US 20060040799A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2006/0040799 A1**

Pompile (43) **Pub. Date: Feb. 23, 2006**

(54) **SHOULDER STABILIZING AND STRENGTHENING METHOD AND APPARATUS**

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(21) Appl. No.: **11/199,728**

(22) Filed: **Aug. 9, 2005**

Related U.S. Application Data

(60) Provisional application No. 60/599,696, filed on Aug. 9, 2004.

Publication Classification

(51) **Int. Cl.**
A63B 21/00 (2006.01)
A63B 23/00 (2006.01)

(52) **U.S. Cl.** **482/92**; 482/148

(57) **ABSTRACT**

A method and adjustable apparatus for stabilizing and strengthening the shoulder muscles and rotator cuff provides an active range of motion activities that can be performed with or without resistance. In particular, the method and apparatus provide for scapular retraction and protraction, shoulder flexion, extension, adduction and abduction, as well as internal and external shoulder rotation, performed horizontally and vertically. All of these motions are beneficial to the shoulder joint because they allow the joint to move freely throughout its normal range of motion using natural mechanics of the rotator cuff and surrounding muscles. The method and apparatus provide the essential benefit of stabilizing the shoulder and rotator cuff throughout these motions so that the user's range of motion and strength building is optimized. The method and apparatus also provide for self myofascial release techniques to decrease spasm.

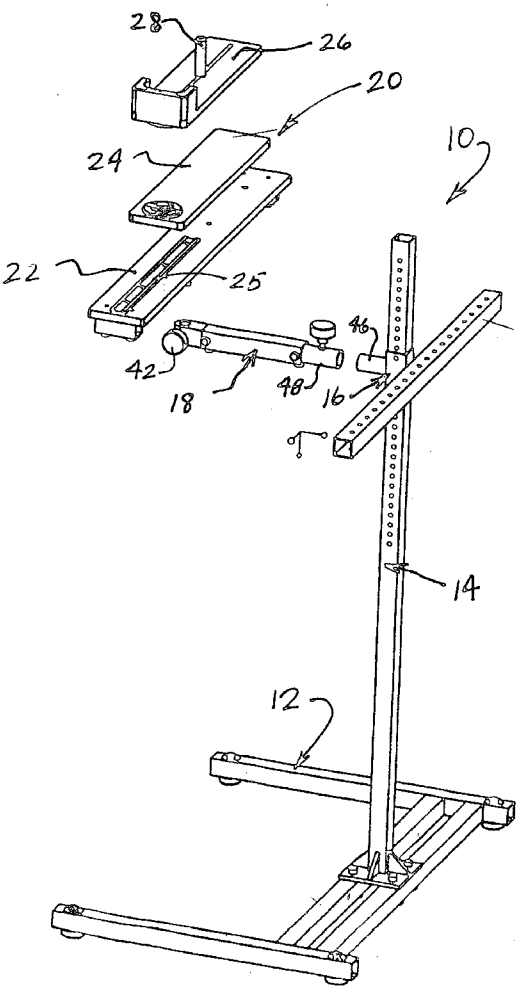


FIG.1

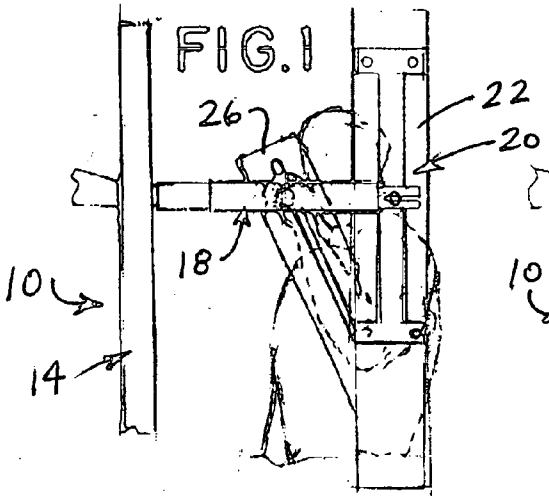


FIG.1A

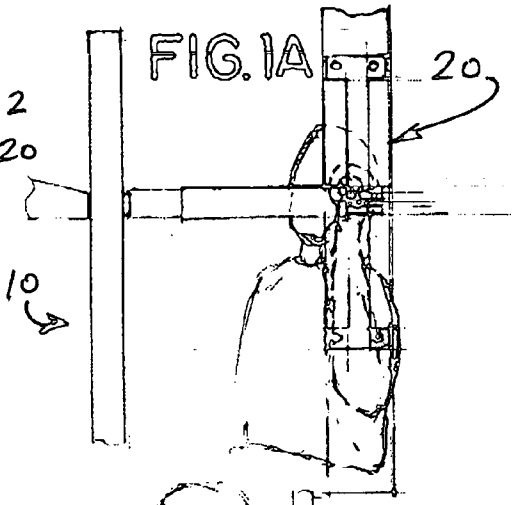


FIG.2

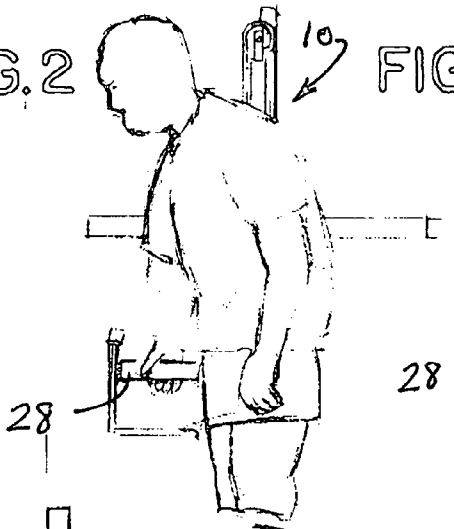


FIG.2A

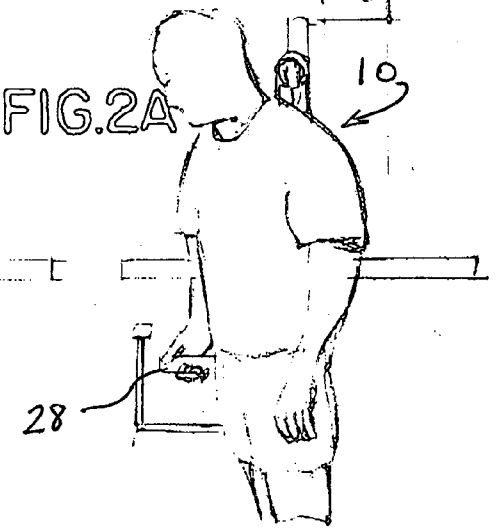


FIG.3

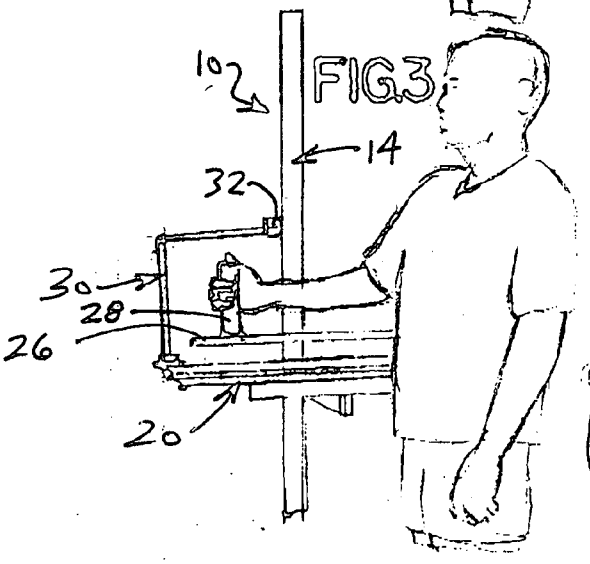
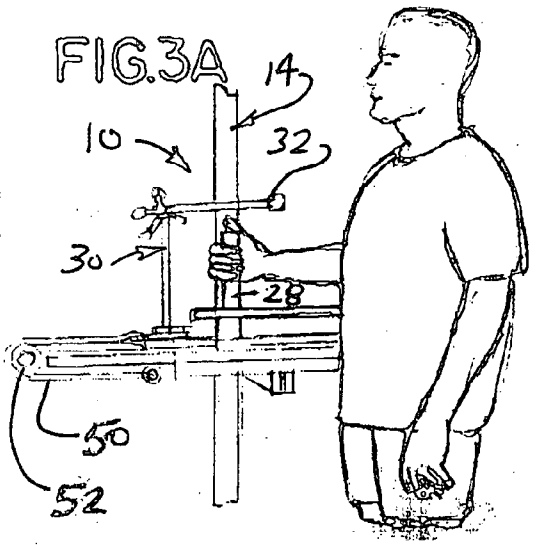


FIG.3A



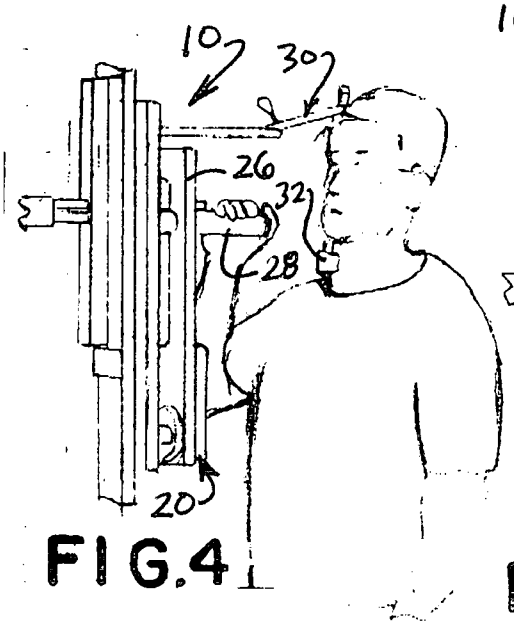


FIG.4

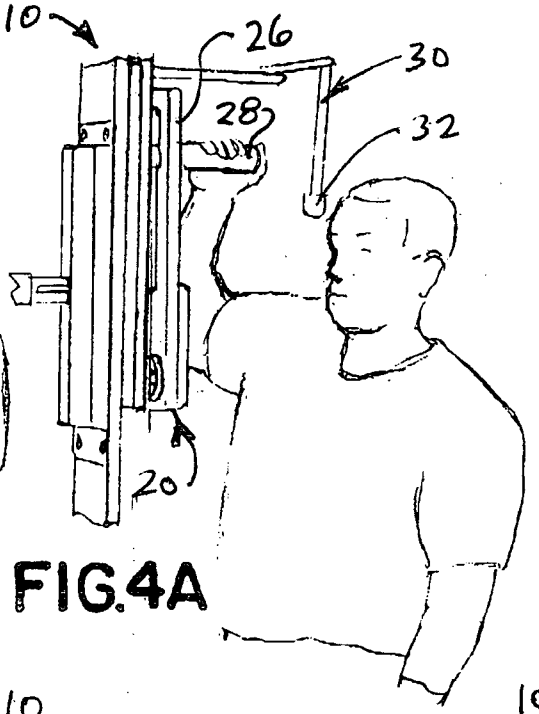


FIG.4A

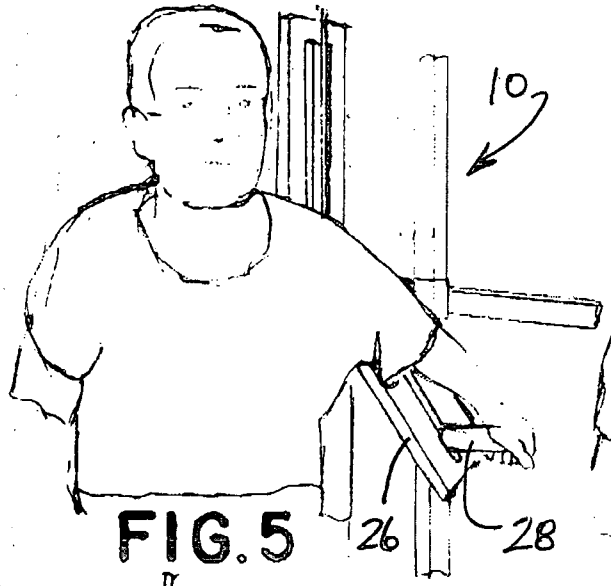


FIG.5

FIG.5A

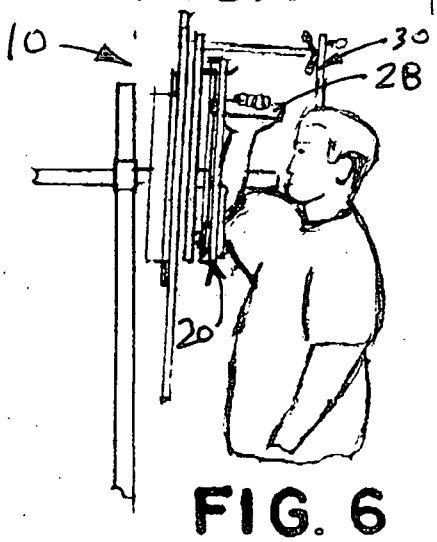


FIG. 6

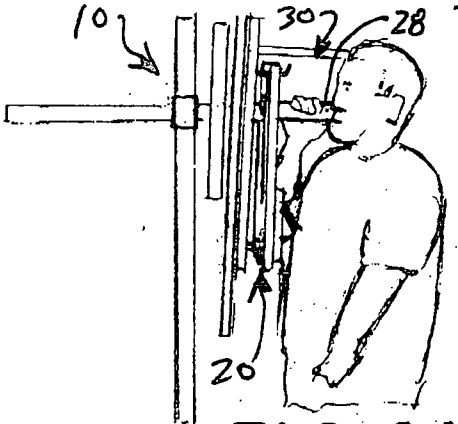


FIG. 6A

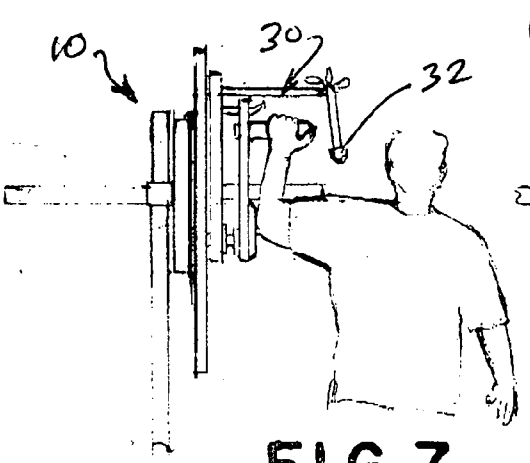


FIG. 7

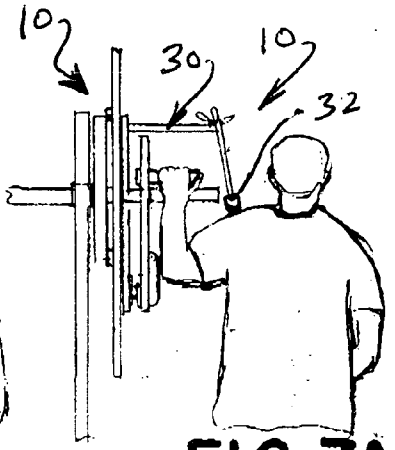


FIG. 7A

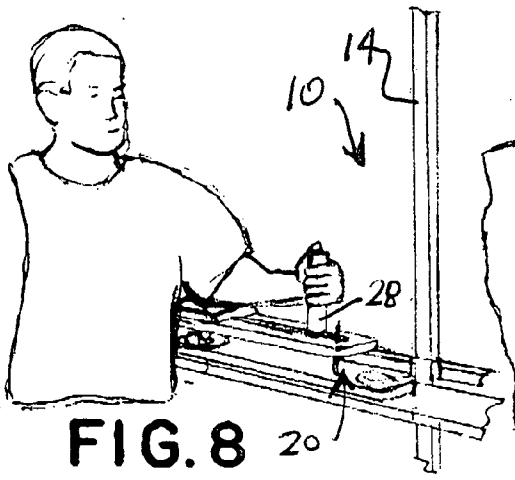


FIG. 8

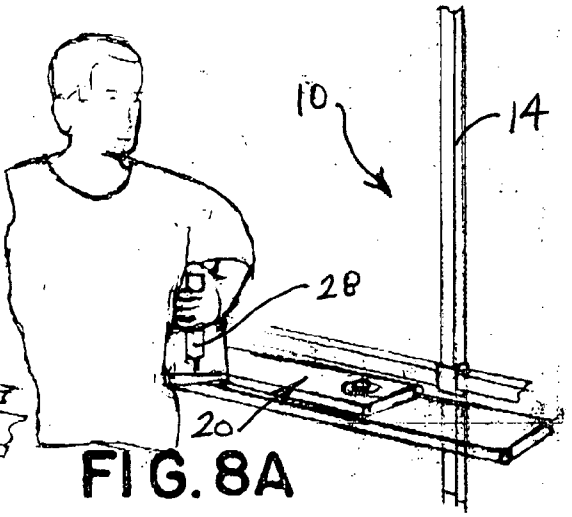


FIG. 8A

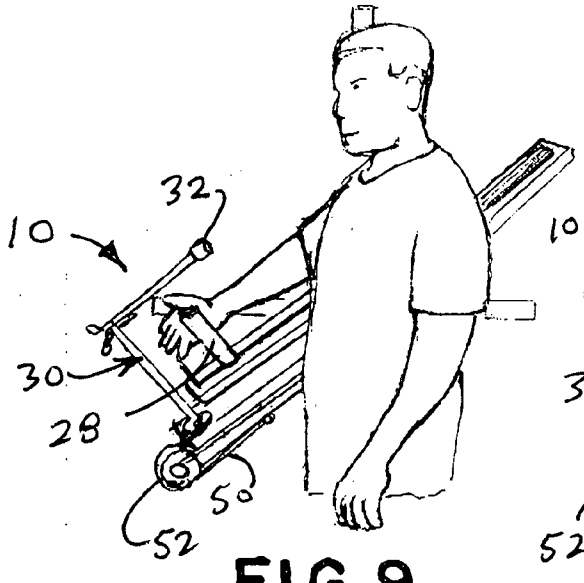


FIG. 9

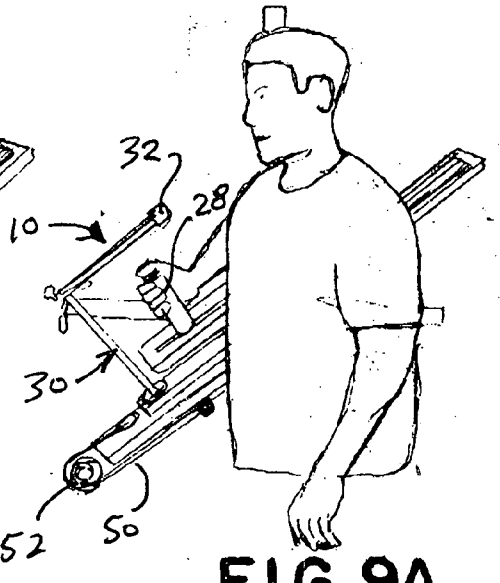


FIG. 9A

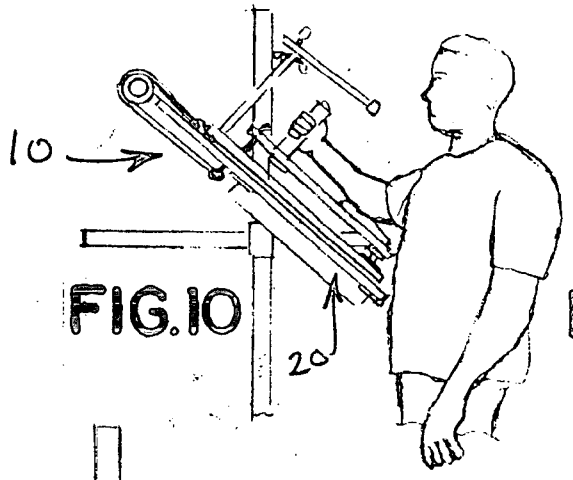


FIG.10

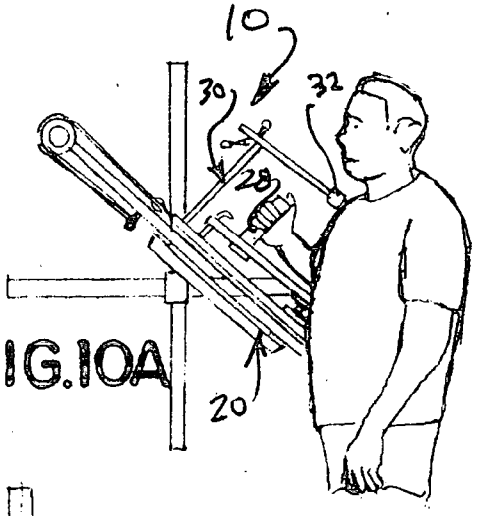


FIG.10A

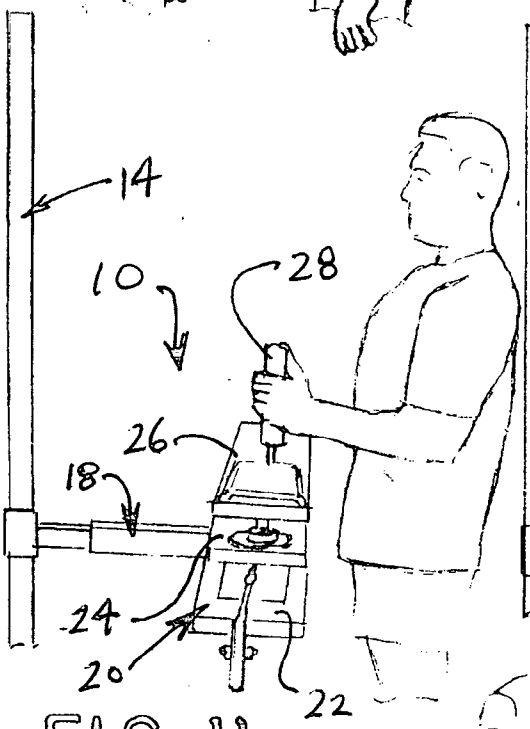


FIG. 11

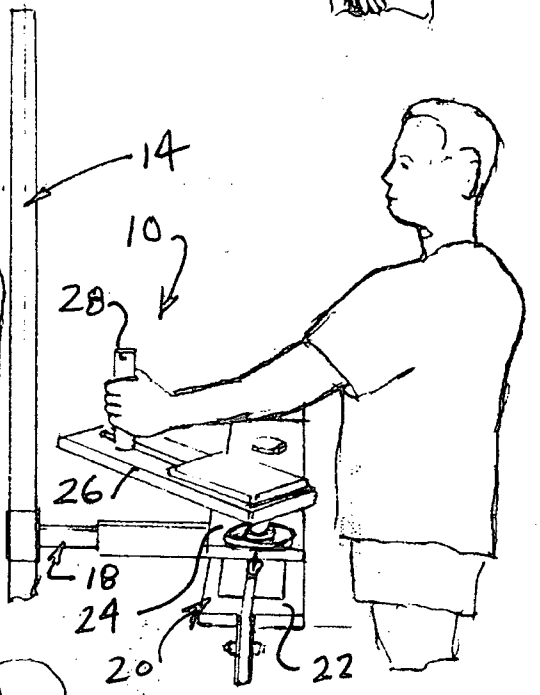


FIG. 11A

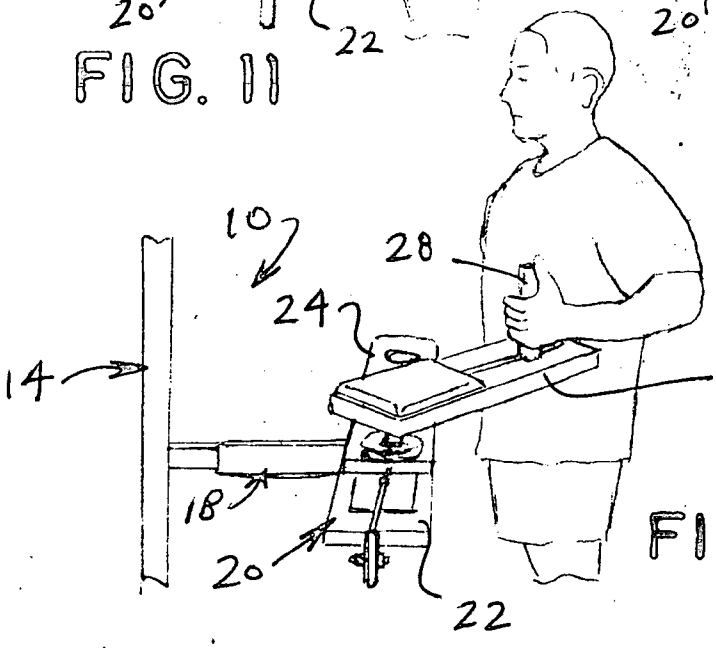


FIG. 11B

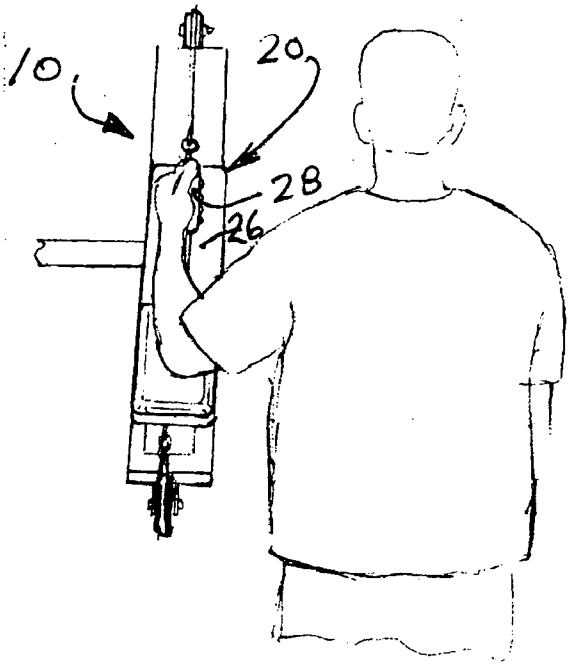


FIG.12

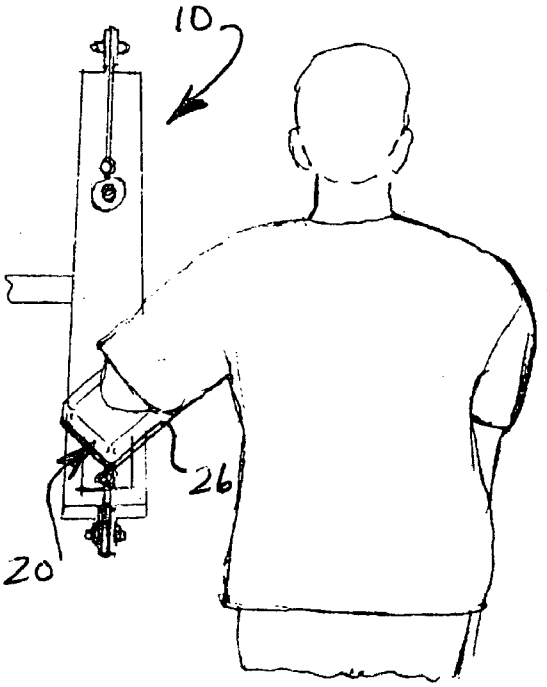


FIG.12A

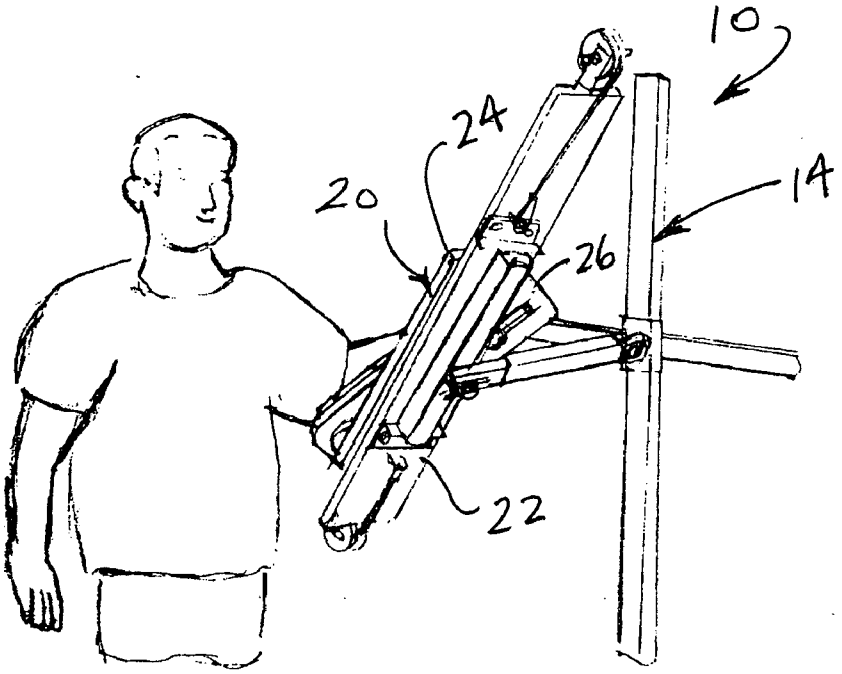


FIG.12B

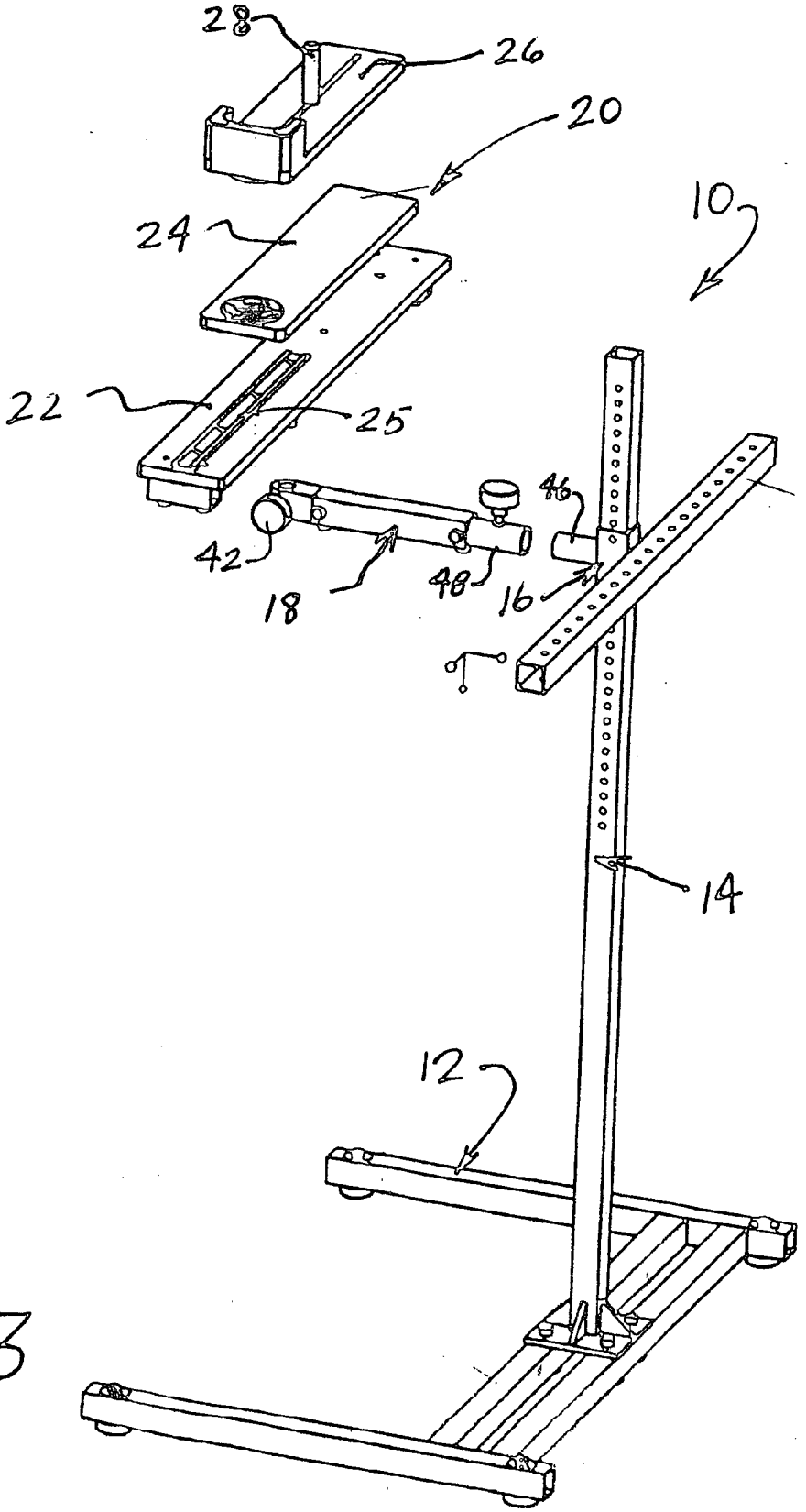


FIG. 13

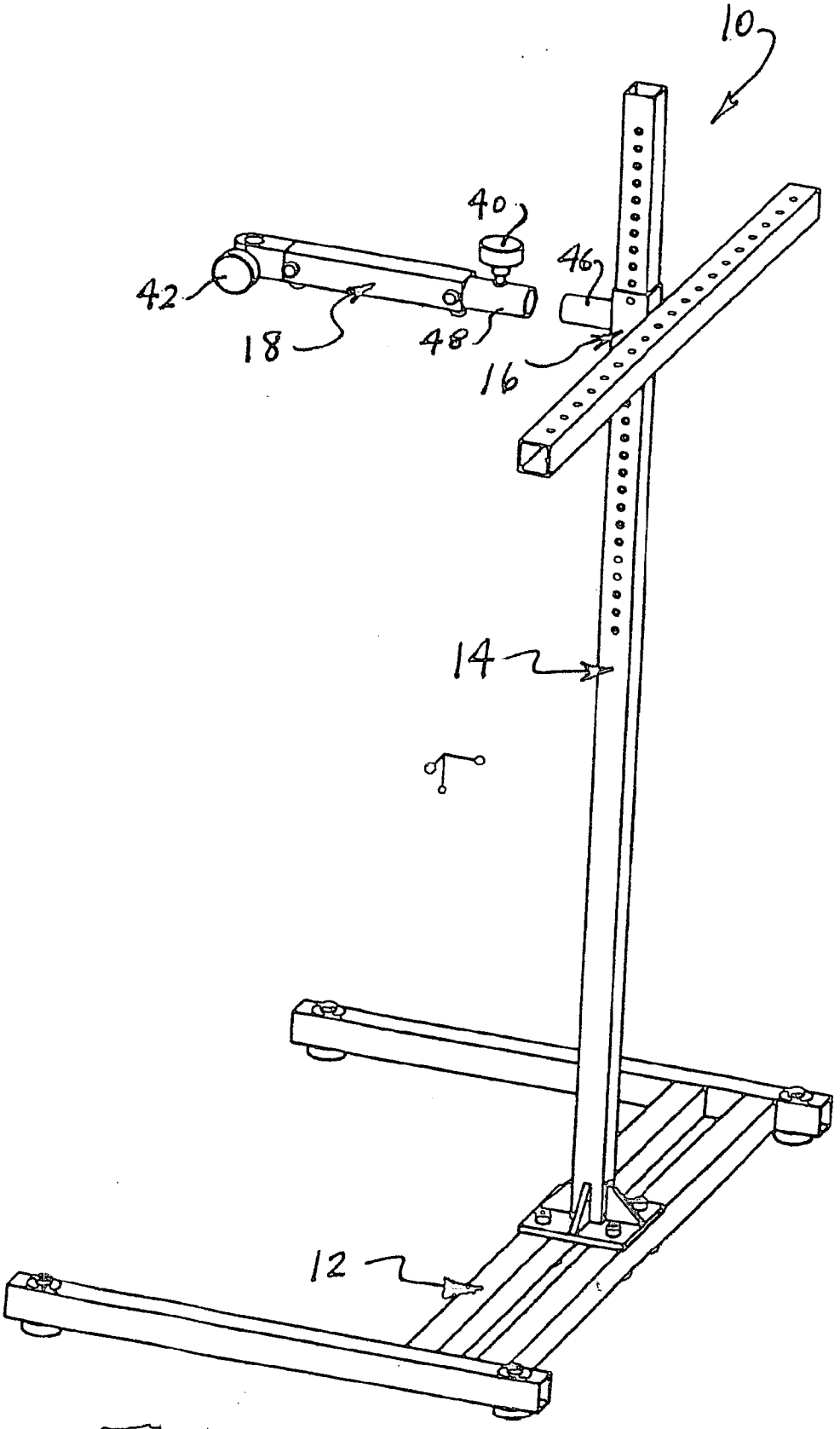


FIG. 14

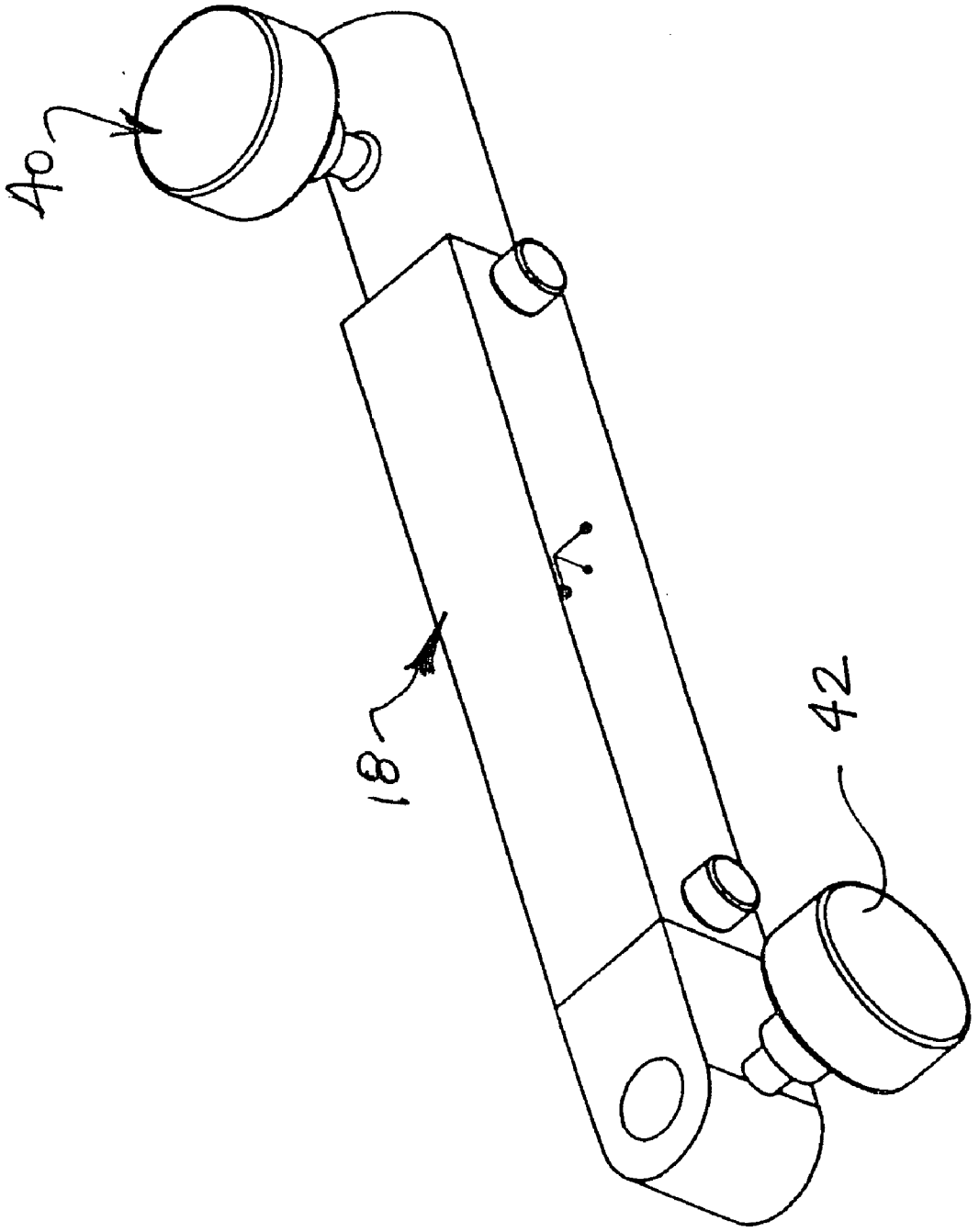


FIG. 15

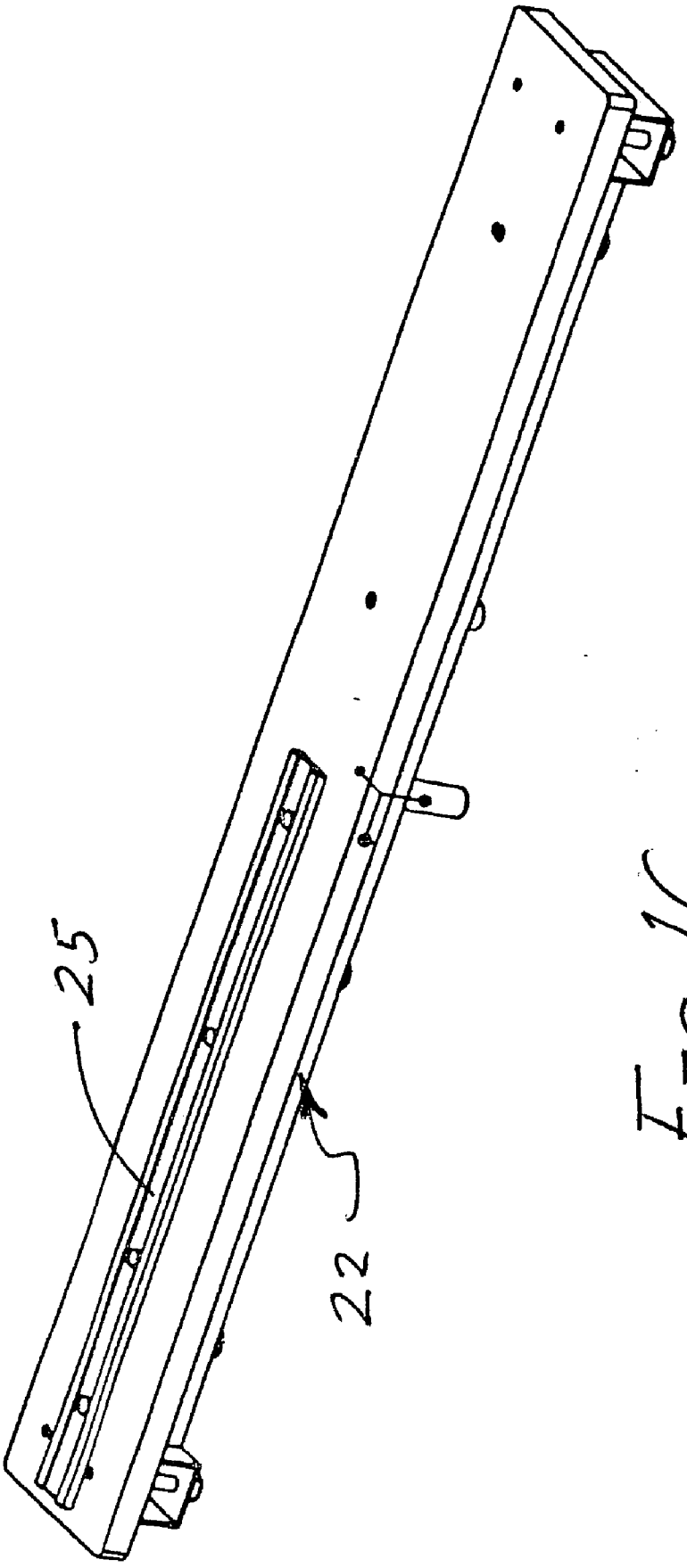


FIG. 16

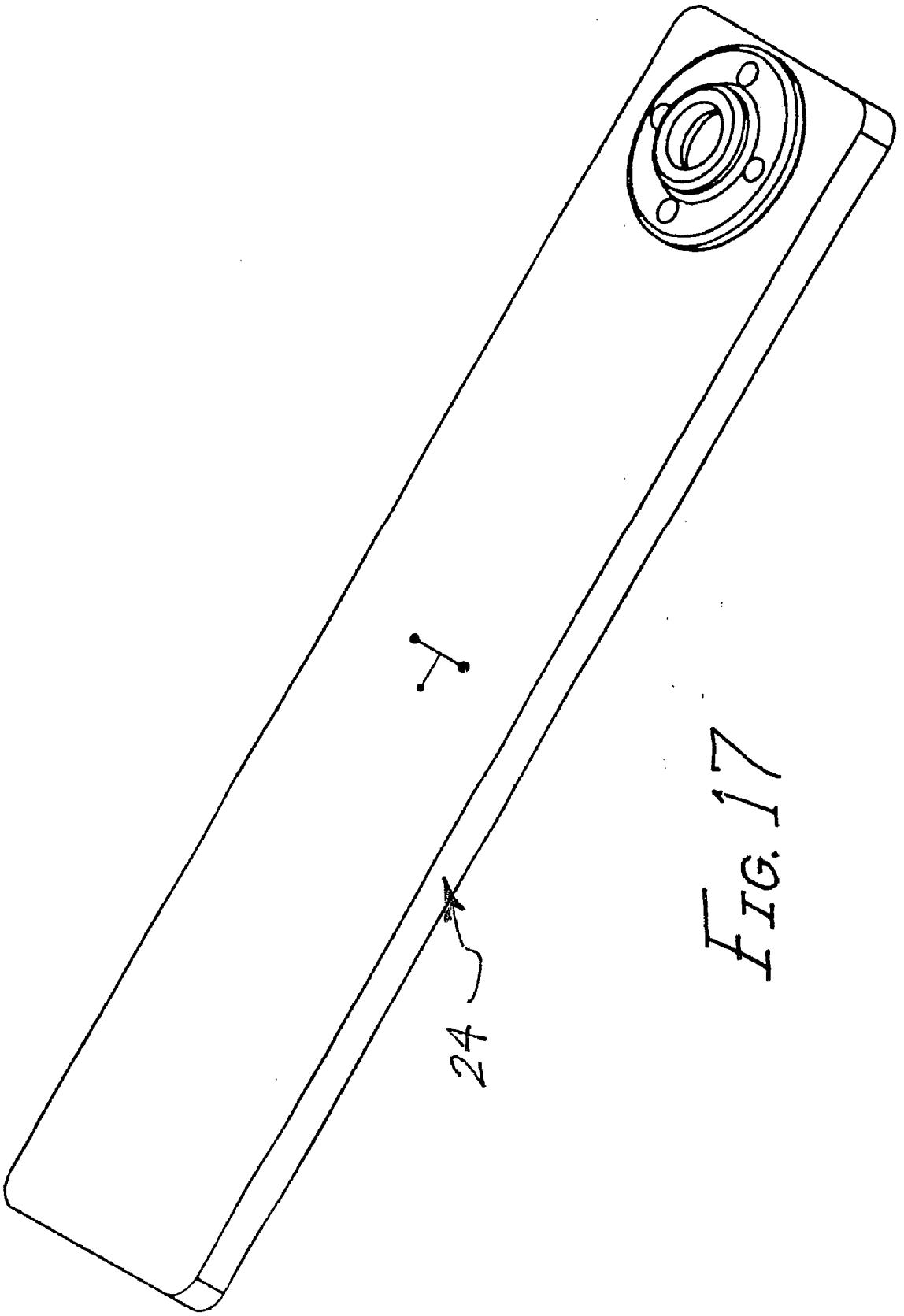


FIG. 17

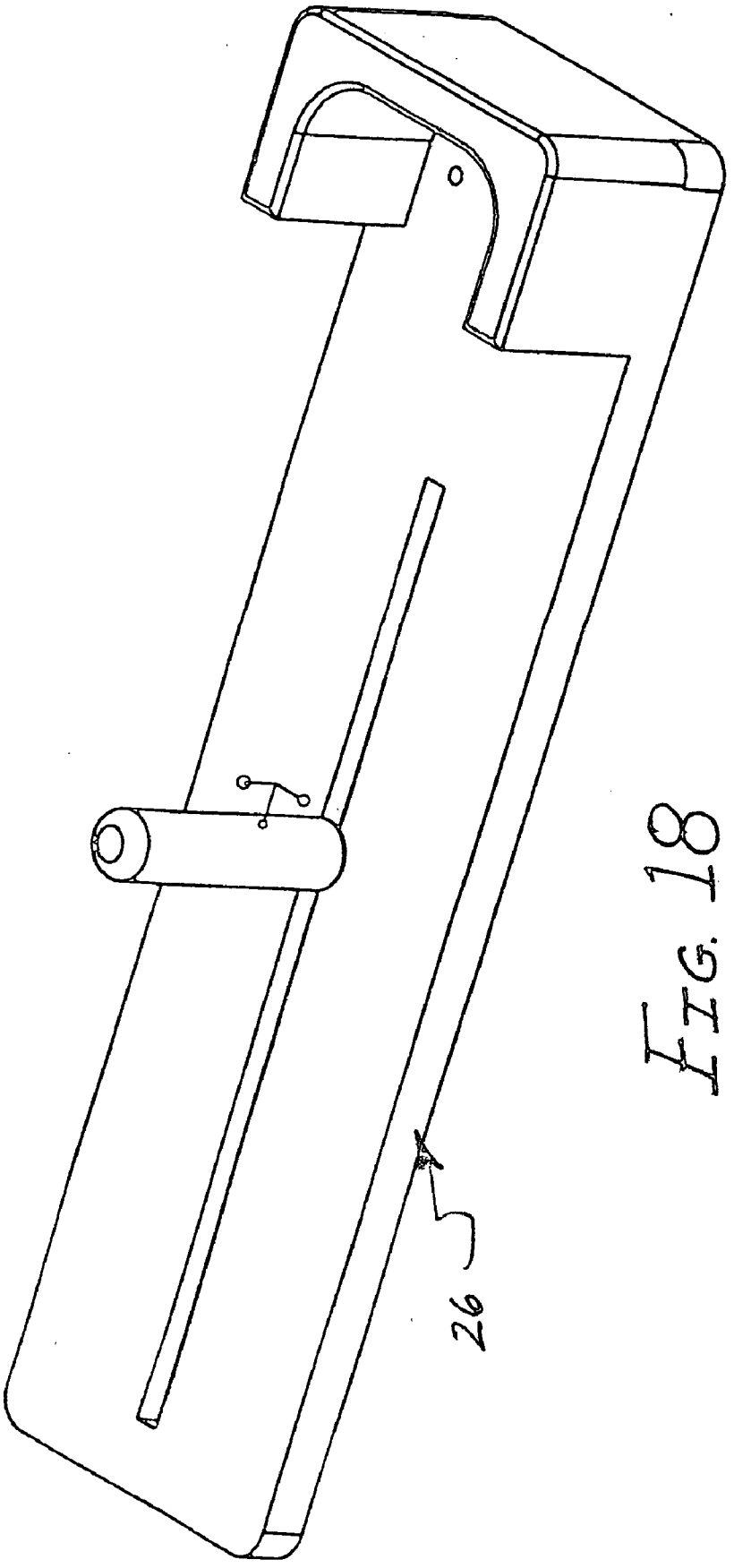


FIG. 18

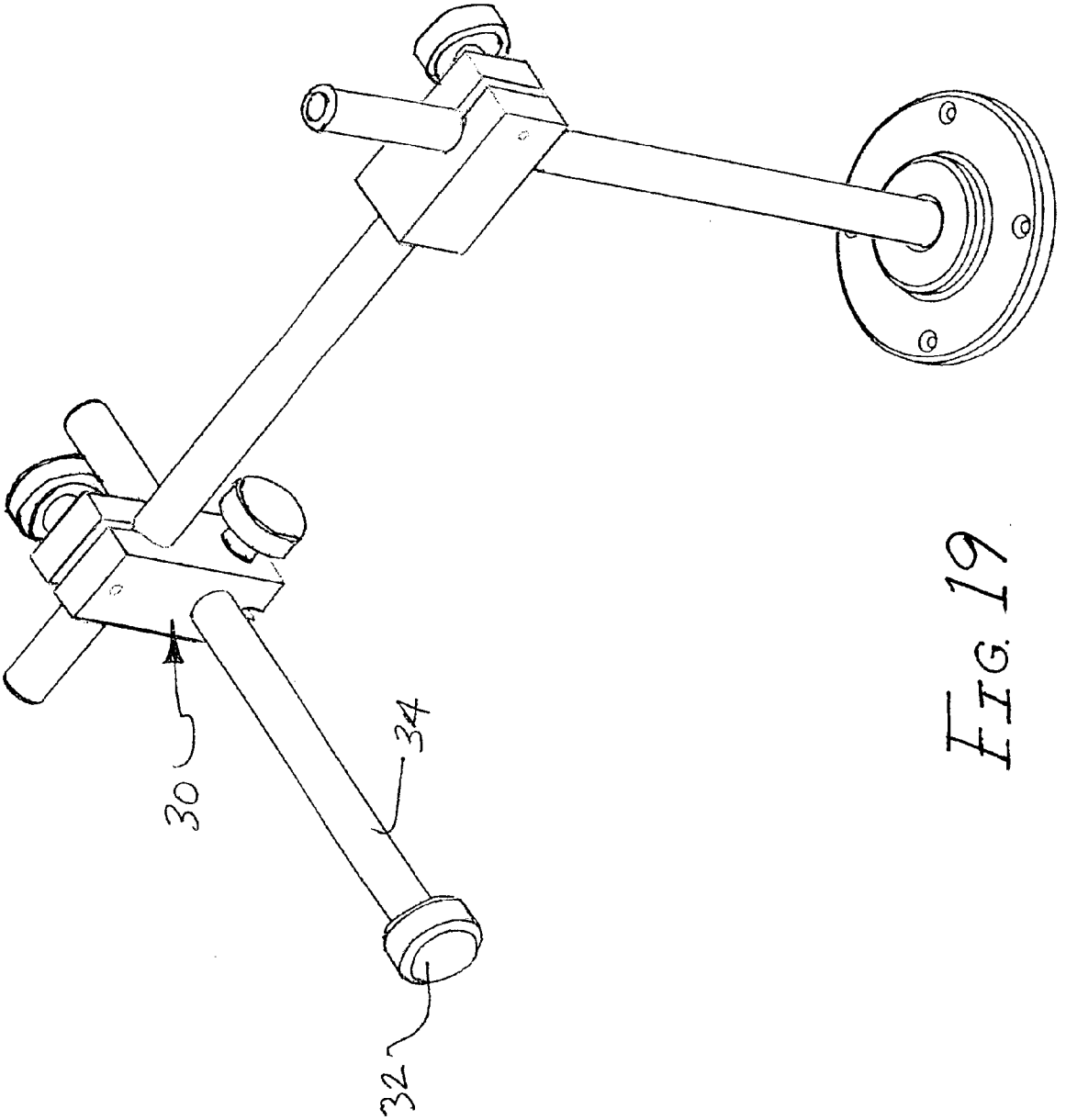


FIG. 19

SHOULDER STABILIZING AND STRENGTHENING METHOD AND APPARATUS

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates generally to shoulder stabilizer apparatus and more specifically it relates to an adjustable apparatus to stabilize the shoulder and rotator cuff, thereby allowing an individual to optimize their shoulder range of motion and strength, as well as to allow for self myofascial release techniques to decrease spasm.

[0003] 2. Discussion of the Related Art

[0004] It can be appreciated that shoulder stabilizer apparatus have been in use for years. Typically, shoulder stabilizer apparatus are comprised of an exercise device that is used for the development of the rotator cuff musculature of a user by isolating the head of the humerus in the glenoid cavity during internal and external rotation.

[0005] The main problem with conventional shoulder stabilizer apparatus is not having the shoulder stabilized in the most optimal position for strengthening the rotator cuff muscles. In particular, existing apparatus do not allow for resisted scapular retraction as well as adduction of the arm while fixated at 90 degrees, nor do they provide for resisted shoulder internal and external rotation. Also the prior art does not allow for scapular depression when the arm is at 90 degrees of shoulder abduction. Further, the prior art does not accommodate for resisted internal rotation which is usually twice as strong as that of external rotation. The apparatus is U.S. Pat. No. 4,817,943 allows for strengthening of the shoulder muscles, but does not allow for mobility and stabilization of the glenerohumeral joint which is essential in order to optimally strengthen the rotator cuff. The apparatus disclosed is U.S. Pat. No. 4,944,508 fails to teach the user to maintain a 90 degree angle of the arm and also has to be stabilized to a solid surface, such as a table. In addition, the prior art fails to provide proper stabilization of the humerus and also the availability to stabilize the shoulder blade, while strengthening the rotator cuff with interchangeable levels of the resistances. The disclosure in U.S. Pat. No. 5,058,574 is mainly concerned about fixating the position of the lower arm, rather than allowing for the proper stabilization of the scapula and the humerus which meet to form the shoulder joint.

[0006] Another short coming in the various apparatus of the prior art is the absence of a self myofascial release to the pectoral minor or levator scapulae in order to allow for optimal movement of the shoulder blade. This is essential to properly begin to scapular retract and adduct the arm at 90 degrees of elbow flexion in order to stabilize the glenerohumeral joint. Another problem with conventional shoulder stabilizer apparatus is the failure to allow for scapular depression with resistance of varying intensities in order to stabilize the shoulder joint when placed in a vertical position at 90 degrees of shoulder abduction.

[0007] While the numerous devices and apparatus of the prior ant may be suitable for the particular purpose to which they address, they are not suitable for individuals to be able to optimize their shoulder range of motion, strength building and stability, nor do they allow for self myofascial release techniques to decrease spasm.

[0008] The adjustable apparatus of the present invention is designed to stabilize the shoulder and rotator cuff in a manner that substantially departs from the conventional concepts and designs of the prior art and, in so doing, provides an apparatus primarily developed for the purpose of enabling a user to optimize their shoulder range of motion and strengthening while maintaining the shoulder stabilized. The invention also provides for self myofascial release techniques to decrease spasm. The adjustability of the apparatus allows the individual user to tailor his/her activities to their specific needs.

OBJECTS AND ADVANTAGES OF THE INVENTION

[0009] A primary object of the present invention is to provide an adjustable apparatus to stabilize the shoulder and rotator cuff throughout a variety of active motion activities to thereby overcome the shortcomings of the prior art.

[0010] Another object of the present invention is to provide an adjustable apparatus to stabilize the shoulder and rotator cuff to allow for individuals to be able to optimize their shoulder range of motion, strength and stability as well as to allow for self myofascial release techniques to decrease spasm.

[0011] Another object is to provide an adjustable apparatus to stabilize the shoulder and rotator cuff in the most optimal position for rotator cuff strengthening.

[0012] Another object is to provide an adjustable apparatus to stabilize the shoulder and rotator cuff while allowing for resisted scapular retraction and shoulder adduction with varying intensities.

[0013] Another object is to provide an adjustable apparatus to stabilize the shoulder and rotator cuff and to maintain the shoulder at a stabilized position on a variety of planes, by either placing the arm in scapular retraction and adduction by one's side, or by raising the shoulder to 90 degrees of abduction.

[0014] Another object is to provide an adjustable apparatus to stabilize the shoulder and rotator cuff while allowing for self myofascial release techniques for the chest and neck muscles which it is imperative to make sure that the muscles are loose in order to allow for proper stabilization the shoulder joint.

[0015] Another object is to provide an adjustable and portable apparatus to stabilize the shoulder and rotator cuff, that and wherein the device can be used in a sitting or standing position for people of all ages, and wherein the apparatus is very user friendly and is adjustable to many individuals.

SUMMARY OF THE INVENTION

[0016] The invention is directed to a method and apparatus for stabilizing and strengthening the shoulder and rotator cuff construction. In particular, the method and apparatus provide for stabilization of the shoulder and rotator cuff to optimize range of motion, strengthening and stability when performing various motion exercises. In addition, the method and apparatus provide for self myofascial release techniques to decrease muscle spasm.

[0017] The apparatus includes a base, a vertical post, an adjustable sleeve on the post, an arm adjustably attached to the sleeve and a motion assembly. The motion assembly includes a bottom plate, a middle plate and a top plate. A handle for grasping with either the left hand or right hand, while performing various motion exercises, is adjustably fitted to the top plate. A self myofascial release device removably attaches to the motion assembly.

[0018] The base of the apparatus supports the entire structure on a floor surface. The vertical post is attached to the base and allows for adjustment of the height of the motion assembly. The sleeve slides up and down the vertical post and is adapted to be locked at any one of a range of fixed, vertically adjusted position. The arm adjustably connects to the sleeve and is rotatable relative to the sleeve to orient the motion assembly in any one of a range of adjusted pitch directions. The bottom plate attaches to the arm assembly and is moveably adjusted throughout a range of yaw positions. This motions allows for selectable resistances which maybe created or enhance with the use of one or more elastomeric cords connecting between the bottom plate and middle plate, as well as the top plate and fixed structure on the apparatus. The middle plate slides relative to the bottom plate along its longitudinal axis. This motion allows for selectable adjusted resistances created by the one or more elastomeric cords connecting between the bottom plate and middle plate. The handle on the top plate is grasped in order to perform motion exercises, moving the top plate in either a longitudinal linear direction relative to the bottom plate and/or in a rotating motion. The distance between the handle and the rotational axis of the top plate is adjustable to accommodate for variations in arm lengths of different user's. The self myofascial release device includes a rubber tip that is mounted at the end of an adjustable arm. Motion of the top plate, while grasping the handle, moves the rubber tip against various muscles to relieve spasm.

[0019] The method of the present invention provides for optimize shoulder range of motion and strengthening of the shoulder muscle and rotator cuff while performing an active range of motion activities. In particular, motion activities include horizontal and vertical motion shoulder pressing, horizontal and vertical motion chest pressing; scapular retraction and protraction; shoulder flexion, extension, adduction, and abduction; and shoulder internal and external rotation, both horizontally and vertically.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] For a fuller understanding of the nature of the present invention, reference should be made to the following detailed description taken in conjunction with the accompanying drawings in which:

[0021] **FIGS. 1 and 1A** illustrate a sequence of movement of resisted external rotation (at 90° degrees) of left shoulder abduction along with resisted scapular depression;

[0022] **FIGS. 2 and 2A** illustrate a sequence of movement of a vertical row exercise;

[0023] **FIGS. 3 and 3A** illustrate a sequence of movement in performing a resisted natural grip row with scapular retraction and adduction;

[0024] **FIGS. 4 and 4A** illustrate a sequence of movement in performing a natural grip shoulder press;

[0025] **FIGS. 5 and 5A** illustrate a sequence of movement in performing an abduction active range of motion exercise of the left shoulder;

[0026] **FIGS. 6 and 6A** illustrate a sequence of movement in performing a self myofascial release activity to the levator scapulae muscles;

[0027] **FIGS. 7 and 7A** illustrate a sequence of movement in performing a self myofascial release activity to the pectoral minor muscles;

[0028] **FIGS. 8 and 8A** illustrate a sequence of movement in performing a resisted scapular retraction with resisted shoulder internal rotation activity;

[0029] **FIGS. 9 and 9A** illustrate a sequence of movement in performing a resisted row with scapular retraction at a reverse incline;

[0030] **FIGS. 10 and 10A** illustrates a sequence of movement in performing a resisted row with scapular retraction at a reverse decline;

[0031] **FIGS. 11 through 11B** illustrate a sequence of movement in performing a resisted scapular retraction along a horizontal row with both resisted internal and external rotation;

[0032] **FIGS. 12 through 12B** illustrate a sequence of movements to perform a resisted scapular depression with resisted internal and external rotation at a 75° degree incline;

[0033] **FIG. 13** is an exploded perspective view of the apparatus of the present invention;

[0034] **FIG. 14** is a partially exploded perspective view of the support and adjustment assembly of the apparatus including a base, post and arm member;

[0035] **FIG. 15** is a perspective of the arm member of the apparatus;

[0036] **FIG. 16** is a perspective view of a bottom plate of the apparatus;

[0037] **FIG. 17** is a perspective view of a middle plate of the apparatus;

[0038] **FIG. 18** is a perspective of a top plate of the apparatus; and

[0039] **FIG. 19** is a self myofascial release device that removably attaches to the middle plate of the apparatus.

[0040] Like reference numerals refer to like parts throughout the several views of the drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0041] Referring to the several views of the drawings, and initially **FIGS. 13-19**, the apparatus of the present invention is shown and is generally indicated as **10**. The apparatus **10** is adjustable to perform various motion activities, as well as to accommodate individuals of varying height and size. The apparatus **10** is specifically structured to stabilize the shoulder and rotator cuff while simultaneously allowing the individual user to perform a variety of motion exercises (activities). Stabilizing the shoulder and rotator cuff throughout the exercises enables the individual user to optimize their shoulder range of motion and muscle

strengthening when performing the exercises. The apparatus also allows for self myofascial release techniques to decrease muscle spasm.

[0042] As best seen in **FIG. 1**, the apparatus **10** includes a base **12**, a vertical post **14**, a sleeve **16** slideably adjustable throughout a range of adjusted positions on the vertical post **14**, and arm assembly **18** adjustably fitted to the sleeve **16** so that the arm assembly **18** is movable with the sleeve throughout the range of vertically adjusted positions. A motion assembly **20** is adjustably fitted to the arm assembly **18** and includes a bottom plate **22**, a middle plate **24** and a top plate **26**. The top plate **26** is provided with a handle **28** for grasping with either the left hand or right hand to perform motion activities of the respective left or right shoulder. The base **12** is formed in a U configuration with opposite parallel legs extending from a central mounting portion to help stabilize and support the entire structure of the apparatus **10** on a floor surface. The vertical post **14** is attached to the central portion of the base and is provided with a series of spaced apertures for adjusted positioning of the sleeve **16** with the use of one or more removable locking pins. The sleeve slides up and down along the post for height adjustment of the arm assembly **18** and motion assembly **20** and is locked into the adjusted position on the post **14** using the removable locking pins which pass through correspondingly aligned apertures on the sleeve **16** and the post **14**. The arm assembly **18** is removably attached to the sleeve by a knob bolt **40** and interconnecting tube sections **46**, **48** which are structured to allowed adjustment of the pitch position of the motion assembly **20**. The bottom plate **22** attaches to the arm assembly **18** by a pin which allows motion of the bottom plate **22** in the yaw direction. This motion allows for selected adjustment of resistance to movement of the top plate **26** when performing various motion exercises. Elastomeric cords may be used to provide increased resistance. The middle plate **24** slides relative to the bottom plate **22** along a track **25**. Motion of the middle plate is along the longitudinal axis of the bottom plate. This motion allows for further selected adjustment of resistances of movement of the motion assembly **20** when performing motion exercises. One or more elastomeric cords **50** connecting to the bottom plate **22** and middle plate **24** and about a pulley **52**, as seen in **FIGS. 3,3A** and **9,9A**, may be used to provide this resistance. The handle **28** on the top plate is grasped by the individual user in order to perform motion in the yaw direction. The distance between the handle and the rotational axis of the top plate **26** is adjustable to the arm size of the individual.

[0043] The self myofascial release device **30** is provided with a rubber tip **32** on the end of an adjustable arm **34** that allows the rubber tip to be positioned at the required location to make pressure contact with either the levitator scapulae muscles or pectoral minor muscles when performing various motion activities.

[0044] In use, the user rests his/her arm on the top plate which includes a padded area for the elbow and the forearm. While holding the handle, the user adjusts the height of the motion assembly **20** by moving the sleeve **16** up or down along the post **14**. When the motion assembly **20** is at the desired height position, the user locks the sleeve **16** into fixed, adjusted position on the post **14** with removable locking pins. Next, the pitch orientation of the motion assembly is adjustably fixed into position. This is performed using the knob **40** on the arm assembly **18**. Next, the user moves the top plate **26** and the middle plate **24** backwards along the rail **25**. Then, by rotating the bottom plate **22**, the user can bring the elbow as closes possible to their side. Lastly, the user loosens knob **42**, rotates the top plate **26** about its yaw axis and fixes the yaw position by tightening knob **42**. All three motions (i.e. pitch, longitudinal sliding, and yaw) have selectable resistance which may be created with elastomeric cords or other tensioning mechanisms. In a different configuration, all three plates (i.e. bottom, middle, top) can be mounted vertically by rotating arm assembly **18** relative to the sleeve **14**. Next, the user pulls down both the top plate **26** and middle plate **24**, with selectable resistance against elastomeric cord **50**, and performs shoulder rotation by rotating the top plate **26** relative to the bottom plate **22**.

[0045] Referring now to **FIGS. 1-12B**, a series of shoulder motion and strengthening activities are shown. Each motion activity is shown in a pair of drawing figures with the first drawing figure in the pair showing a start position and the second drawing figure (labeled with a "A") showing a stop position at the end of the full range of motion. After this stop position, the motion is returned back to the original start position.

[0046] **FIGS. 1 and 1A** show a sequence of movement of resisted external rotation, at 90° degrees, of the left shoulder with abduction and resisted scapular depression. The movement of resisted external rotation helps to strengthen the external rotators of the rotator cuff (infraspinatus) along with resisted scapular depression which helps to stabilize the head of the humerus in the shoulder joint (glenerohumeral joint). By performing these two activities together, the user achieves optimal stabilization and strengthening of the structures surrounding the shoulder joint.

[0047] **FIGS. 2 and 2A** illustrate a sequence of movement of a vertical row (i.e. shrug). This movement allows for strengthening of the trapezius muscle that is vital for shoulder stabilization. This movement also provides scapular elevation and active range of motion.

[0048] **FIGS. 3 and 3A** illustrate a sequence of movement for performing an resisted natural grip row with scapular retraction and adduction. This activity allows the user to strengthen the stabilizing muscles that surround the shoulder complex. Additionally, this motion activity provides for mobility and range of motion of the shoulder joint, scapula and surrounding musculature.

[0049] **FIGS. 4 and 4A** illustrate a sequence of movement in performing a natural grip shoulder press. Performing this movement allows the user to safely and effectively strengthen the anterior and medial deltoid muscles with variable resistance.

[0050] **FIGS. 5 and 5A** illustrate a sequence of movement in performing in abduction active range of motion exercise of the left shoulder. This movement allows the individual to perform left shoulder abduction active range of motion with varying resistance and degrees of range of motion.

[0051] **FIGS. 6 and 6A** illustrate a sequence of movement in performing a self myofascial release (SMR) activity to the levitator scapulae muscles. By performing an SMR activity to the levitator scapulae muscles, the individual is able to relieve the levitator muscles of any tension or tightness that may exist, along with allowing the shoulder blade the ability to return to a resting position. **FIGS. 7 and 7A** illustrate a sequence of movement in performing a self myofascial release SMR activity to the pectoral minor muscles. With the SMR to the pectoral minor, this movement allows the chest muscles to ultimately relax, thus allowing the shoulder blade to return to a normal resting position. Both SMR activities,

as shown in **FIGS. 6-6A** and **7-7A**, will allow for decrease tension to the cervical spine and cervical musculature along with providing increased range of motion to the cervical spine. The SMR activities also provide increased range of motion to the shoulder blade, which is essential for optimal functioning of the shoulder joint.

[**0052**] **FIGS. 8 and 8A** illustrate a sequence of movement in performing a resisted scapular retraction with resisted shoulder internal rotation. These two movements allow strengthening of the rotator cuff (subscapularis) muscles. Resisted scapular retraction allows for the proper alignment of the shoulder joint, thus providing optimal shoulder orientation for strengthening of the rotator cuff with resisted internal rotation activities.

[**0053**] **FIGS. 9 and 9A** illustrate a sequence of movement in performing a resisted row with scapular retraction with a reverse incline. **FIGS. 10 and 10A** illustrate a sequence of movement in performing a resisted row with scapular retraction at a reverse decline. Both of these movements illustrate the extreme flexibility and variability of the apparatus **10**, wherein the scapular stabilizing muscles can be further strengthen with resisted growing and scapular retraction activities while the arm and shoulder are position at varying angles. This allows for strengthening the shoulder complex and surrounding structure throughout the shoulder and rotator cuff full functional capacity and active ranges of motion.

[**0054**] **FIGS. 11 through 11B** illustrate a sequence of movement in performing a resisted scapular retraction along a horizontal row with both resisted internal and external rotation. This motion is beneficial to the user because it allows for optimal alignment of the shoulder joint along with resisted scapular retraction/protraction, resisted shoulder internal and external rotation, as well as resisted rowing and pressing activities. All of these motions help to stabilize and strengthen the shoulder joint particularly with resistance.

[**0055**] **FIGS. 12 through 12B** illustrate a sequence of movements to perform a resisted scapular depression with resisted internal and external rotation at a 75° degree incline. This motion is beneficial because it allows the user to depress the shoulder blade (scapula) with or without resistance. With depression of the shoulder blade, the shoulder joint is able to optimally glide and spin as a ball and socket joint. With resisted scapular depression, the user is able to properly and safely strengthen the muscles that are needed for maintaining the shoulder blade in its proper position for optimal joint function. Resisted scapular depression will also allow decreased tension to the cervical spine, as well as the cervical musculature.

[**0056**] While the present invention has been generally shown and described in accordance with a preferred and practical embodiment thereof, it is recognized that departures from the instant disclosure are contemplated within the spirit and scope of the present invention.

What is claimed is:

1. An apparatus for stabilizing, strengthening and optimizing range of motion of the shoulder muscles and rotator cuff, said apparatus comprising:

a base for supporting said apparatus on a floor surface;

a vertical post attached to an extending upwardly from said base;

a sleeve slideably adjustable throughout a range of adjusted positions on said vertical post;

an arm assembly adjustably fitted to the sleeve, said arm assembly being adjustable throughout a range of rotated positions relative to said sleeve;

a motion assembly adjustably fitted to said arm assembly, and said motion assembly being adjustable throughout a range of adjusted yaw positions relative to said arm assembly; and

said motion assembly including a handle for grasping with one hand to perform a variety of motion activities while the shoulder and rotator cuff construction of the user remains in a stable orientation to allow the user's shoulder joint to move freely throughout a maximum range of motion for the particular individual user, thereby optimizing shoulder range of motion and strengthening of the shoulder muscles when performing the motion activities.

2. The apparatus as recited in claim 1 wherein said arm assembly and said motion assembly are structured and disposed to permit movement of the user's shoulder and rotator cuff construction throughout an active range of motion activities including:

scapular retraction and protraction;

shoulder flexion, extension, adduction and abduction; and

shoulder internal and external rotation.

3. A method for strengthening the shoulder muscles and rotator cuff comprising the steps of:

stabilizing the shoulder and rotator cuff construction of the user; and

performing an active range of motion activities of the shoulder and rotator cuff while the shoulder and rotator cuff construction remain stabilized.

4. The method as recited in claim 3 wherein said active range of motion activities include scapular retraction and protraction.

5. The method as recited in claim 3 wherein said active range of motion activities include shoulder flexion, extension, adduction and abduction.

6. The method as recited in claim 3 wherein said active range of motion activities include internal and external shoulder rotation.

7. The method as recited in claim 6 wherein said internal and external shoulder rotation active range of motion activities are performed horizontally and vertically.

8. The method as recited in claim 3 wherein said active range of motion activities include;

shoulder pressing in a horizontal motion and a vertical motion.

9. The method as recited in claim 3 wherein said active range of motion activities include;

chest pressing in both horizontal and vertical motion.

10. The method as recited in claim 3 further comprising the steps of:

providing resistance throughout said active range of motion activities.

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