that the preceding embodiments and variations can be modified to incorporate various types of substitute and or additional or alternative materials, relative arrangement of elements, order of steps and additional steps, and dimensional configurations.

[0052] Accordingly, even though only few variations of the method and products are described herein, it is to be understood that the practice of such additional modifications and variations and the equivalents thereof, are within the spirit and scope of the method and products as defined in the following claims. The corresponding structures, materials, acts, and equivalents of all means or step plus function elements in the claims below are intended to include any structure, material, or acts for performing the functions in combination with other claimed elements as specifically claimed.

List of references

[0053]

10	Static Dynamic Exercise Apparatus
100	Frame
110	Base
120	Lateral Support
122	Weight Bar Support
130	Upper Member
140	Rotation Channel
150	Rotable Rail Attachment
160	Weight Storage Attachment
170	Rail
175	Rail Lower End
176	Rail Lower Joint
178	Rail Upper End
179	Rotation Channel Engagement Area
200	Spatially Displaceable Object
210	Weight
220	Pressure Cylinder
222	Pressure Piston
300	Force Applicator
305	Weight Bar
307	Gripping Area
310	Weight Engagers
330	Weight Bar Support Engager
400	Resistance System
410	Pressure Generator
412	Filter
414	Regulator
416	Pressure Channels
420	Resistance Interlock
422	Controller
U	User

Claims

1. A static dynamic exercise apparatus (10) comprising;

a. at least one spatially displaceable object (200) having a predetermined mass movably coupled to a support frame (100) and coupled to a force applicator (300) capable of transmitting a user-applied force to the spatially displaceable object (200);

b. a resistance system (400) coupled to the spatially displaceable object (200) and the force applicator (300) capable of producing a variable resistance to movement of the spatially displaceable object (200) and the force applicator (300), including at least a resistance to movement equal to or greater than the user-applied force and wherein the resistance system (400)

may be reversibly alternated between at least two predetermined levels of resistance.

2. The apparatus (10) according to Claim 1, wherein the at least one spatially displaceable object (200) is at least one metal weight (210).

3. The apparatus (10) according to at least one of the preceding claims, wherein the spatially displaceable object (200) further comprises a pressure piston (222) in a pressure cylinder (220) capable of generating a fluid pressure.

4. The apparatus (10) according at least one of the preceding claims, wherein the support frame (100) further comprises at least one rail (170) having a length, a rail lower end (175) and a rail upper end (178), slidably coupled at a first predetermined position to at least one object selected from the objects consisting of the spatially displaceable object (200) and the force applicator (300), wherein the spatially displaceable object (200) may be displaced to a second predetermined position on the rail (170) length by the application of the user-applied force to the force applicator (300).

5. The apparatus (10) according to Claim 4, wherein the rail lower end (175) has a rail lower joint (176) rotably coupled to a rotable rail attachment (150) on the support frame (100) and the rail upper end (178) has a rotation channel engagement area (179) movable within a rotation channel (140) on the frame (100) allowing a predetermined degree of rotational movement of the rail (170) relative to the support frame (100).

6. The apparatus (10) according to at least one of the preceding claims, wherein the support frame (100) includes at least one lateral support (120) coupled to a base (110) and at least one upper member (130).

7. The apparatus (10) according to at least one of the preceding claims, wherein the resistance system (400) further comprises a pressure generator (410) capable of creating a pressure in fluid communication with a resistance interlock (420), wherein pressure produced by the pressure generator (410) is transmissible to the resistance interlock (420), thereby creating the variable resistance to movement of the spatially displaceable object (200).

8. The apparatus (10) according to Claim 7, wherein

- the resistance system (400) further comprises a controller (422) capable of regulating the pressure transmissible to the resistance interlock (420), and/or
- the resistance interlock (420) has a first position in which no resistance is applied by the resistance system (400) and at least a second position wherein a resistance equal to that necessary to prevent movement of the spatially movable object (200) is applied by the resistance system (400) to the spatially movable object (200), and/or
- the pressure generator (410) generates a pressure in fluid communication with an ambient atmosphere through a filter (412) and pressurizes the ambient atmosphere to a predetermined pressure greater than that of the ambient atmosphere, wherein the pressurized atmosphere is pressure regulated by a pressure regulator (414) and transmitted through at least one pressure channel (416) to the resistance interlock (420).

9. A static dynamic exercise apparatus (10) comprising;

a. at least one weight (210) having a predetermined mass movably coupled to a support frame (100) and coupled to a weight bar (305) having a gripping area (307), transmissible of a user-applied force to the weight (210);
b. a pressure generator (410) coupled to the weight (210) and the weight bar (305), in fluid communication with a resistance interlock (420) having a controller (422); wherein the resistance interlock (420) is reversibly capable of producing a variable resistance to movement of the weight (210) and weight bar (305), including at least a resistance in excess of the user-applied force and wherein the resistance interlock (420) may be reversibly alternated between at least two predetermined levels of resistance.

10. The apparatus according to Claim 9, wherein the support frame (100) further comprises at least one weight storage attachment (160), in particular wherein

- the weight bar (305) has at least one weight engager (310) releasably connecting the weight bar (305) to the at least one weight (210).

11. The apparatus (10) according to Claim 9 or 10, wherein the weight bar (305) further comprises at least one weight bar support engager (330) releasably engageable with at least one weight bar support (122) on the support frame (100).

12. The apparatus (10) according at least one of the claims 9 to 11, wherein the at least two predetermined levels of resistance comprise a level of no resistance to movement and a level of resistance capable of preventing movement of the spatially

movable object (200) by the application of a user-applied force.

13. A method of static-dynamic exercise comprising the steps of:

a. predetermining a maximum achievable user-applied force;
b. providing a spatially movable object (200) having a mass and movable with a force equal to a first predetermined percentage of the maximum achievable user-applied force;
c. providing a resistance to movement of the spatially movable object (200) at least sufficient to overcome a movement cause by the application of a second predetermined percentage, greater than the first predetermined percentage, of the maximum achievable user-applied force;
d. allowing the user to apply the second predetermined percentage of the maximum achievable user-applied force to the spatially movable object (200); and
e. releasing the resistance to movement of the spatially movable object (200), thereby allowing the second percentage of the maximum achievable user-applied force to move the spatially moveable object (200).

14. The method according to Claim 13, wherein

- the predetermined percentage of the maximum achievable user-applied force is approximately one-third of the maximum achievable user applied force, and/or
- the release of the resistance to movement of the spatially moveable object (200) is completed is less than one-half second, and/or
- the release of the resistance to movement of the spatially moveable object (200) is completed is less than one-tenth second.

15. The method according to at least one of the claims 13 to 14, further comprising the step of providing an increased resistance to movement of the spatially movable object (200) after the object (200) has moved a predetermined distance.

Amended claims in accordance with Rule 137(2) EPC.

1. A static dynamic exercise apparatus (10) comprising;

a. at least one spatially displaceable object (200) having a predetermined mass movably coupled to a support frame (100) and coupled to a force applicator (300) capable of transmitting a user-applied force to the spatially displaceable object (200);
b. a resistance system (400) coupled to the spatially displaceable object (200) and the force applicator (300) capable of producing a variable resistance to movement of the spatially displaceable object (200) and the force applicator (300), including at least a resistance to movement equal to or greater than the user-applied force and wherein the resistance system (400) may be reversibly alternated between at least two predetermined levels of resistance, wherein the resistance system (400) is capable of a first resistance preventing the user-applied force from displacing the spatially displaceable object 200, and that this resistance is releasable such that the resistance system (400) generates a second resistance less than the user-applied force, thereby allowing the user to spatially displace the spatially displaceable object (200).

2. The apparatus (10) according to Claim 1, wherein the at least one spatially displaceable object (200) is at least one metal weight (210).

3. The apparatus (10) according to at least one of the preceding claims, wherein the spatially displaceable object (200) further comprises a pressure piston (222) in a pressure cylinder (220) capable of generating a fluid pressure.

4. The apparatus (10) according at least one of the preceding claims, wherein the support frame (100) further comprises at least one rail (170) having a length, a rail lower end (175) and a rail upper end (178), slidably coupled at a first predetermined position to at least one object selected from the objects consisting of the spatially displaceable object (200) and the force applicator (300), wherein the spatially displaceable object (200) may be displaced to a second predetermined position on the rail (170) length by the application of the user-applied force to the force applicator (300).

5. The apparatus (10) according to Claim 4, wherein the rail lower end (175) has a rail lower joint (176) rotably coupled to a rotable rail attachment (150) on the support frame (100) and the rail upper end (178) has a rotation channel engagement area (179) movable within a rotation channel (140) on the frame (100) allowing a predetermined degree of rotational movement of the rail (170) relative to the support frame (100).

6. The apparatus (10) according to at least one of the preceding claims, wherein the support frame (100) includes at least one lateral support (120) coupled to a base (110) and at least one upper member (130).

7. The apparatus (10) according to at least one of the preceding claims, wherein the resistance system (400) further comprises a pressure generator (410) capable of creating a pressure in fluid communication with a resistance interlock (420), wherein pressure produced by the pressure generator (410) is transmissible to the resistance interlock (420), thereby creating the variable resistance to movement of the spatially displaceable object (200).

8. The apparatus (10) according to Claim 7, wherein

- the resistance system (400) further comprises a controller (422) capable of regulating the pressure transmissible to the resistance interlock (420), and/or
- the resistance interlock (420) has a first position in which no resistance is applied by the resistance system (400) and at least a second position wherein a resistance equal to that necessary to prevent movement of the spatially movable object (200) is applied by the resistance system (400) to the spatially movable object (200), and/or
- the pressure generator (410) generates a pressure in fluid communication with an ambient atmosphere through a filter (412) and pressurizes the ambient atmosphere to a predetermined pressure greater than that of the ambient atmosphere, wherein the pressurized atmosphere is pressure regulated by a pressure regulator (414) and transmitted through at least one pressure channel (416) to the resistance interlock (420).

9. A static dynamic exercise apparatus (10) comprising;

a. at least one weight (210) having a predetermined mass movably coupled to a support frame (100) and coupled to a weight bar (305) having a gripping area (307), transmissible of a user-applied force to the weight (210);
b. a pressure generator (410) coupled to the weight (210) and the weight bar (305), in fluid communication with a resistance interlock (420) having a controller (422); wherein the resistance interlock (420) is reversibly capable of producing a variable resistance to movement of the weight (210) and weight bar (305), including at least a resistance in excess of the user-applied force and wherein the resistance interlock (420) may be reversibly alternated between at least two predetermined levels of resistance, wherein a resistance system (400), comprising the pressure generator (410) creating the pressure in fluid communication with the resistance interlock (420), is capable of a first resistance preventing the user-applied force from displacing the spatially displaceable object 200, and that this resistance is releasable such that the resistance system (400) generates a second resistance less than the user-applied force, thereby allowing the user to spatially displace the spatially displaceable object (200).

10. The apparatus according to Claim 9, wherein the support frame (100) further comprises at least one weight storage attachment (160), in particular wherein

- the weight bar (305) has at least one weight engager (310) releasably connecting the weight bar (305) to the at least one weight (210).

11. The apparatus (10) according to Claim 9 or 10, wherein the weight bar (305) further comprises at least one weight bar support engager (330) releasably engageable with at least one weight bar support (122) on the support frame (100).

12. The apparatus (10) according at least one of the claims 9 to 11, wherein the at least two predetermined levels of resistance comprise a level of no resistance to movement and a level of resistance capable of preventing movement of the spatially movable object (200) by the application of a user-applied force.

13. A method of static-dynamic exercise comprising the steps of:

a. predetermining a maximum achievable user-applied force;
b. providing a spatially movable object (200) having a mass and movable with a force equal to a first predetermined percentage of the maximum achievable user-applied force;
c. providing a resistance to movement of the spatially movable object (200) at least sufficient to overcome a movement cause by the application of a second predetermined percentage, greater than the first predetermined percentage, of the maximum achievable user-applied force;
d. allowing the user to apply the second predetermined percentage of the maximum achievable user-applied force to the spatially movable object (200); and
e. releasing the resistance to movement of the spatially movable object (200), thereby allowing the second percentage of the maximum achievable user-applied force to move the spatially moveable object (200), wherein a resistance system (400), comprising the pressure generator (410) creating the pressure in fluid communication with a resistance interlock (420), is ca-

pable of a first resistance preventing the user-applied force from displacing the spatially displaceable object 200, and that this resistance is releasable such that the resistance system (400) generates a second resistance less than the user-applied force, thereby allowing the user to spatially displace the spatially displaceable object (200).

14. The method according to Claim 13, wherein

- the predetermined percentage of the maximum achievable user-applied force is approximately one-third of the maximum achievable user applied force, and/or
- the release of the resistance to movement of the spatially moveable object (200) is completed is less than one-half second, and/or
- the release of the resistance to movement of the spatially moveable object (200) is completed is less than one-tenth second.

15. The method according to at least one of the claims 13 to 14, further comprising the step of providing an increased resistance to movement of the spatially movable object (200) after the object (200) has moved a predetermined distance.

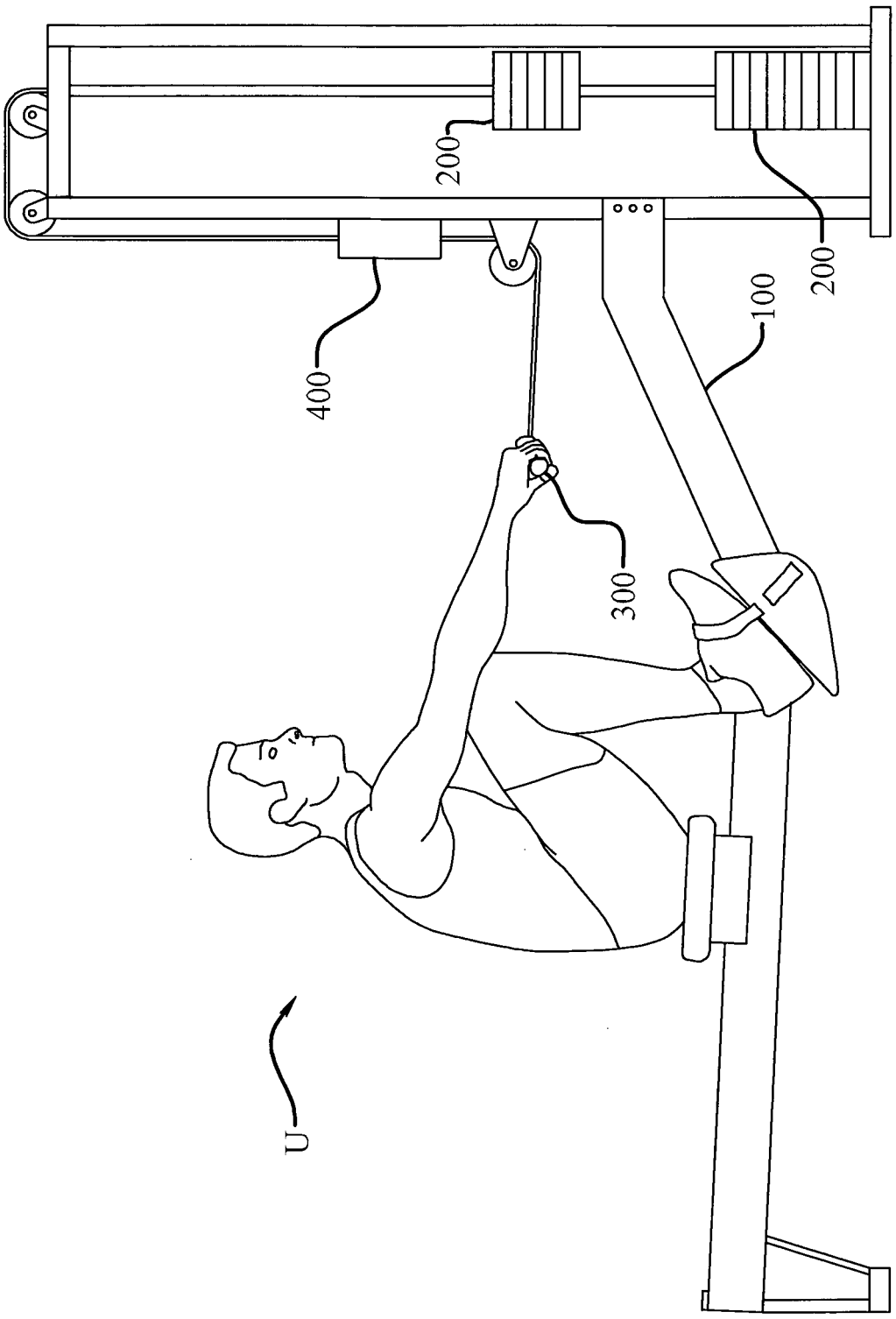

Fig. 1

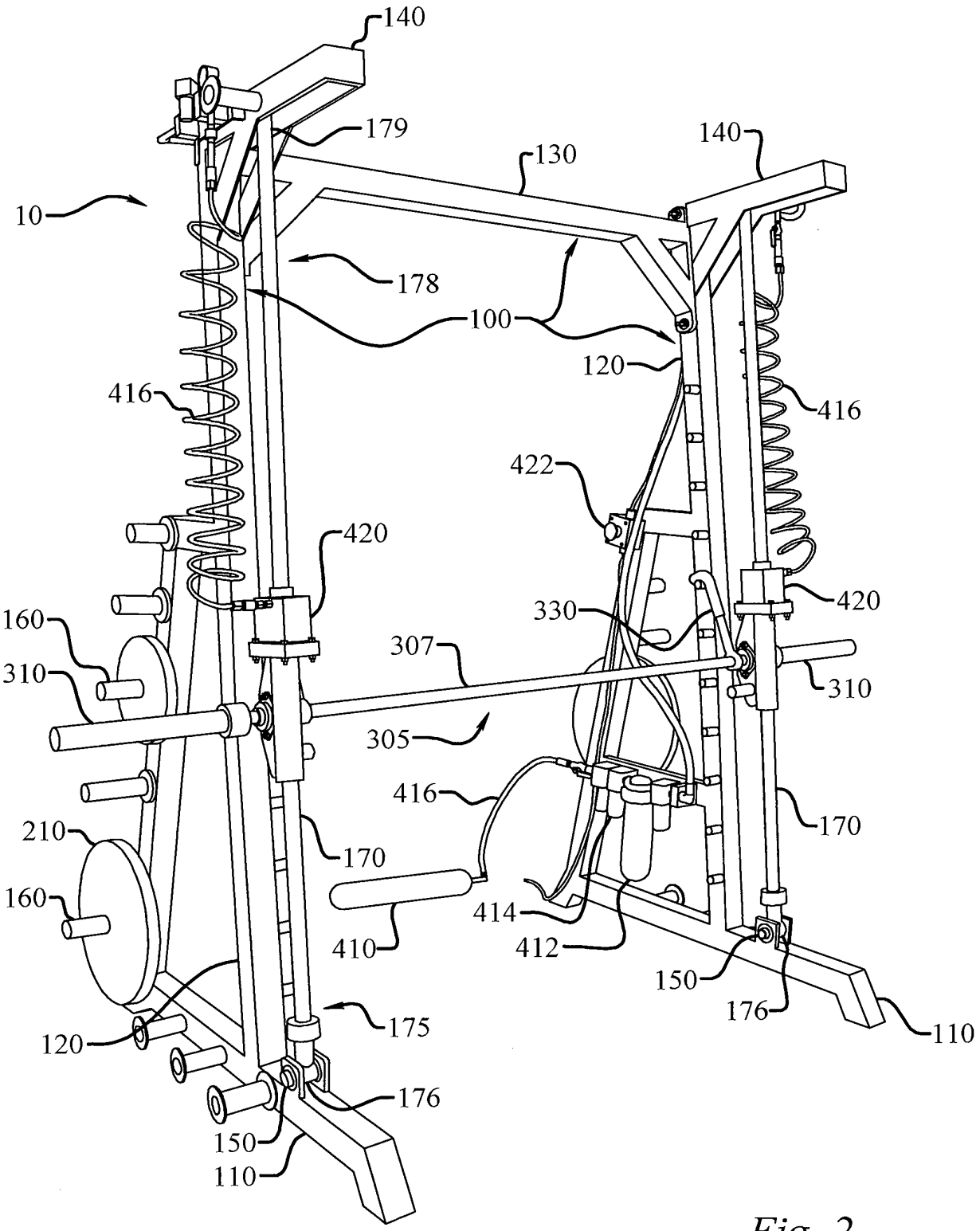
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Fig. 2

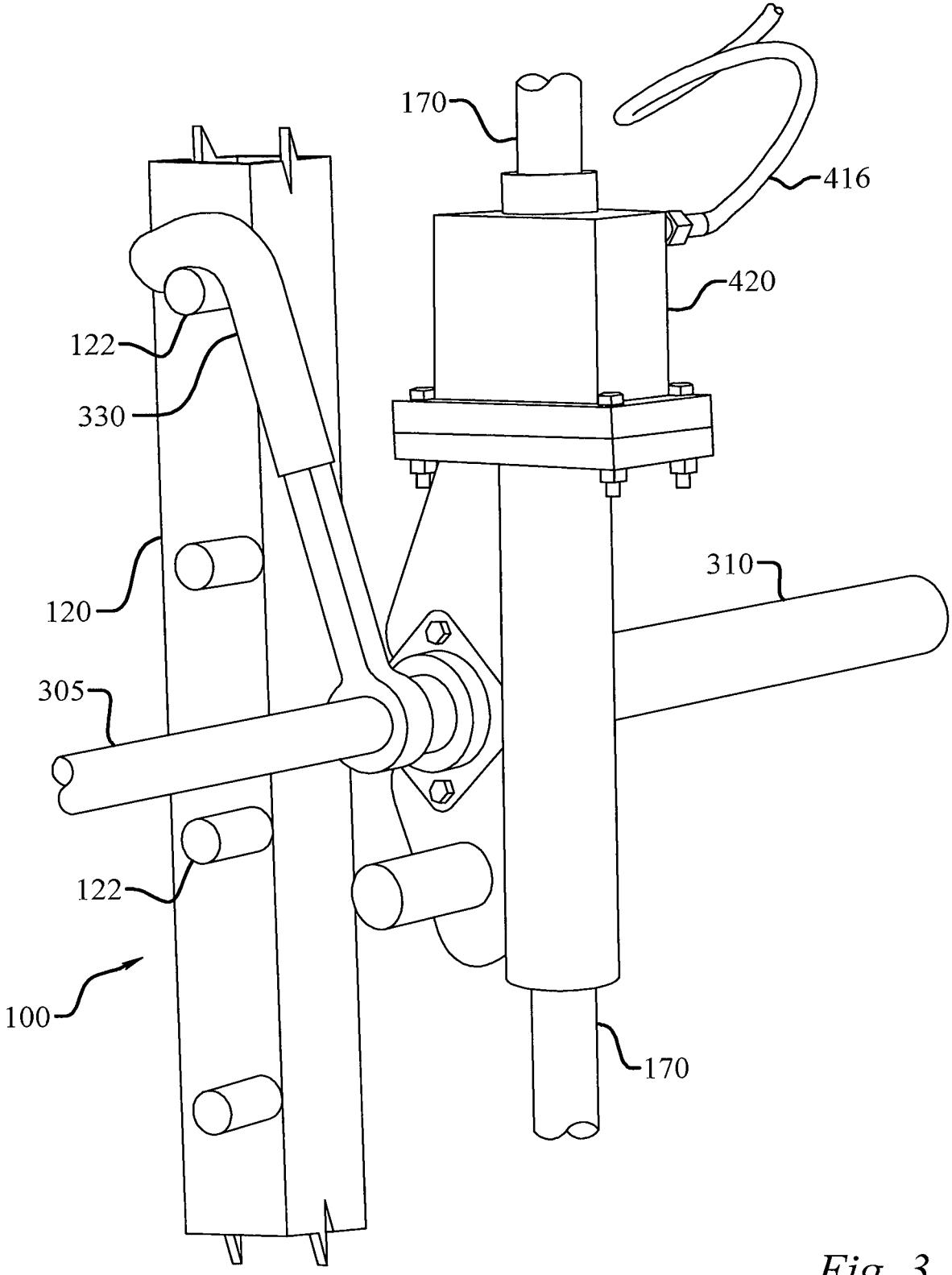

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 15 00 2826

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 750 739 A (LANGE OLAF [US]) 14 June 1988 (1988-06-14) * the whole document * -----	1-11	INV. A63B21/00 A63B21/002 A63B21/008
X	ES 2 289 906 A1 (PADULLES RIU JOSE M [ES]) 1 February 2008 (2008-02-01) * the whole document * -----	1-15	A63B21/062 A63B23/035 A63B24/00
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TECHNICAL FIELDS SEARCHED (IPC)

A63B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 March 2016	Squeri, Michele

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02-03-2016

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82