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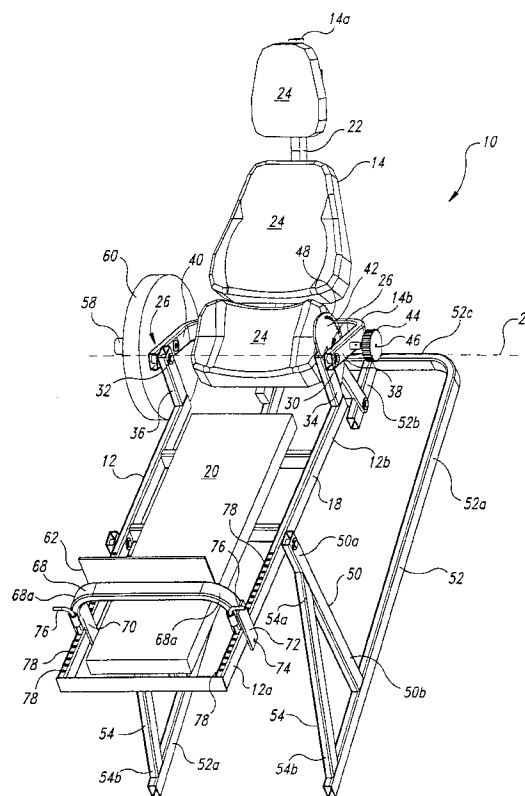
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80538 München (DE)**(54) **Exercise apparatus**

(57) An exercise apparatus having a lower body support for supporting a lower body portion of the user, and an upper body support for supporting an upper body portion of the user. The lower support has a first end portion toward which the user's feet are positioned and a second end portion toward which the user's upper legs are positioned. The upper support has a first end portion toward which the user's head is positioned and a second end portion toward which the user's lower back is positioned. The support second end portions are positioned toward each other and coupled together for angular movement therebetween about a pivot axis of a pivot coupler. The pivot axis is located at about the position of an imaginary line extending between the user's hip joints when the user is resting on the supports in position for exercise. First and second members are coupled to the lower and upper supports, respectively, to hold them in an elevated position and permit their pivotal movement relative to the other support. A foot stop is attached to the lower body support first end portion and selectively moveable along the lower support first end portion to be engaged by the user's feet and limit movement of the user's body toward the lower support first end portion during exercise to keep the hinge line of the user's hip joints generally coincident with the pivot axis of the pivot coupler.

*Fig. 1*

Description

Technical Field

The present invention relates generally to exercise equipment, and more particularly, to an exercise apparatus which is usable to stretch and strengthen gluteal and hamstring muscles and thereby alleviate back pain.

Background of the Invention

Back pain is a large problem in the United States and throughout the world. It is estimated that over 60% of the adults in developed societies have had at least one episode of low back pain. It is estimated that the problem is experienced by 3.4 million people each year in the United States. For the people under the age of 45 who have lived with some type of chronic disorder, about 40% of them are living with back pain. In the United States alone, about \$13 billion is spent annually trying to relieve low back pain and the associated complaints. Back pain is among the most common reasons given for absence from work.

There are a variety of causes of back pain and many theories of treatment and prevention. Strength and flexibility of certain muscles, specifically the gluteal and hamstring muscles, are widely recognized as contributing factors with regard to the treatment and prevention of back pain. For example, since the hamstring muscles are attached to both the leg and the pelvis, a tight hamstring will cause the pelvis to rotate in the direction of the pull. This rotation will affect the curvature of the spine and compression on the disks of the spine. Correcting this rotation is a common back treatment.

Many athletes and exercisers not suffering from back pain also desire to strengthen and stretch the hamstring and gluteal muscles. This can be part of a program of strength training and stretching, or for warm-up prior to an athletic endeavor.

The difficulty with strengthening and stretching these muscles is that it has heretofore been difficult, if not impossible, to do so without also involving and thereby stressing the muscles and structure of the lower back. Using existing equipment and techniques, the involvement of the muscles of the lower back and the flexing of the lower back during such exercises can cause a lower back problem and will frequently exacerbate an already existing lower back problem. This can interfere with an otherwise prudent back treatment.

It will therefore be appreciated that there has long been a significant need for an exercise apparatus which allows the stretching and strengthening of gluteal and hamstring muscles without stressing the muscles of the lower back. The present invention fulfills this need and further provides other related advantages.

Summary of the Invention

The present invention resides in an exercise apparatus for stretching and strengthening, particularly for stretching and strengthening the gluteal and hamstring muscles. The apparatus includes a body support having first and second body support portions. The first support portion is sized to provide support to a first body portion of a user when in position thereon, and has an inward end portion. The second support portion is sized to provide support to a second body portion of the user when in position thereon, and has an inward end portion. In the illustrated embodiment of the invention, the first support portion receives a lower body portion of the user thereon and the second support portion receives an upper body portion of the user thereon.

The first support inward end portion and the second support inward end portion are positioned toward each other and pivotally coupled together by a pivot coupler for angular movement of the first support portion and the second support portion relative to each other about a pivot axis of the pivot coupler. The pivot axis of the pivot coupler is located to an upper side of and spaced away from both the first and second support portions at about the position of an imaginary line extending between a user's hip joints when the user is resting the user's first and second body portions on the first and second support portions, respectively, in position for exercise using the back exercise apparatus of the present invention.

The illustrated embodiment of the exercise apparatus further includes a foot stop. The foot stop is positioned toward an outward end portion of the first support portion to be engaged by at least one foot of the user. The foot stop limits movement of the user's lower body portion toward the first support outward end portion when the user is resting the user's lower body portion on the first support portion and the user's upper body portion on the second support portion during exercise with the hinge line of the user's hip joints generally coincident with the pivot axis of the pivot coupler. The foot stop is adjustably attached to the first support outward end portion and selectively movable along a length of the first support outward end portion to position the foot stop according to the user's lower body length. Thereby, the user's body stays on the first and second support portions with the hinge line of the user's hip joints generally coincident with the pivot axis.

In the illustrated embodiment of the exercise apparatus, a weight attachment member is attached to the body support and removably receives a weight at a position to produce a selected downward force on the body support tending to move the first and second support inward end portions downward and pivot the first and second support portions about the pivot axis with the upper sides of the first and second support portions generally moving toward each other.

In the illustrated embodiment of the exercise apparatus, the pivot coupler includes left and right side pivot

couplers. The first support portion includes left and right arms projecting away from the upper side of the first support portion, and the second support portion includes left and right arms projecting away from the upper side of the second support portion. The left arms of the first and second support portions are pivotally coupled together by the left side pivot coupler, and the right arms of the first and second support portions are pivotally coupled together by the right side pivot coupler.

The exercise apparatus further includes a first member coupled to the first support portion to hold the first support portion and permit pivotal movement thereof relative to the second support portion during exercise. Similarly, a second member is coupled to the second support portion to hold the second support portion and permit pivotal movement thereof relative to the first body support portion during exercise. In the illustrated embodiment, the first member is held stationary during exercise and has a first end portion pivotally coupled to the first support portion, and the second member is movable during exercise and has a first end portion pivotally coupled to the second support portion and a second end portion supported for pivotal movement. The exercise apparatus includes a ground engaging base member, and the first member has a second end portion rigidly attached to the base member. The second end portion of the second member is pivotally attached to the base member.

In the illustrated embodiment of the exercise apparatus, the first and second members are coupled to the first and second support portions at locations spaced apart along a length of the body support to allow the body weight of the user on the upper sides of the first and second support portions to move the first and second support inward end portions downward. This also pivots the first and second support portions about the pivot axis with the upper sides of the first and second support portions moving toward each other.

A selectively operable lock is provided to selectively lock the first and second support portions against angular movement relative to each other.

Other features and advantages of the invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings.

Brief Description of the Drawings

Figure 1 is a front isometric view of the exercise apparatus of the present invention shown in the rest position.

Figure 2 is a left side elevational view of the exercise apparatus of Figure 1 shown in the rest position.

Figure 3 is a rear isometric view of the exercise apparatus of Figure 1 shown in a flexed position.

Figure 4 is a left side elevational view of the exercise apparatus of Figure 1 shown in a flexed position.

Figure 5 is a first end elevational view of the exer-

cise apparatus of Figure 1 shown in the flexed position.

Figure 6 is a second end elevational view of the exercise apparatus of Figure 1 shown in the flexed position.

Figure 7 is a left side elevational view of the exercise apparatus of Figure 1 shown with a representation of a human user positioned thereon in the rest position.

Figure 8 is a left side elevational view of the exercise apparatus of Figure 1 shown with the user thereon in the flexed position.

Figure 9 is an enlarged, fragmentary view of the pivot coupler and lock pin assemblies of the exercise apparatus shown in Figure 1.

Figure 10 is an enlarged, fragmentary view of the adjustable foot stop assembly of the exercise apparatus shown in Figure 1.

Figure 11 is a left side elevational view of the exercise apparatus as shown in Figure 8 with the foot stop removed to illustrate the possible resultant undesirable lumbar flexion.

Figure 12 is a left side elevational view of a first alternative embodiment of the present invention shown in the rest position.

Figure 13 is a left side elevational view of the exercise apparatus of Figure 12 shown in a flexed position.

Figure 14 is a left side elevational view of a second alternative embodiment of the present invention shown in the rest position.

Figure 15 is a left side elevational view of the exercise apparatus of Figure 14 shown in flexed position.

Detailed Description of the Invention

As shown in the drawings for purposes of illustration, the present invention is embodied in an exercise apparatus 10 which includes a lower body support 12 and an upper body support 14 in longitudinally extending arrangement. As illustrated in Figure 7 for the rest position, a user 16 positions himself resting on his back atop the lower and upper body supports 12 and 14 in a recumbent or reclined position for exercise using the exercise apparatus 10.

The lower body support 12 includes a rigid frame 18 with a cushion 20 mounted thereon. The frame 18 has left and right side frame members and cross-members extending therebetween, as best illustrated in Figure 5. The cushion 20 is sized to support a lower body portion 16a of the user 16 when in position thereon for exercise (see Figures 7 and 8). If desired the cushion 20 can be contoured to comfortably support the user's lower body portion and to assist the user in maintaining his legs bent during exercise. The lower body support 12 has a longitudinally outward first end portion 12a toward which the user's feet 16b are positioned, and a longitudinally inward second end portion 12b toward which the user's upper legs 16c are positioned.

The upper body support 14 has a rigid frame 22 supporting a contoured cushion 24 shaped to comfortably

support an upper body portion 16d of the user 16 when in position thereon for exercise. The cushion 24 has separate portions to support the user's head, upper back and lower back. The frame 22 has a longitudinally extending center frame member, as best illustrated in Figure 6. The upper body support 14 has a longitudinally outward first end portion 14a towards which the user's head 16e is positioned, and a longitudinally inward second end portion 14b toward which the user's lower back 16f is positioned.

The lower body support second end portion 12b and the upper body support second end portion 14b are positioned toward each other and are pivotally coupled together by a pivot coupler assembly 26 for angular movement of the lower body support 12 and the upper body support 14 relative to each other through a vertical plane about a pivot axis 28 of the pivot coupler assembly 26 shown by broken line in Figures 1 and 3.

In the illustrated embodiment of the invention, the pivot coupler assembly 26 includes a left side pivot coupler 30 and a right side pivot coupler 32. The lower body support 12 includes left and right arms 34 and 36, respectively, rigidly attached to the corresponding one of the left and right side frame members of the frame 18 of the lower body support at the second end portion 12b thereof. The left and right arms 34 and 36 project upward and beyond an upper side of the cushion 20 of the lower body support. Further, the upper body support 14 includes left and right arms 38 and 40, respectively, rigidly attached to the center frame member of the frame 22 of the upper body support at the second end portion 14b thereof, as best illustrated in Figures 3 and 6. The left and right arms 38 and 40 extend laterally left and right, respectively, from the center frame member and turn upward, projecting upward and beyond an upper side of the cushion 24 of the upper body support. The upper ends of the left arms 34 and 38 of the lower and upper body supports 12 and 14 are pivotally coupled together by the left side pivot coupler 30. Similarly, the upper ends of the right arms 36 and 40 of the lower and upper body supports 12 and 14 are pivotally coupled together by the right side pivot coupler 32.

The left side pivot coupler 30 is pivotal about a left side pivot axis coincident with the pivot axis 28 and the right side pivot coupler 32 is pivotal about a right side pivot axis that is coincident with the pivot axis 28 such that the left and right side pivot axes are generally coaxially aligned. The left arms 34 and 38 are positioned to a left side of the cushions 20 and 24, and the right arms 36 and 40 are positioned to a right side of the cushions so as to position the left and right arms and the left and right pivot couplers 30 and 32 sufficiently laterally spaced apart to allow the user's pelvis to be positioned therebetween.

The left arms 34 and 38 and the right arms 36 and 40 have a sufficient length so as to position the left and right couplers 30 and 32 attached at the upper ends of the arms in position spaced away from and above the

lower and upper body supports 12 and 14 by a distance such that the left side pivot axis of the left side pivot coupler 30 is at a location corresponding to about the location of the user's left hip joint and the right side pivot axis of the right side pivot coupler 32 is at a location corresponding to about the location of the user's right hip joint when the user 16 is in position for exercise resting on the cushions 20 and 24 of the lower and upper body supports.

In the illustrated embodiment of the exercise apparatus 10, the left and right side pivot couplers 30 and 32 each comprise a pivot pin rotatably retained by the upper ends of the corresponding left or right arms, as best illustrated in Figure 9. It should be recognized that other forms of pivotal couplers which provide for the angular movement of the lower body support 12 relative to the upper body support 14, preferably through a plane, can be utilized. Further, while an arrangement is illustrated for movement through a vertical plane, the angular orientation of the plane through which the lower and upper body supports move can be varied as desired.

With the exercise apparatus 10 of the present invention, the location of the pivot axis 28 of the pivot coupler assembly 26 is closely matched to an imaginary hinge line extending between the user's hip joints when the user is resting the user's lower body portion 16a on the lower body support 12 and the user's upper body portion 16d on the upper body support 14 in position for exercise using the exercise apparatus. With the user's lower and upper body portions on the exercise apparatus in the position described, when the lower and upper body supports 12 and 14 are angularly moved through the vertical plane by the user 16 during exercise they pivot about the pivot axis 28 of the pivot coupler assembly 26, and the lower and upper body portions 16a and 16b of the user bend therewith about the hinge line of the user's hip joints. As noted above, the hinge line of the user's hip joints is generally coincident with the pivot axis 28 thereby allowing bending about the user's hip without substantial bending of the user's lower back 16f. As a result of such use of the exercise apparatus 10, the user 16 will stretch and strengthen his gluteal and hamstring muscles without stressing the muscles of the lower back 16f (*i.e.*, without flexion of the lumbar spine).

The exercise apparatus 10 of the present invention allows the user 16 to stretch and strengthen the gluteal and hamstring muscles by flexing at the hips without concern that the lumbar spine will also significantly flex. By limiting the flexion of the spine the exercise apparatus 10 permits a very powerful stretch of the gluteal and hamstring muscles without the associated risk of injuring the lower back associated with prior art exercise apparatus. By increasing the flexibility of the gluteal and hamstring muscles, the exercise apparatus 10 will help treat and prevent back injuries. By use in a program of strength training and stretching, or by use prior to engaging in an athletic endeavor, the gluteal and hamstring muscles will be strengthened and stretched, and

less susceptible to injury. Hamstring injuries in athletes, for example, are often correlated with flexibility. With the exercise apparatus 10 it is possible to perform strong terminal extension contractions of the gluteal and hamstring muscles. Terminal extension contractions are strengthening exercises performed when the muscle is fully stretched. Strengthening in this range further protects the muscle from injury by developing strength where the muscle is vulnerable. Hamstring injuries have also been highly correlated to muscle strength.

The use of the exercise apparatus 10 is best illustrated by Figure 7 showing the exercise apparatus in the rest position, and Figure 8 showing the exercise apparatus in the flexed position. In the rest position, the user 16 is simply resting upon the cushions 20 and 22 of the lower and upper body supports 12 and 14. To facilitate the user 16 mounting and dismounting from the exercise apparatus 10, a generally semi-circular locking plate 42 is fixedly attached by welding to the left arm 34 (best illustrated in Figure 9), which as noted above is fixedly attached to the frame 18 at the second end portion 12b of the lower body support 12. A lock pin assembly 44 is fixedly attached to the left arm 38, which as noted above is fixedly attached to the frame 22 at the second end portion 14b of the upper body support 14. The lock pin assembly 44 slidably retains a lock pin 46 for selective lateral extension thereof. The lock pin assembly 44 is positioned along the length of the left arm 38 such that the lock pin 46 coincides with a series of lock pin holes 48 positioned around a perimeter portion of the locking plate 42. The lock pin holes 48 are arranged along a circumferential path relative to the pivot axis 28 of the pivot coupler assembly 26, and thus the lock pin 46 will sequentially move past the lock pin holes as the lower and upper body supports 12 and 14 angularly move relative to each other about the pivot axis 28.

The lock pin 46 has sufficient length that when moved laterally within the lock pin assembly 44 toward the right side of the exercise apparatus, the lock pin will project through and beyond the left arm 38 and enter into a selected one of the lock pin holes 48 in the locking plate 42. In such fashion, further angular movement of the lower and upper body supports 12 and 14 relative to each other is inhibited, and the user is permitted to safely mount and dismount from the exercise apparatus.

When resting on the cushions 20 and 24 of the lower and upper body supports 12 and 14 in position to commence an exercise, *i.e.*, the rest position shown in Figure 7, the user 16 or an assistant simply pulls laterally outward on the lock pin 46 enough to withdraw the lock pin from the lock pin hole 48 in which it was positioned. The lower and upper body supports 12 and 14 are then free to angularly move relative to each other about the pivot axis 28 of the pivot coupler assembly 26. The basic movement involved is relatively simple in that gravity acting on the body of the user (*i.e.*, the user's body weight) presses downward on the lower and upper body supports 12 and 14 to move the second end portions

12b and 14b of the lower and upper body supports downward and pivot the lower and upper body supports about the pivot axis 28 of the pivot coupler assembly 26. This causes the upper sides of the lower and upper body supports to generally move toward each other and into the flexed position shown in Figure 8. The user 16 engages in exercise by resisting the resulting downward movement of his body and by also using his gluteal and hamstring muscles to return the lower and upper body supports 12 and 14 from the flexed position back to the rest position shown in Figure 7. This results in a complete repetition. When a desired number of repetitions have been computed, the user 16 can simply slide the lock pin 46 laterally into a desired one of the lock pin holes 48 to again lock the lower and upper body supports 12 and 14 against further angular movement relative to each other and dismount from the exercise apparatus 10.

In the illustrated embodiment of the exercise apparatus 10, the lower body support 12 is supported in an elevated position by left and right side lower body support legs 50. The left side lower body support leg 50 has an upper end portion 50a pivotally attached to the left side frame member of the frame 18 of the lower body support 12, and the right side lower body support leg 50 has its upper end portion 50a pivotally attached to the right side frame member of the frame 18. Each of the lower body support legs 50 has a lower portion 50b attached to a stationary U-shaped base frame 52 which engages the floor or ground on which the exercise apparatus 10 is positioned. The lower body support legs 50 are held stationary during exercise by the rigid attachment of their lower end portions 50b to a corresponding one of left and right leg portion 52a of the base frame 52, and by left and right braces 54. The braces 54 each have an upper end portion 54a rigidly attached toward the upper end portion 50a of a corresponding one of the left and right lower body support legs 50 and a lower end portion 54b rigidly attached to a corresponding one of the left and right leg portions 52a of the base frame 52. In such manner, the lower body support legs 50 are coupled to the lower body support 12 in a manner that permits pivotal movement of the lower body support relative to the upper body support 14 during exercise.

A single upper body support leg 56 holds the upper body support 14 in an elevated position. As best illustrated in Figure 6, an upper end portion 56a of the upper body support leg 56 is pivotally attached to the center frame member of the frame 22 of the upper body support 14. The upper body support leg 56 has a lower end portion 56b pivotally attached to a longitudinally inward projecting frame member portion 52b rigidly attached to a cross-member portion 52c extending between the left and right leg portions 52a of the base frame 52. In such manner, the upper body support leg permits pivotal movement of the upper body support 14 relative to the lower body support 12 during exercise. The lower body support legs 50 are held stationary during exercise,

whereas the upper body support leg 56 is free to rotate relative to both the upper body support 14 and the base frame 52 during the exercise as a result of its pivotally coupling to both the upper body support and the base frame. While the lower and upper body supports 12 and 14 are illustrated and described as being supported by legs, it should be understood that a frame or other means for support may be utilized which allows the desired angular movement between the lower and upper body supports needed to accomplish the intended exercise.

The upper end portions 50a of the lower body support legs 50 are pivotally coupled to the frame 18 of the lower body support 12 generally midway along the length thereof. Similarly, the upper end portion 56a of the upper body support leg 56 is pivotally coupled to the frame 22 of the upper body support 14 generally midway along the length of the upper body support. This places the attachment points of the upper end portions 50a of the lower body support legs 50 and the upper end portion 56a of the upper body support leg 56 sufficiently spaced apart along the length of the lower and upper body supports so as to cause the body weight of the user resting thereon to apply a downward force on the lower and upper body support second end portions 12b and 14b tending to move them downward. This placement also causes the lower and upper body supports 12 and 14 to pivot about the pivot axis 28 of the pivot coupler assembly 26 so as to cause the upper sides of the lower and upper body supports to move toward each other as the exercise apparatus is moved from the rest position shown in Figure 7 to the flexed position shown in Figure 8. By so positioning the upper body support and lower body support legs 50 and 56, the center of gravity of the user 16 resting on the lower and upper body supports 12 and 14 drops as the user flexes at his hips and the exercise apparatus 10 goes from the rest position toward the flexed position. This causes the weight of the user to encourage hip flexion. Muscular effort must be exerted to resist this flexion or to extend the hip.

A post 58 is rigidly attached to the right arm 40, which as described above is rigidly attached at one end to the frame 22 of the upper body support 14. The post 58 extends laterally outward to the right of the user 16 when the user is positioned on the lower and upper body supports 12 and 14, and allows the user or an assistant to selectively add and remove weights, such as the weight 60 illustrated on the post in Figure 1. The selectively added weight 60 causes a correspondingly greater force which pulls the exercise apparatus 10 into the flexed position of Figure 8 and the user 16 into a flexed hip position. This force assists in the stretching of the gluteal and hamstring muscles and builds strength in these muscles as the user works against the weight 60, his own body weight and the weight of the lower and upper body supports 12 and 14 to resist downward movement of the lower and upper body supports toward

the flexed position and to extend the hip after each flexion of the hip as the lower and upper body supports are moved toward the rest position. The ability to vary the size of the weight 60 permits control over the strengthening portion of the exercise.

To maintain the alignment of the imaginary line extending between the user's hip joints with the pivot axis 28 of the pivot coupler assembly 26 when the user 16 is resting on the lower and upper body supports 12 and 14 while performing an exercise using the exercise apparatus 10, a foot plate or stop 62 is adjustably attached to the first end portion 12a of the lower body support 12 in a position to be engaged by the user's feet 16b. The foot stop 62 limits movement of the user's lower and upper body portions 16a and 16d toward the lower body support first end portion 12a. By properly setting the location of the foot stop 62 based upon the length of the user's lower body 16a, the hinge line of the user's hip joints can be maintained by the user generally coincident with the pivot axis 28 of the pivot coupler assembly 26 throughout the exercise. It is noted that the hinge line of the user's hip joints is illustrated in Figures 7 and 8 for both the rest position and the flexed position as the flex point 64 along an imaginary line 66 which extends longitudinally through the body of the user 16. As can be seen from Figures 7 and 8, the foot stop 62 prevents the hinge line from moving longitudinally relative to the pivot axis 28 (the pivot axis 28 is shown in Figures 1 and 3 as a broken line).

The foot stop 62 is adjustably attached to the frame 18 of the lower body support 12 at the lower body support first end portion 12a and is selectively movable along the length of the lower body support first end portion to permit adjustable positioning of the foot stop prior to commencing an exercise according to the user's lower body length. As best illustrated in Figure 10, to allow selective longitudinal adjustment of the position of the foot stop 62, the foot stop includes an inverted U-shaped frame 68 having left and right end portions 68a, each with an inner and outer plate 70 and 72, respectively, which extend downward to the inside and outside of a corresponding one of the left and right side frame members of the frame 18 of the lower body support 12 and below the frame member. Each pair of the inner and outer plates 70 and 72 has a retainer pin 74 extending therebetween at a position below the corresponding one of the left and right side frame members of the frame 18 to couple the foot stop 62 to the frame 18 for selective longitudinal movement therealong. The left and right end portions 68a of the U-shaped frame 68 has a downwardly slidable lock pin 76 positioned to enter a selected one of a longitudinally distributed plurality of holes 78 in the top side of the left and right side frames of the frame 18 to selectively lock the foot stop 62 against longitudinal movement during an exercise.

Before commencement of an exercise using the exercise apparatus 10, and while standing, the length between the user's hip joint and the floor is measured. The

foot plate 62 is then moved to position the lock pins 76 into the lock pin holes 78 that correspond with the measured length. The user 16 then mounts the exercise apparatus and lays on his back with his pelvis positioned between the left and right pivot couplers 30 and 32. He then moves his body longitudinally along the lower and upper body supports 12 and 14, either toward the first end portion 12a of the lower body support or the first end portion 14a of the upper body support, by an amount necessary to generally align the hinge line of the user's hip joints with the pivot axis 28 of the pivot coupler assembly 26. By so adjusting the longitudinal position of the foot stop 62 based upon the measured leg length of the user 16, the user's hip joints will be fixed in position during the entire exercise with the hinge line thereof generally coincident with the pivot axis 28 of the pivot coupler assembly 26. In so doing, the hip will be the only joint that will be caused to significantly articulate when the lower and upper body supports 12 and 14 angularly move relative to each other during the exercise.

If the foot stop 62 or some other manner of maintaining alignment of the hinge line of the user's hip joints with the pivot axis 28 were not used, as the user 16 exercised by moving the exercise apparatus 10 between the rest and flexed positions, the body of the user would tend to slide along the lower body support 12 toward the first end portion 12a of the lower body support. This would tend to longitudinally move the hinge line of the user's hip joints away from the pivot axis 28 of the pivot coupler assembly 26 to a position such as shown in Figure 11 (showing the exercise apparatus 10 with the foot stop 62 removed). The result would be not only flexion at the hinge line of the user's hip joints (indicated by the flex point 64), but also flexion at the flex point 74 along the imaginary longitudinal body line 66 which is in the lumbar region of the user's back. The same problem would occur with a similar style exercise apparatus which was designed to have a pivot coupler assembly with a pivot axis located other than at about the hinge line of the user's hip joints.

If such an exercise apparatus does not align the pivot axis of the pivot coupler assembly with the hinge line of the user's hip joints, or if aligned, does not provide a means for maintaining the user's body throughout the exercise in an aligned position, undesirable flexing of the spine in the lumbar region will occur as the hip joints bend when the lower and upper body supports angularly move relative to each other. Of course, even with the exercise apparatus 10 of the present invention, if the user does not set the foot stop 62 at a position to produce precise alignment of the hinge line of the user's hip joints with the pivot axis 28 of the pivot coupler assembly 26, some spine flexion will occur in the lumbar region, especially if the user engages in a full range of hip flexion during the exercise. However, even if the foot stop 62 of the present invention is not precisely set, it will still prevent the user's body from slipping along the length of the exercise apparatus while exercising and thereby

progressively increasing the longitudinal distance between the hinge line of the user's hip joints and the pivot axis of the pivot coupler assembly, and thus will minimize the amount of spine flexion and possible damage that does occur. Naturally, the human body can tolerate some spine flexion in the lumbar region without damage occurring, so an extremely precise placement of the foot stop 62 is not required. However, it is important that the foot stop 62 be used to prevent the longitudinal movement of the user's body along the exercise apparatus during an exercise and the resultant misalignment of the hinge line of the user's hip joints with the pivot axis of the pivot coupler assembly during the exercise.

It is noted that use of the foot stop 62 assumes the user 16 will exercise with the exercise apparatus 10 without significantly bending his legs beyond whatever initial bend exists in the legs when the longitudinal position of the foot stop is set before the exercise commences.

While the illustrated embodiment of the exercise apparatus 10 utilizes the foot stop 62, it is contemplated that other retainer means might be employed to maintain the desired initial longitudinal position of the user's body on the lower and upper body supports 12 and 14 during the entire exercise, or to at least minimize the longitudinal movement to within tolerable limits. For example, contouring the cushions 20 and 24 or utilizing leg straps would prevent or minimize longitudinal movement of a user's body. Also, fasteners which retain the user's upper body in the vicinity of the pelvis in position on the upper body support 14 could also be used to prevent or minimize longitudinal movement of the user's body.

A first alternative embodiment of an exercise apparatus 10' embodying the present invention is shown in Figures 12 and 13 in the rest and flexed positions, respectively. For ease of understanding, the components of the alternative embodiments described hereinafter will be similarly numbered with those of the embodiment of Figures 1-11 when of similar construction. Only the differences in construction will be described in detail.

In this first embodiment of the exercise apparatus 10', at least the upper body support 14 rests directly on the ground or a floor 80. A mechanical mechanism or an assistant (not shown) raises the lower body support 12 and causes it to angularly move relative to the upper body support 14 about the pivot axis 28 of the pivot coupler assembly 26 toward the flexed position shown in Figure 13. The user 16 resting on the lower and upper body supports 12 and 14 achieves the stretching and strengthening of the gluteal and hamstring muscles by resisting the movement while maintaining the hinge line of his hip joints generally coincident with the pivot axis 28 by keeping his feet 16b engaged with the foot stop 62. No lower or upper body support legs 50 or 56 are utilized to hold the lower and upper body supports 12 and 14 in an elevated position.

A second alternative embodiment of an exercise

apparatus 10" embodying the present invention is shown in Figures 14 and 15. In this embodiment the lower and upper body supports 12 and 14 are not only pivotally coupled together by the pivot coupler assembly 26, but are supported above the floor 80 by their pivotal coupling in coaxial alignment with the pivot axis 28 to left and right side, floor engaging support plates 82. One or the other or both of the lower and upper body supports 12 and 14 can be raised from the rest position shown in Figure 14 using a mechanical mechanism or an assistant (not shown), with the upward force applied indicated by arrows F1 and F2 in Figures 14 and 15 to angularly move the lower and upper body supports relative to each other about the pivot axis 28 of the pivot coupler assembly 26 toward the flexed position shown in Figure 15. The user 16 achieves the desired stretching and strengthening exercise by resisting the movement while maintaining the hinge line of his hip joints generally coincident with the pivot axis 28 by keeping his feet 16b engaged with the foot stop 62. Again, no lower or upper body support legs 50 or 56 are utilized.

It will be appreciated that, although a specific embodiment of the invention has been described herein for purposes of illustration, various modifications may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not limited except as by the appended claims.

Claims

1. An exercise apparatus usable by a user to stretch and strengthen gluteal and hamstring muscles, comprising:

a lower body support sized to provide support to a lower body portion of the user when in position thereon, said lower body support having a first end portion toward which the user's feet are positioned and a second end portion toward which the user's upper legs are positioned;
 an upper body support sized to provide support to an upper body portion of the user when in position thereon, said upper body support having a first end portion toward which the user's head is positioned and a second end portion toward which the user's lower back is positioned, said lower body support second end portion and said upper body support second end portion being positioned toward each other and pivotally coupled together by a pivot coupler for angular movement of said lower body support and said upper body support relative to each other through a vertical plane about a pivot axis of said pivot coupler, said pivot axis of said pivot coupler being located to an upper side of and spaced away from both said lower body support second end portion and said up-

per body support second end portion at about the position of an imaginary line extending between the user's hip joints when the user is resting the user's lower body portion on said lower body support and the user's upper body portion on said upper body support in position for exercise using the exercise apparatus, whereby when said lower and upper body supports are angularly moved through said vertical plane by the user during exercise they pivot about said pivot axis, and the lower and upper body portions of the user bend therewith about the hinge line of the user's hip joints which is generally coincident with said pivot axis thereby allowing bending about the user's hip without substantial bending of the user's lower back;

a first member coupled to said lower body support to hold said lower body support in an elevated position and permit pivotal movement thereof relative to said upper body support during exercise; and

a second member coupled to said upper body support to hold said upper body support in an elevated position and permit pivotal movement thereof relative to said lower body support during exercise.

2. The exercise apparatus of claim 1, further including a foot stop attached to said lower body support first end portion in a position to be engaged by the user's feet and limit movement of the user's lower body portion toward said lower body support first end portion when the user is resting the user's lower body portion on said lower body support and the user's upper body portion on said upper body support during exercise with the hinge line of the user's hip joints generally coincident with said pivot axis.
3. The exercise apparatus of claim 2 wherein said foot stop is adjustably attached to said lower body support first end portion and selectively movable along a length of said lower body support first end portion to position said foot stop according to the user's lower body length and thereby position the user's body on said lower and upper body supports with the hinge line of the user's hip joints generally coincident with said pivot axis, whereby different users with different lower body lengths can adjust the position of said foot stop according to their lower body lengths such that each user has the hinge line of the user's hip joints generally at said pivot axis.
4. The exercise apparatus of claim 1 wherein said first member is held stationary during exercise and has a first end portion pivotally coupled to said lower body support, and wherein said second member is movable during exercise and has a first end portion pivotally coupled to said upper body support and a

second end portion supported for pivotal movement.

5. The exercise apparatus of claim 4, further including a ground engaging base member and wherein said first member has a second end portion rigidly attached to said base member and wherein said second end portion of said second member is pivotally attached to said base member. 5
6. The exercise apparatus of claim 1 for use with a weight, further including a weight attachment member attached to one of said lower and upper body supports and removably receiving the weight at a position to produce a selected downward force thereto tending to move said lower and upper body support second end portions downward and pivot said lower and upper body supports about said pivot axis with said upper sides of said lower and upper body supports generally moving toward each other. 10
7. The exercise apparatus of claim 6 wherein said weight attachment member is attached at a position toward said pivot coupler. 15
8. The exercise apparatus of claim 6 wherein said weight attachment member holds the weight in a position toward said second end portion of one of said lower and upper body supports. 20
9. The exercise apparatus of claim 1 wherein said first and second members are coupled to said lower and upper body supports at locations spaced apart along a length of said lower and upper body supports such that the body weight of the user on said lower and upper body supports tends to move said lower and upper body support second end portions downward and pivot said lower and upper body supports about said pivot axis with said lower and upper body supports generally moving toward each other. 25
10. The exercise apparatus of claim 1, further including a selectively operable lock to selectively lock said lower and upper body supports against angular movement relative to each other. 30
11. The exercise apparatus of claim 1 wherein said pivot coupler includes left and right side pivot couplers, and the exercise apparatus further includes left and right arms projecting away from an upper side of said lower body support and attached to said lower body support, and left and right arms projecting away from an upper side of said upper body support and attached to said upper body support, said left arms attached to said lower and upper body supports being pivotally coupled together by said left side pivot coupler and said right arms attached to said lower and upper body supports being pivotally 35

coupled together by said right side pivot coupler.

12. An exercise apparatus usable by a user to stretch and strengthen gluteal and hamstring muscles, comprising: 40

a body support having first and second body support portions, said first support portion having an upper side sized to support a first body portion of the user when in position thereon, said first support portion having an inward end portion, said second support portion having an upper side sized to support a second body portion of the user when in position thereon, said second support portion having an inward end portion, said first support inward end portion and said second support inward end portion being positioned toward each other and pivotally coupled together by a pivot coupler for angular movement of said first support portion and said second support portion relative to each other through a plane about a pivot axis of said pivot coupler, said pivot axis of said pivot coupler being located to said upper side of said first and second support portions at about the position of an imaginary line extending between the user's hip joints when the user is resting the user's first and second body portions on said upper sides of said first and second support portions, respectively, in position for exercise using the exercise apparatus;

a first member engaging said first support portion to hold said first support portion in an elevated position and permit pivotal movement thereof relative to said second support portion during exercise; and

a second member engaging said second support portion to hold said second support portion in an elevated position and permit pivotal movement thereof relative to said first support portion during exercise, said first and second members engaging said first and second support portions at locations spaced apart along a length of said body support such that the body weight of the user on said upper sides of said first and second support portions tends to move said first and second support inward end portions downward and pivot said first and second support portions about said pivot axis with said upper sides of said first and second support portions moving generally toward each other. 45

13. The exercise apparatus of claim 12 for use where the first body portion of the user is a lower body portion and the second body portion of the user is an upper body portion, further including a foot stop attached to said first support portion toward an outward end portion thereof in a position to be engaged 50

by at least one foot of the user and limit movement of the user's lower body portion toward said first support outward end portion when the user is resting the user's lower body portion on said upper side of said first support portion and the user's upper body portion on said upper side of said second support portion during exercise with the hinge line of the user's hip joints generally coincident with said pivot axis.

14. The exercise apparatus of claim 13 wherein said foot stop is adjustably attached to said first support outward end portion and selectively movable along a length of said first support outward end portion to position said foot stop according to the user's lower body length and thereby position the user's body on said upper side of said first and second support portions with the hinge line of the user's hip joints generally coincident with said pivot axis.

15. The exercise apparatus of claim 12 for use with a weight, further including a weight attachment member attached to said body support and removably receiving the weight at a position to produce a selected downward force to said body support tending to move said first and second support inward end portions downward and pivot said first and second support portions about said pivot axis with said upper sides of said first and second support portions generally moving toward each other.

16. The exercise apparatus of claim 12 wherein said pivot coupler includes left and right side pivot couplers, and wherein said first support portion includes left and right arms projecting away from said upper side of said first support portion and said second support portion includes left and right arms projecting away from said upper side of said second support portion, said left arms of said first and second support portions being pivotally coupled together by said left side pivot coupler and said right arms of said first and second support portions being pivotally coupled together by said right side pivot coupler.

17. An exercise apparatus for stretching and strengthening, comprising:

a body support having first and second body support portions, said first support portion being sized to provide support to a first body portion of a user when in position thereon, and having an inward end portion, said second support portion being sized to provide support to a second body portion of the user when in position thereon, and having an inward end portion, said first support inward end portion and said second support inward end portion being posi-

tioned toward each other and pivotally coupled together by a pivot coupler for angular movement of said first support portion and said second support portion relative to each other about a pivot axis of said pivot coupler, said pivot axis of said pivot coupler being located to an upper side of and spaced away from both said first and second support portions at about the position of an imaginary line extending between the user's hip joints when the user is resting the user's first and second body portions on said first and second support portions, respectively, in position for exercise using the exercise apparatus;

a first member engaging said first support portion to support said first support portion while permitting pivotal movement thereof relative to said second support portion during exercise; and

a second member engaging said second support portion to support said second support portion while permitting pivotal movement thereof relative to said first support portion during exercise.

18. The exercise apparatus of claim 17, further including a retainer attached to said body support and engaging the user to retain the user in position with the hinge line of the user's hip joints generally coincident with said pivot axis when the user is resting the user's lower body portion on said first support portion and the user's upper body portion on said second support portion during exercise.

19. The exercise apparatus of claim 18 for use where the first body portion of the user is a lower body portion, and wherein said retainer is a foot stop adjustably attached to said first support outward end portion and selectively movable along a length of said first support outward end portion to position said foot stop according to the user's lower body length and thereby position the user's body on said first and second support portions with the hinge line of the user's hip joints generally coincident with said pivot axis.

20. The exercise apparatus of claim 17 for use with a weight, further including a weight attachment member attached to said body support and removably receiving the weight at a position to produce a selected downward force to said body support tending to move said first and second support inward end portions downward and pivot said first and second support portions about said pivot axis with said upper sides of said first and second support portions generally moving toward each other.

21. The exercise apparatus of claim 17 wherein said

pivot coupler includes left and right side pivot couplers, and wherein said first support portion includes left and right arms projecting away from said upper side of said first support portion and said second support portion includes left and right arms projecting away from said upper side of said second support portion, said left arms of said first and second support portions being pivotally coupled together by said left side pivot coupler and said right arms of said first and second support portions being pivotally coupled together by said right side pivot coupler.

22. An exercise apparatus for stretching and strengthening, comprising a body support having first and second body support portions, said first support portion being sized to provide support to a first body portion of a user when in position thereon, and having an inward end portion, said second support portion being sized to provide support to a second body portion of the user when in position thereon, and having an inward end portion, said first support inward end portion and said second support inward end portion being positioned toward each other and coupled together by a coupler for angular movement of said first support portion and said second support portion relative to each other about an axis, said axis being located to an upper side of and spaced away from both said first and second support portions at about the position of an imaginary line extending between the user's hip joints when the user is resting the user's first and second body portions on said first and second support portions, respectively, in position for exercise using the exercise apparatus.

23. The exercise apparatus of claim 22, further including a retainer attached to said body support and engaging the user during exercise to retain the user in position with the hinge line of the user's hip joints generally coincident with said axis when the user is resting the user's first body portion on said first support portion and the user's second body portion on said second support portion during exercise.

24. The exercise apparatus of claim 23 for use where the first body portion of the user is a lower body portion, and wherein said retainer is a foot stop adjustably attached to said first support outward end portion and selectively movable along a length of said first support outward end portion to position said foot stop according to the user's lower body length and thereby position the user's body on said first and second support portions with the hinge line of the user's hip joints generally coincident with said axis.

25. The exercise apparatus of claim 22 for use with a

weight, further including a weight attachment member attached to said body support and removably receiving the weight at a position to produce a selected downward force to said body support tending to move said first and second support inward end portions downward and angularly move said first and second support portions about said axis with said upper sides of said first and second support portions generally moving toward each other.

26. The exercise apparatus of claim 22 wherein said coupler includes left and right side couplers, and wherein said first support portion includes left and right arms projecting away from said upper side of said first support portion and said second support portion includes left and right arms projecting away from said upper side of said second support portion, said left arms of said first and second support portions being coupled together by said left side coupler and said right arms of said first and second support portions being coupled together by said right side coupler.

27. An exercise apparatus for stretching and strengthening, comprising a body support having first and second body support portions, said first support portion having an upper side sized to support a first body portion of a user when in position thereon, said first support portion having an inward end portion, said second support portion having an upper side sized to support a second body portion of the user when in position thereon, said second support portion having an inward end portion, said first support inward end portion and said second support inward end portion being positioned toward each other and pivotally coupled together by left and right side pivot couplers for angular movement of said first support portion and said second support portion relative to each other, said left and right side pivot couplers each being pivotal about a common pivot axis, said left side pivot coupler being attached toward a left side of both said first and second support inward end portions, said right side pivot coupler being attached toward a right side of both said first and second support inward end portion, said left and right side pivot couplers being spaced apart sufficient to allow the pelvis of the user to be positioned therebetween, said pivot axis of said left and right pivot couplers being located to said upper side of said first and second support portions at about the position of an imaginary line extending between the user's hip joints when the user is resting the user's first and second body portions on said upper sides of said first and second support portions, respectively, in position for exercise using the exercise apparatus.

28. The exercise apparatus of claim 27, further includ-

ing:

a first member engaging said first support portion to support said first support portion while permitting pivotal movement thereof relative to said second support portion during exercise; and

a second member engaging said second support portion to support said second support portion while permitting pivotal movement thereof relative to said first body support portion during exercise.

29. The exercise apparatus of claim 27 for use where the first body portion of the user is a lower body portion and the second body portion of the user is an upper body portion, further including a retainer attached to said body support and engaging the user to retain the user in position with the hinge line of the user's hip joints generally coincident with said pivot axis when the user is resting the user's lower body portion on said upper side of said first support portion and the user's upper body portion on said upper side of said second support portion during exercise.

30. The exercise apparatus of claim 29 wherein said retainer is a foot stop adjustably attached to said first support outward end portion and selectively movable along a length of said first support outward end portion to position said foot stop according to the user's lower body length and thereby position the user's body on said upper side of said first and second support portions with the hinge line of the user's hip joints generally coincident with said pivot axis.

31. An exercise apparatus usable by a user to stretch and strengthen gluteal and hamstring muscles, comprising:

a body support having first and second body support portions, said first support portion having an upper side sized to support a first body portion of the user when in position thereon, said first support portion having an inward end portion, said second support portion having an upper side sized to support a second body portion of the user when in position thereon, said second support portion having an inward end portion, said first support inward end portion and said second support inward end portion being positioned toward each other and pivotally coupled together by left and right side pivot couplers for angular movement of said first support portion and said second support portion relative to each other through a plane, said left side pivot coupler being pivotal about a left side pivot axis and said right side pivot coupler being

pivotal about a right side pivot axis, said left side pivot coupler being attached toward a left side of both said first and second support inward end portions, said right side pivot coupler being attached toward a right side of both said first and second support inward end portion, said left and right side pivot couplers being spaced apart sufficient to allow the pelvis of the user to be positioned therebetween, said left side pivot coupler being positioned spaced away from said upper side of said first and second support portions and having said left side pivot axis at a location corresponding to about the location of the user's left hip joint when the user is in position for exercise on said upper side of said first and second support portions, said right side pivot coupler being positioned spaced away from said upper side of said first and second support portions and having said right side pivot axis at a location corresponding to about the location of the user's right hip joint when the user is in position for exercise on said upper side of said first and second support portions;

a first member coupled to said first support portion to hold said first support portion in an elevated position and permit pivotal movement thereof relative to said second support portion during exercise; and

a second member coupled to said second support portion to hold said second support portion in an elevated position and permit pivotal movement thereof relative to said first body support portion during exercise.

32. The exercise apparatus of claim 31 for use where the first body portion of the user is a lower body portion and the second body portion of the user is an upper body portion, further including a foot stop attached to said first support portion toward an outward end portion thereof in a position to be engaged by at least one foot of the user and limit movement of the user's lower body portion toward said first support outward end portion when the user is resting the user's lower body portion on said upper side of said first support portion and the user's upper body portion on said upper side of said second support portion during exercise with the hinge line of the user's hip joints generally coincident with said pivot axis.

33. The exercise apparatus of claim 32 wherein said foot stop is adjustably attached to said first support outward end portion and selectively movable along a length of said first support outward end portion to position said foot stop according to the user's lower body length and thereby position the user's body on said upper side of said first and second support portions.

tions with the hinge line of the user's hip joints generally coincident with said pivot axis.

34. The exercise apparatus of claim 31 wherein said left and right side pivot axes are generally axially aligned. 5
35. The exercise apparatus of claim 31 wherein said first member is held stationary during exercise and has a first end portion pivotally coupled to said first support portion, and wherein said second member is movable during exercise and has a first end portion pivotally coupled to said second support portion and a second end portion supported for pivotal movement. 10 15
36. The exercise apparatus of claim 35, further including a ground engaging base member and wherein said first member has a second end portion rigidly attached to said base member and wherein said second end portion of said second member is pivotally attached to said base member. 20
37. The exercise apparatus of claim 31 for use with a weight, further including a weight attachment member attached to said body support and removably receiving the weight at a position to produce a selected downward force to said body support tending to move said first and second support inward end portions downward and pivot said first and second support portions about said left and right side pivot axes with said upper sides of said first and second support portions generally moving toward each other. 25 30 35
38. The exercise apparatus of claim 37 wherein said weight attachment member is attached at a position toward one of said left and right side pivot couplers. 40
39. The exercise apparatus of claim 37 wherein said weight attachment member holds the weight in a position toward said inward end portion of one of said first and second support portions. 45
40. The exercise apparatus of claim 31 wherein said first and second members are coupled to said first and second support portions at locations spaced apart along a length of said body support such that the body weight of the user on said upper sides of said first and second support portions tends to move said first and second support inward end portions downward and pivot said first and second support portions about said left and right side pivot axes with said upper sides of said first and second support portions generally moving toward each other. 50 55
41. The exercise apparatus of claim 31, further including a selectively operable lock to selectively lock

said first and second support portions against angular movement relative to each other.

42. The exercise apparatus of claim 31 wherein said first support portion includes left and right arms projecting away from said upper side of said first support portion and wherein said second support portion includes left and right arms projecting away from said upper side of said second support portion, said left arms of said first and second support portions being pivotally coupled together by said left side pivot coupler and said right arms of said first and second support portions being pivotally coupled together by said right side pivot coupler.
43. An exercise apparatus for stretching and strengthening, comprising a body support having first and second body support portions, said first support portion being sized to provide support to a first body portion of a user when in position thereon, and having an inward end portion, said second support portion being sized to provide support to a second body portion of the user when in position thereon, and having an inward end portion, said first support inward end portion and said second support inward end portion being positioned toward each other, said first support portion and said second support portion being angularly movable relative to each other about an axis located to an upper side of and spaced away from both said first and second support portions at about the position of an imaginary line extending between the user's hip joints when the user is resting the user's first and second body portions on said first and second support portions, respectively, in position for exercise using the exercise apparatus.
44. The exercise apparatus of claim 43, further including a retainer attached to said body support and engaging the user during exercise to retain the user in position with the hinge line of the user's hip joints generally coincident with said axis when the user is resting the user's first body portion on said first support portion and the user's second body portion on said second support portion during exercise.
45. The exercise apparatus of claim 44 for use where the first body portion of the user is a lower body portion, and wherein said retainer is a foot stop adjustably attached to said first support outward end portion and selectively movable along a length of said first support outward end portion to position said foot stop according to the user's lower body length and thereby position the user's body on said first and second support portions with the hinge line of the user's hip joints generally coincident with said axis.

46. The exercise apparatus of claim 43 for use with a weight, further including a weight attachment member attached to said body support and removably receiving the weight at a position to produce a selected downward force to said body support tending to move said first and second support inward end portions downward and angularly move said first and second support portions about said axis with said upper sides of said first and second support portions generally moving toward each other.

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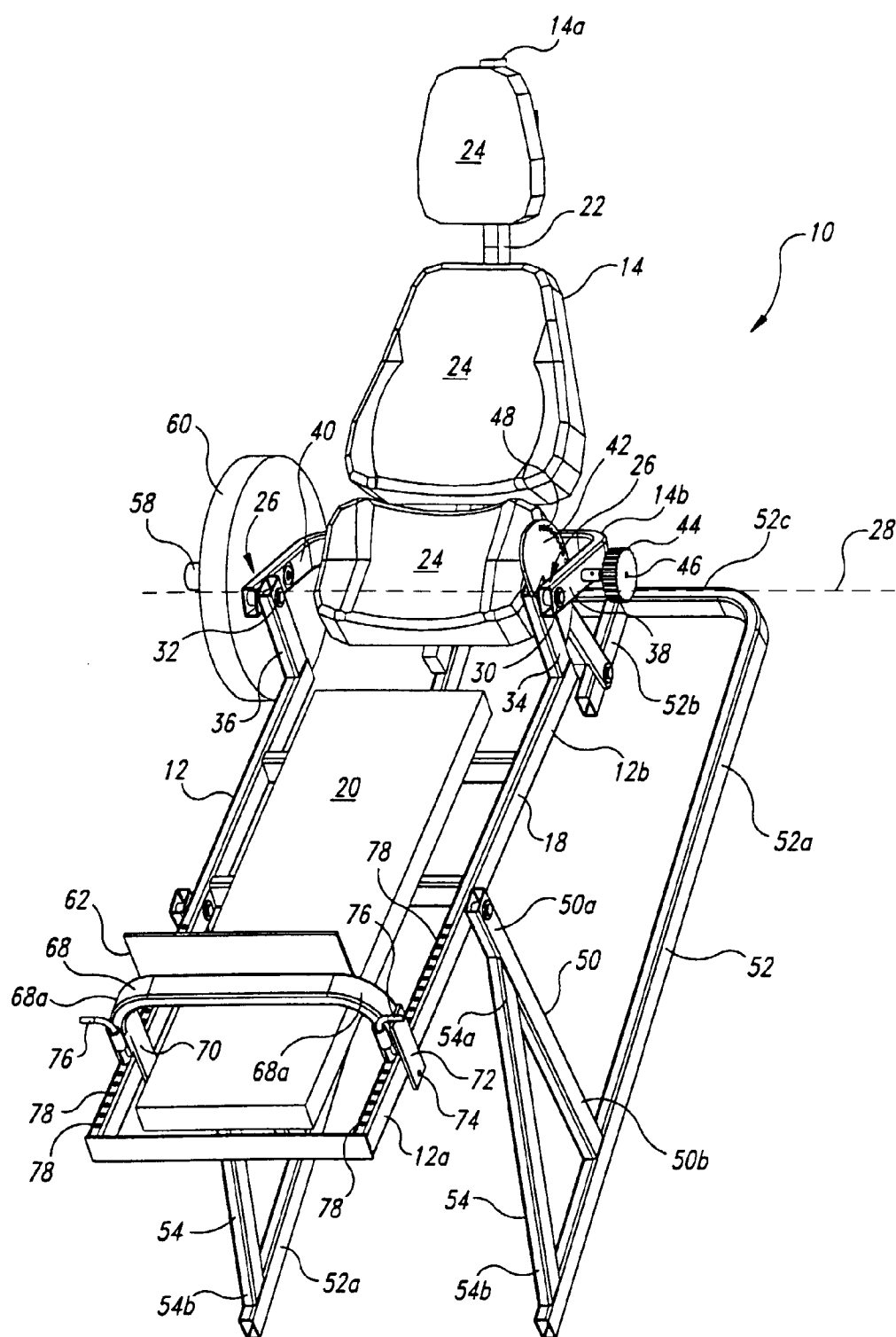


Fig. 1

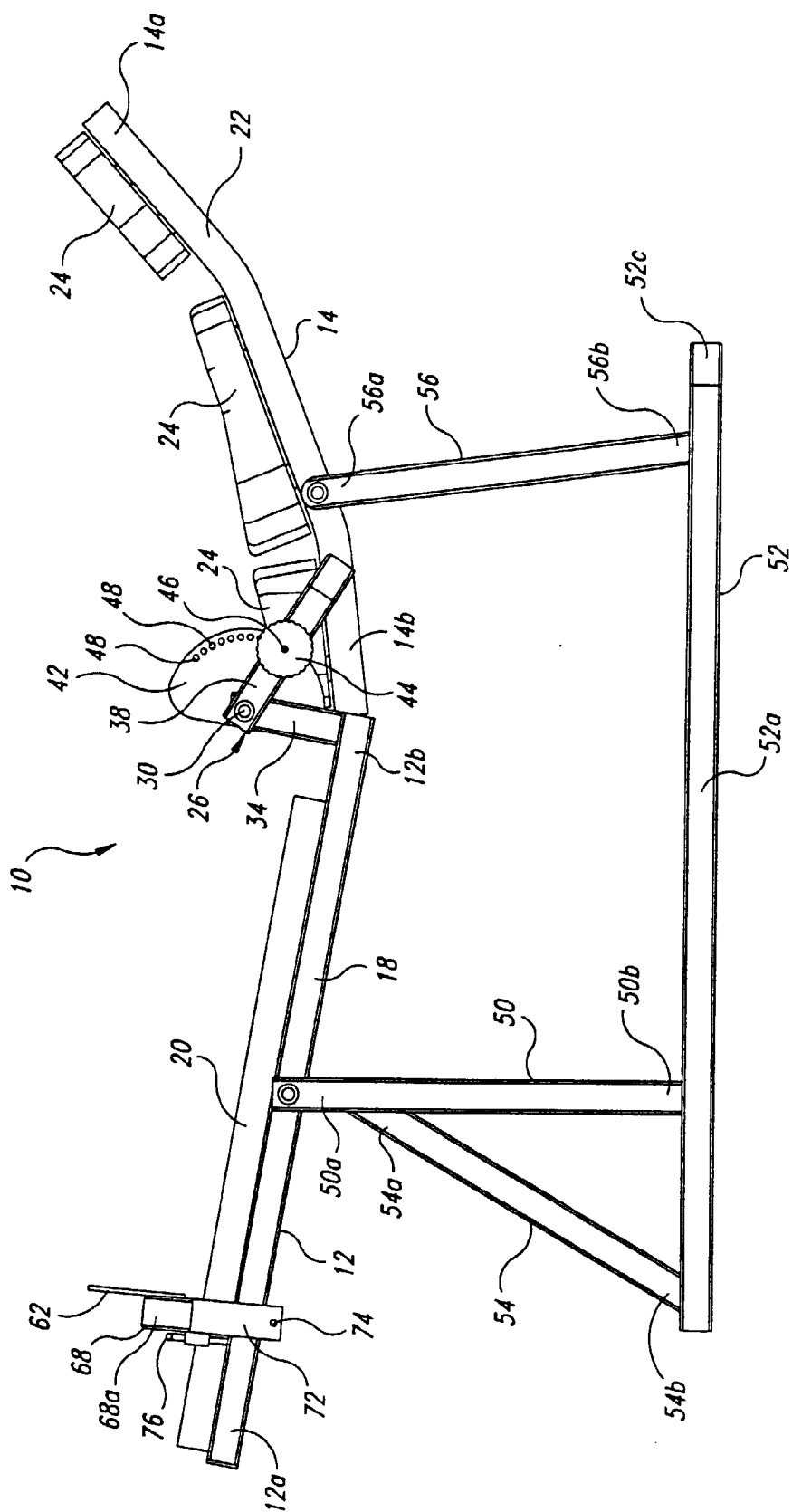


Fig. 2

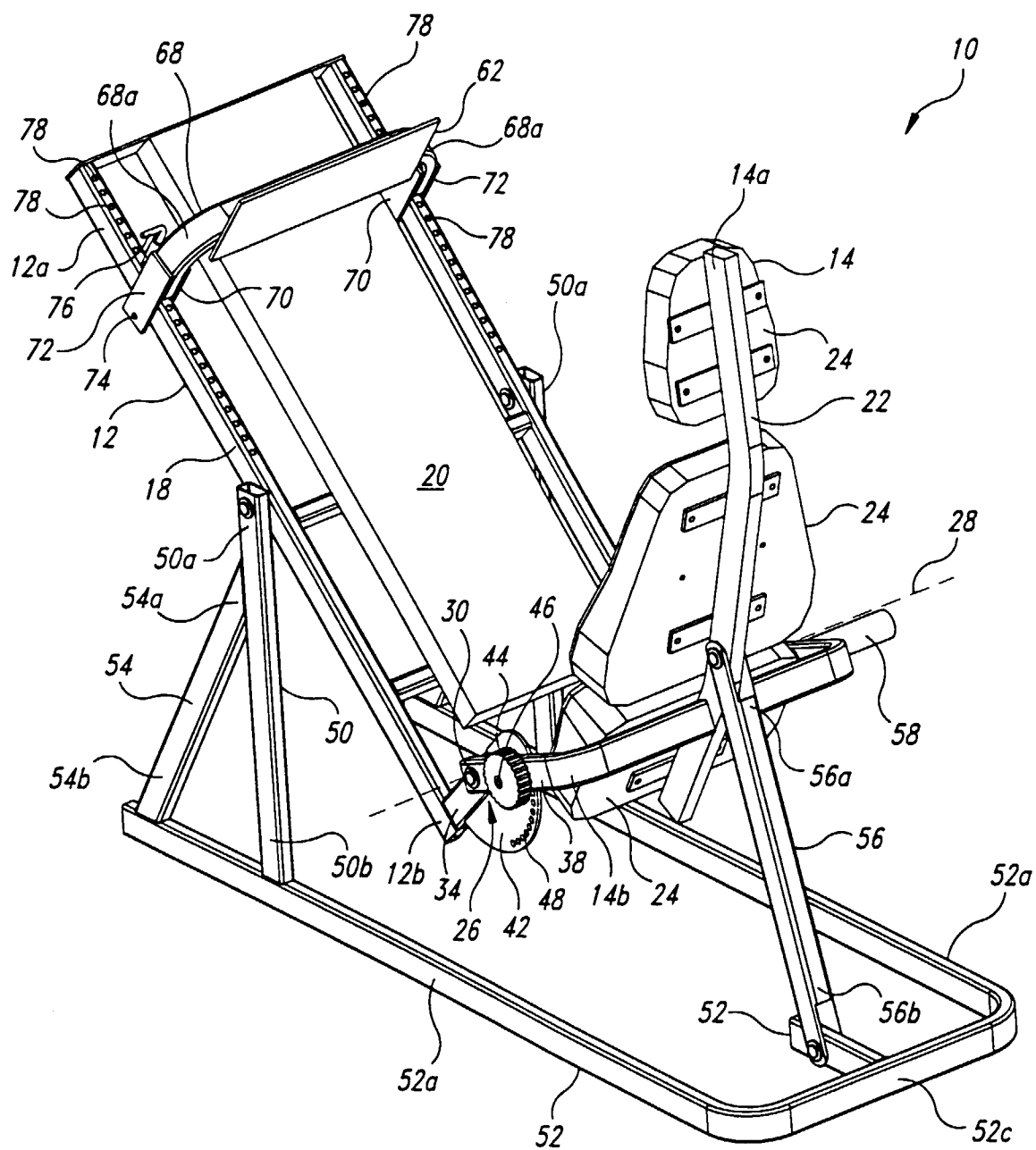


Fig. 3

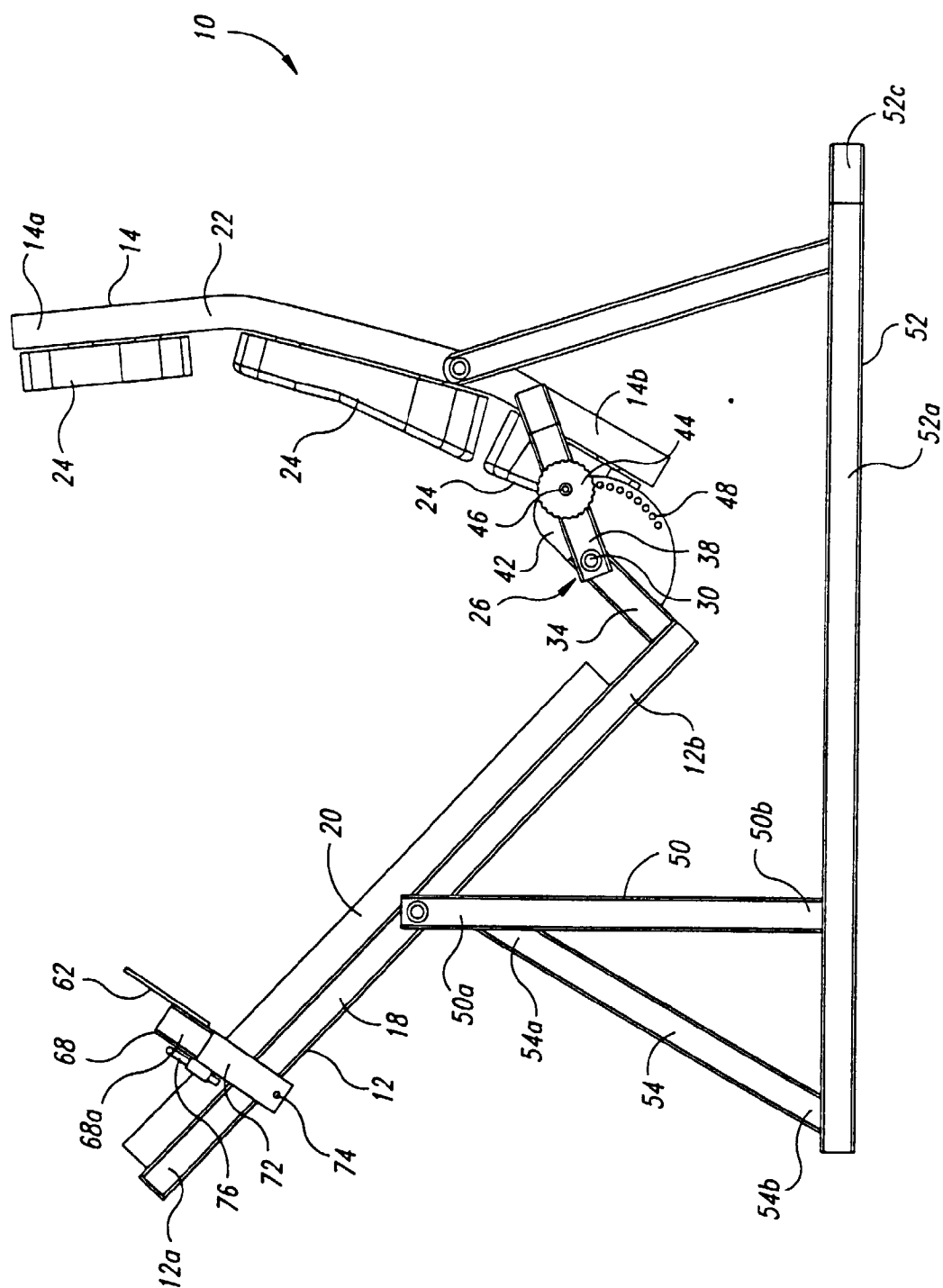
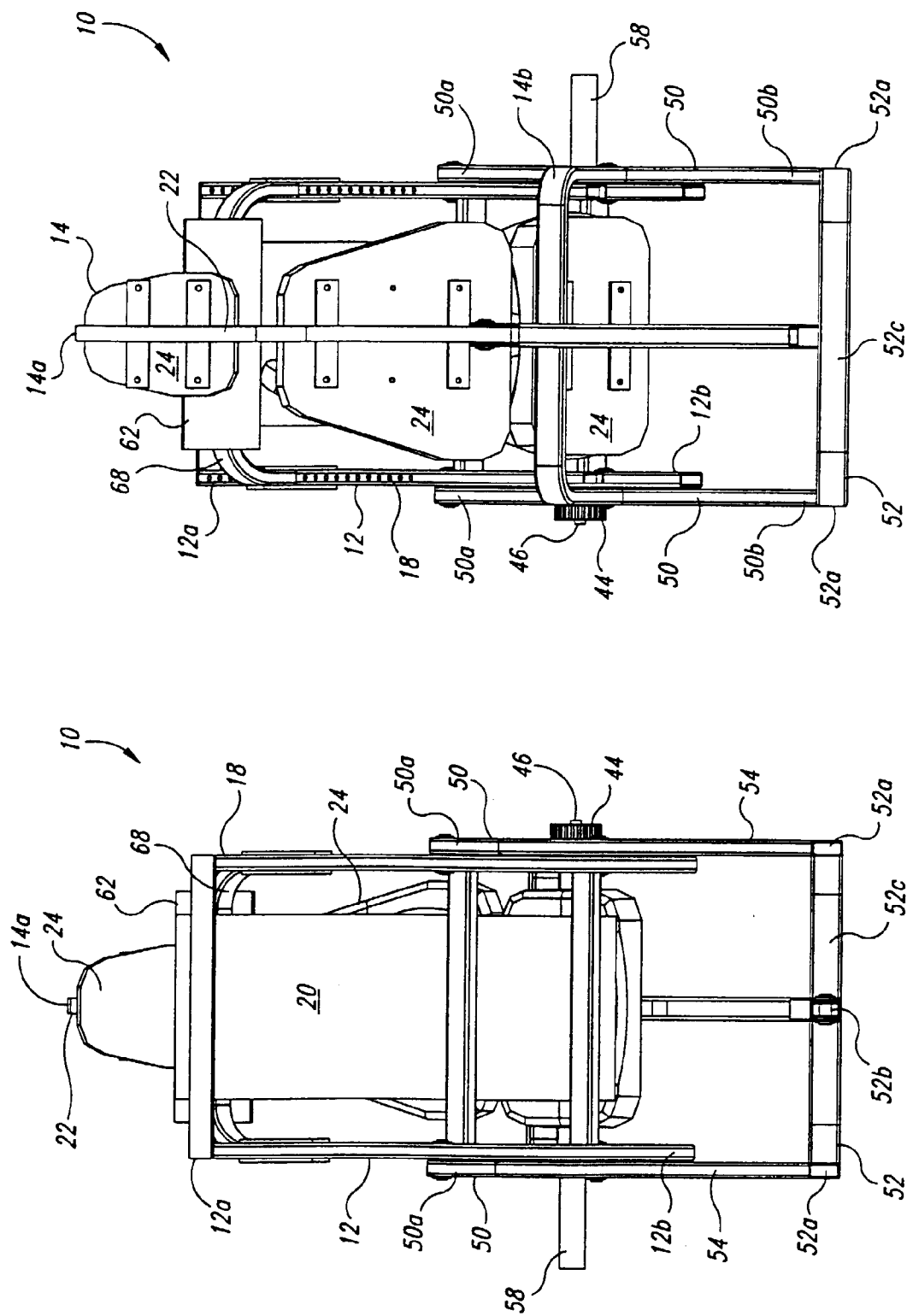


Fig. 4



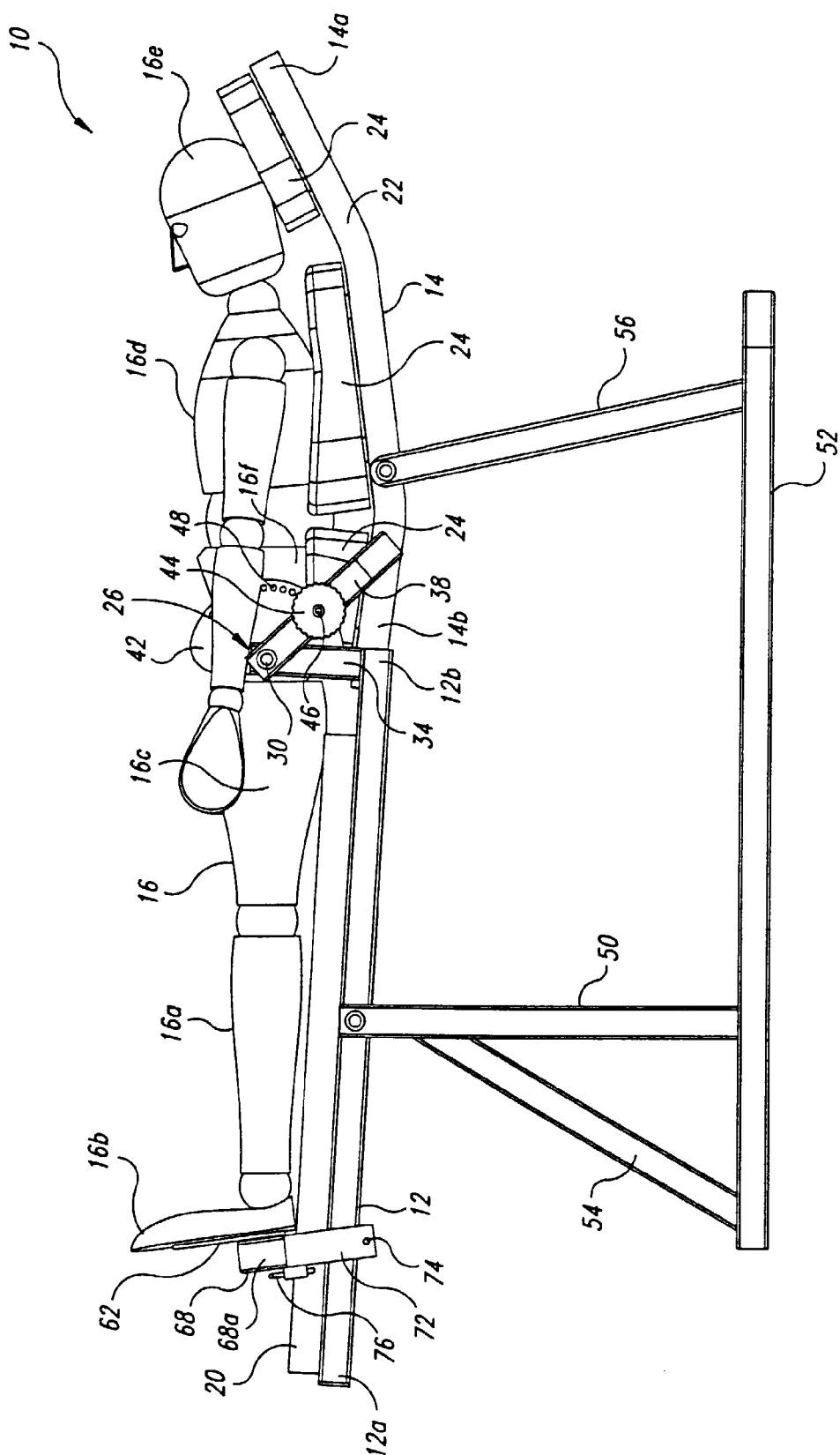


Fig. 7

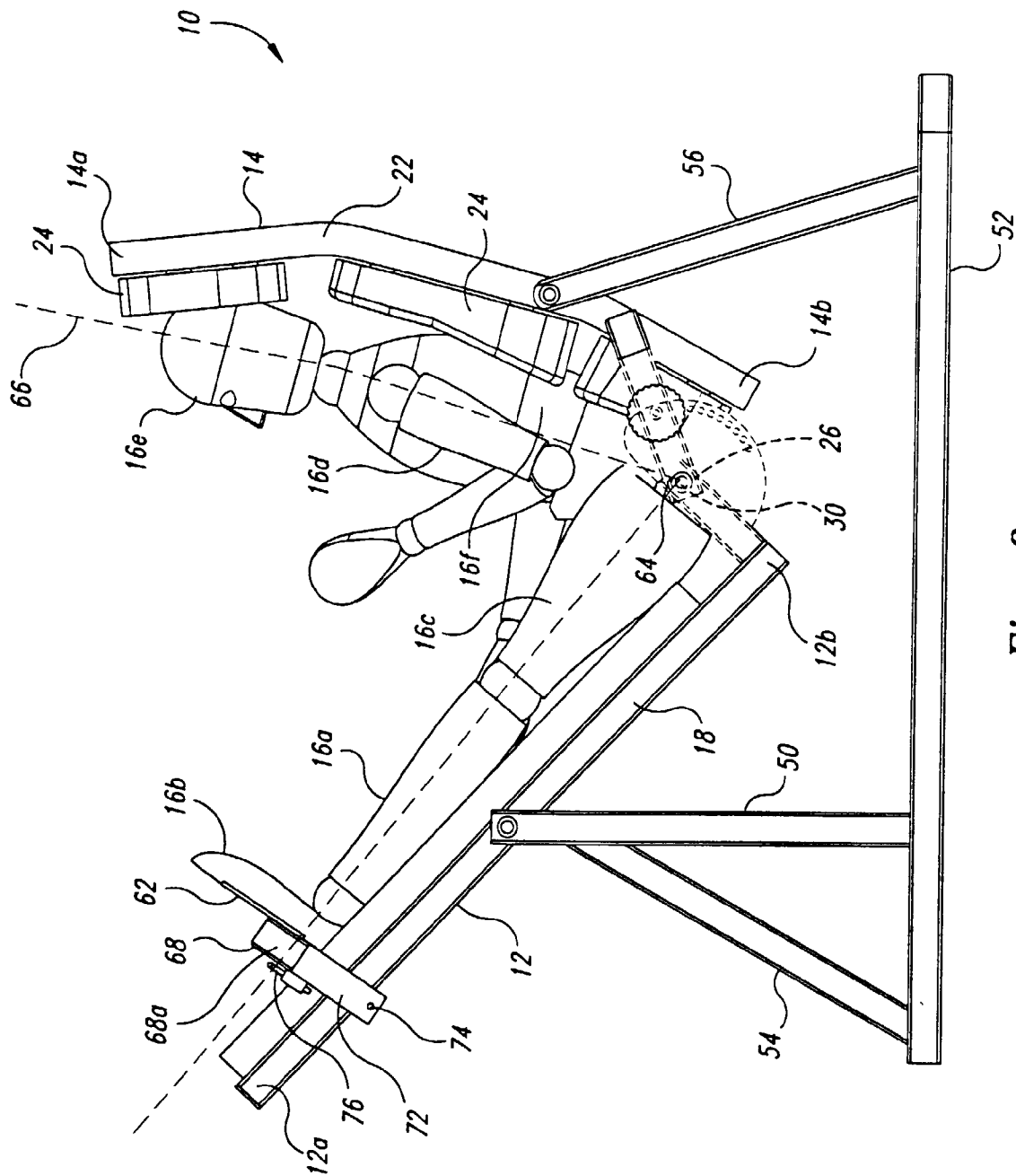


Fig. 8

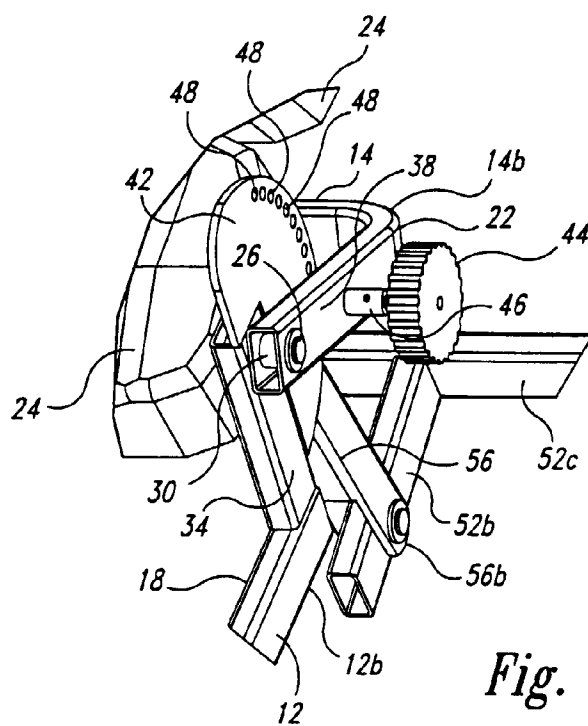


Fig. 9

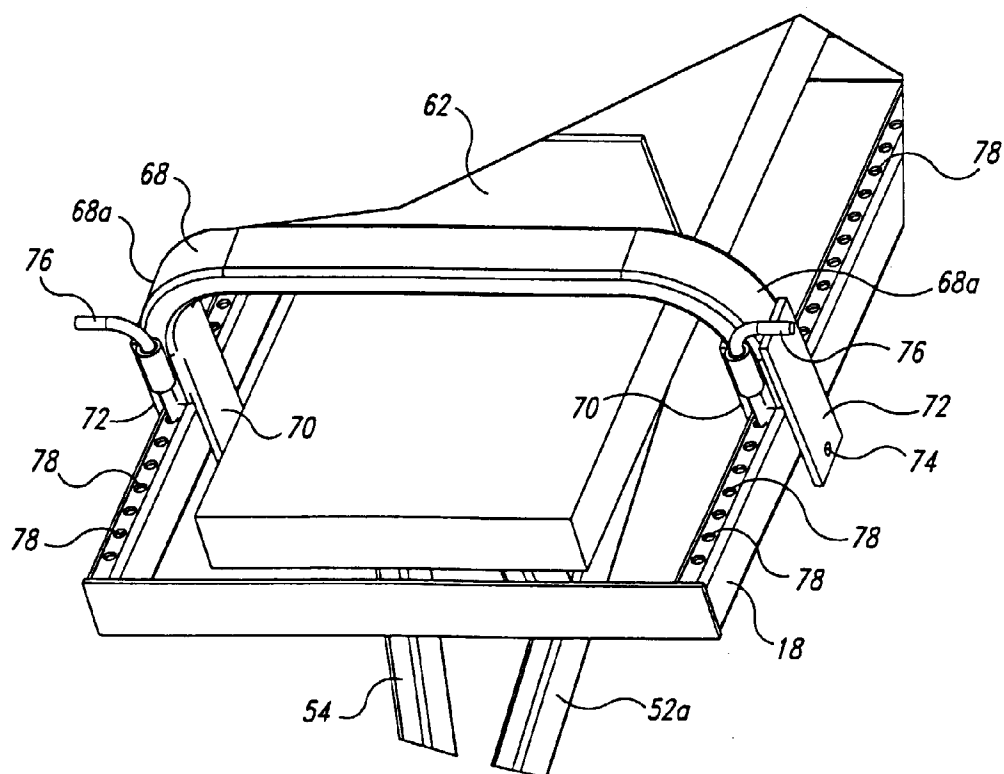
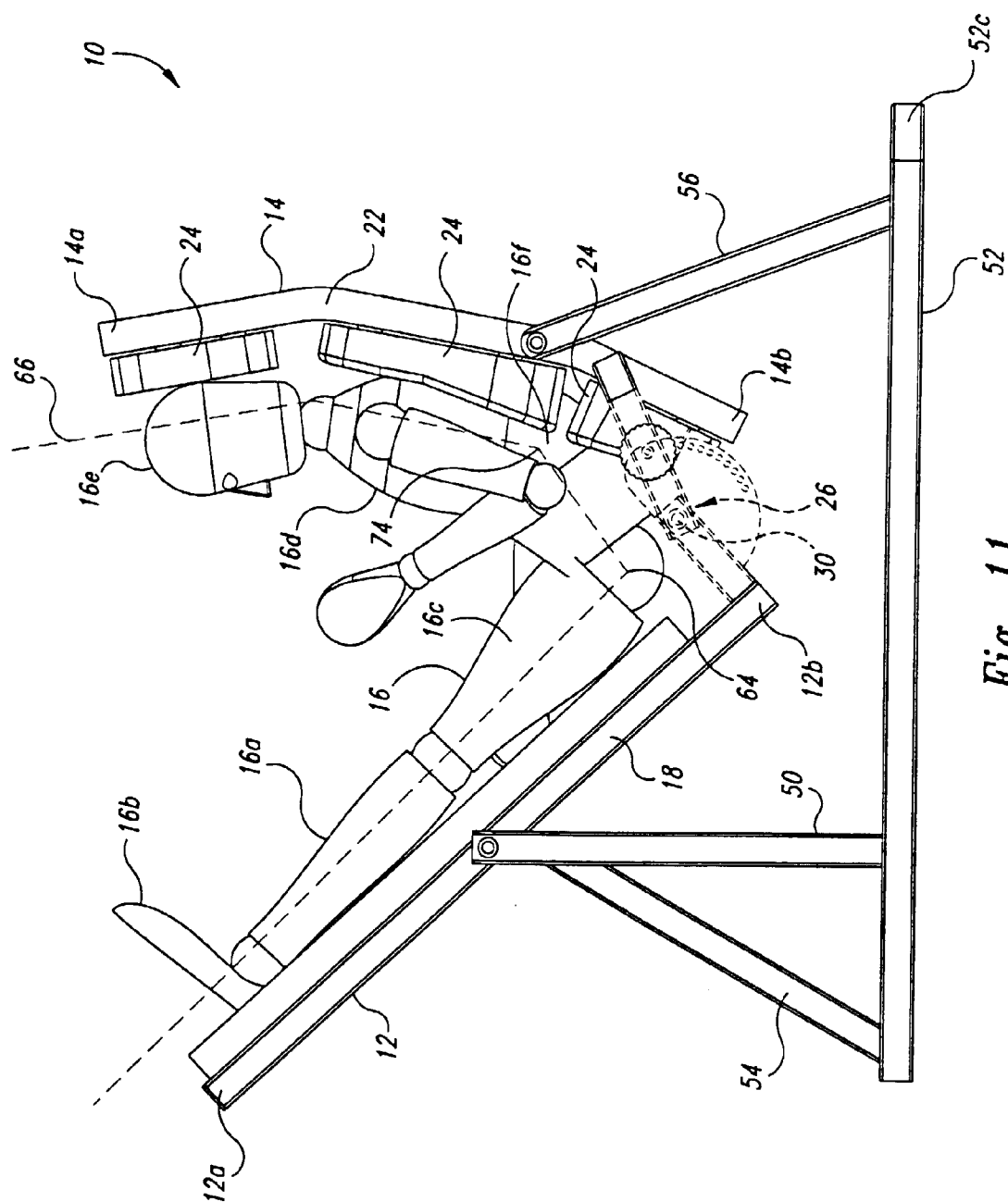


Fig. 10



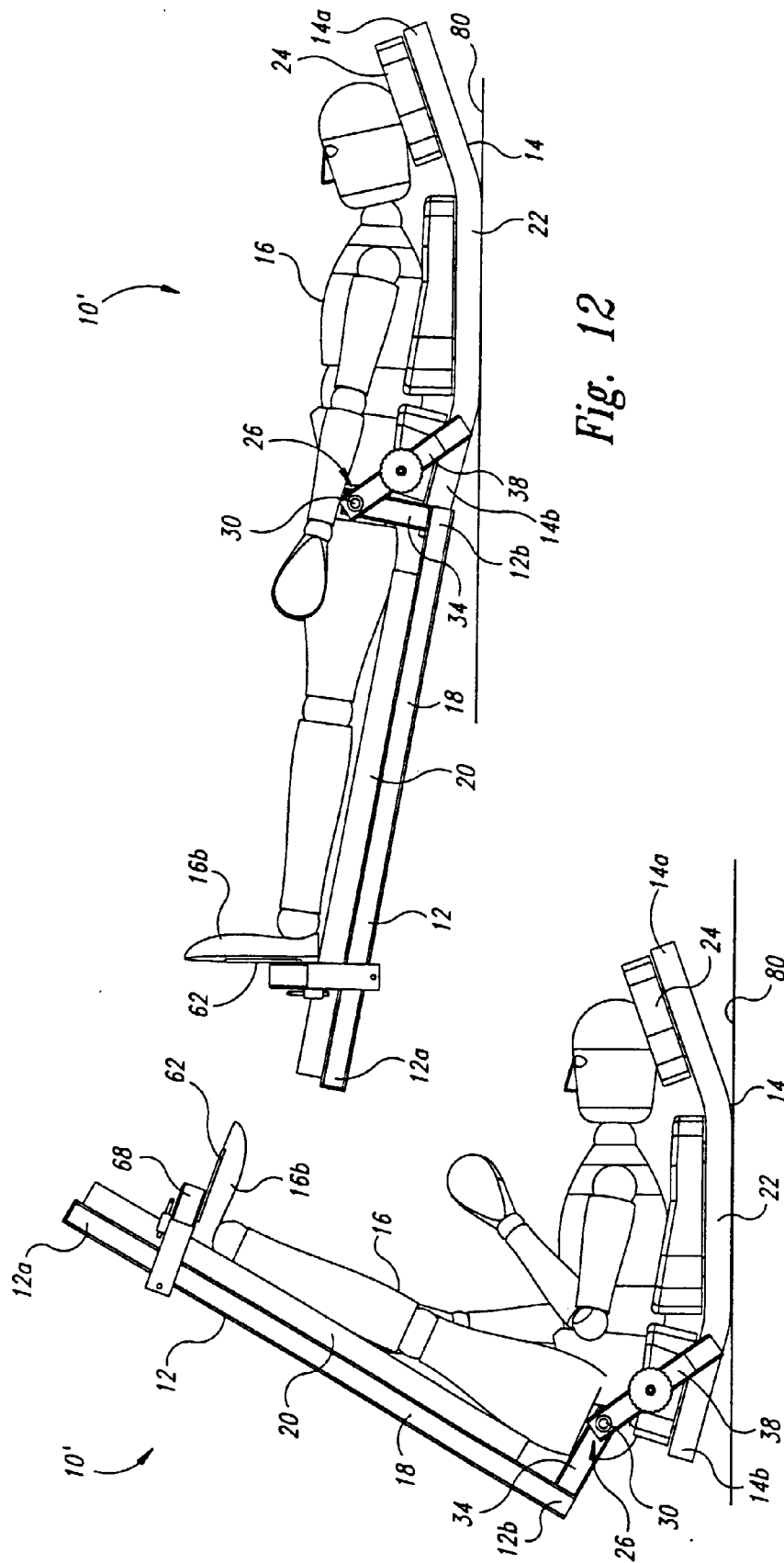


Fig. 12

Fig. 13

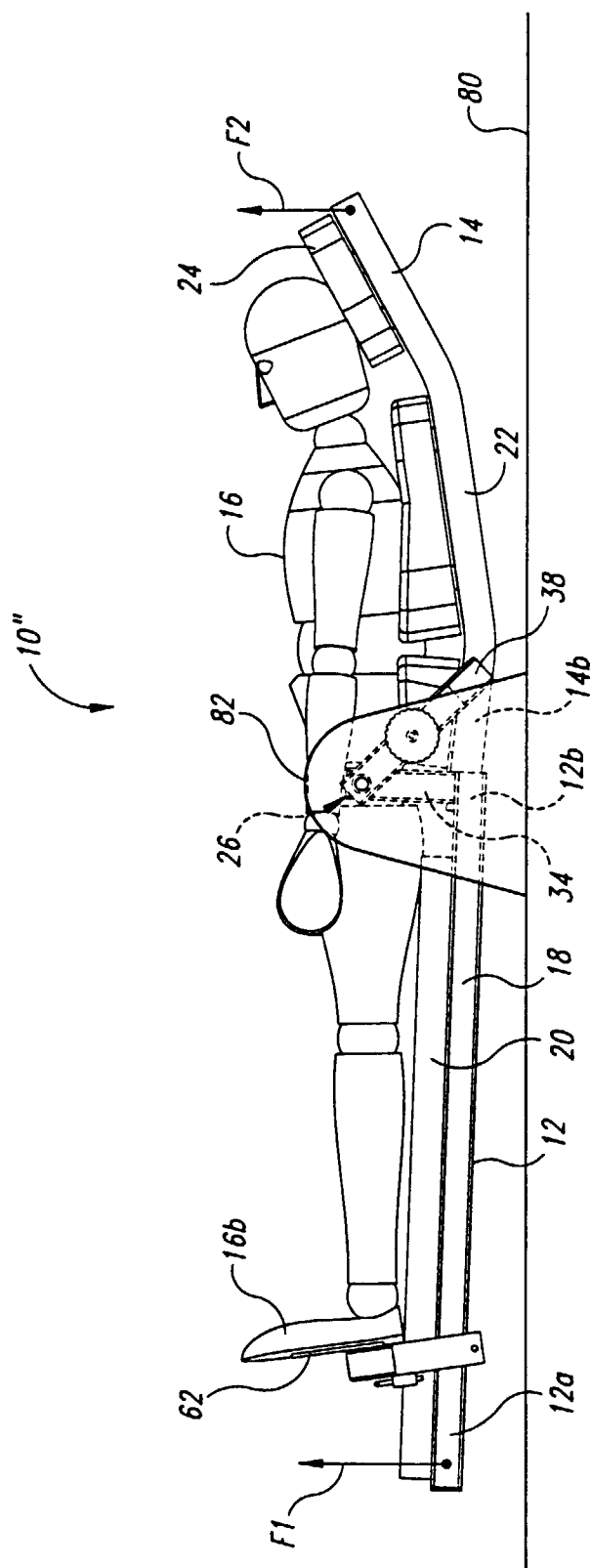


Fig. 14

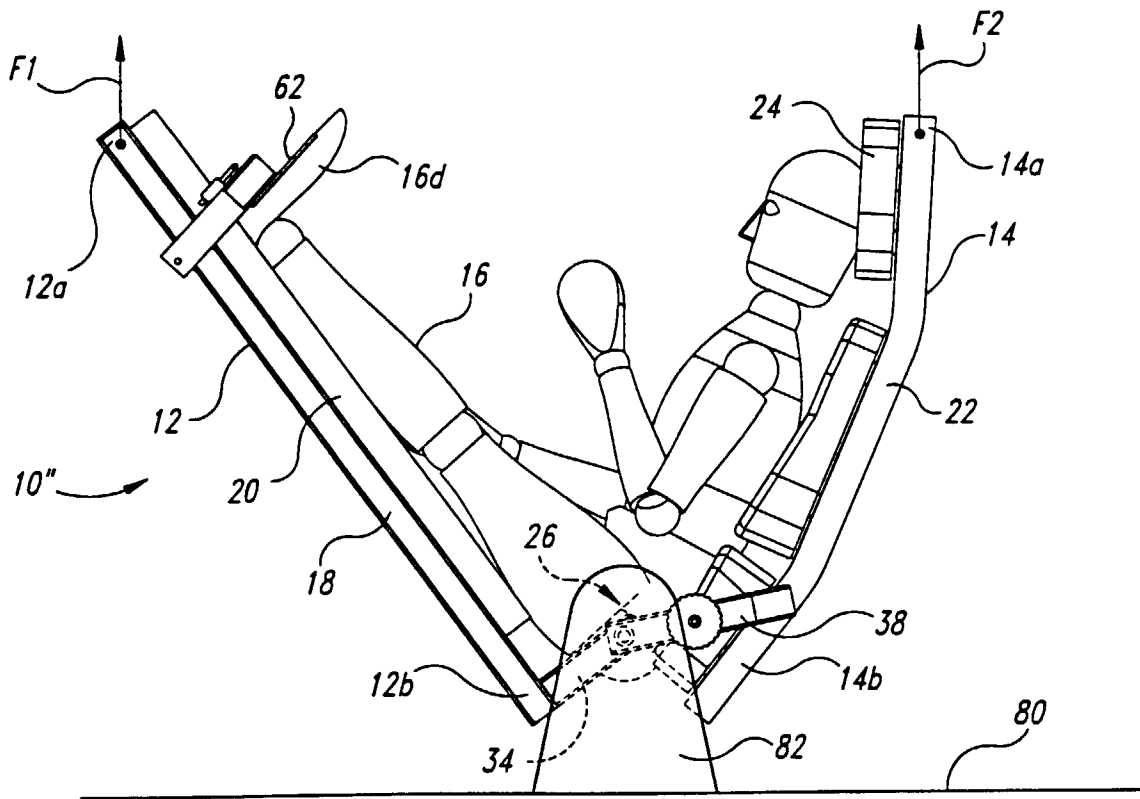


Fig. 15