

FORM 2
THE PATENT ACT 1970
(39 OF 1970)
AND
The patent rules, 2003
COMPLETE SPECIFICATION
(See section 10: rule 13)

1. **TITLE OF INVENTION**

Bungee Cord Apparatus for Simulating Gym Gravity Weights

2 **APPLICANTS**

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3. **PREAMBLE TO THE DESCRIPTION**

COMPLETE

Following specification particularly describes the invention and the manner in which it is to be performed.

4. DESCRIPTION.

Technical field of invention:

Present invention in general relates to gym equipment for various single or multipurpose physical exercises incorporating weight simulator using much lighter and simple bungee cord and in particular to equipment that perform various different exercises at any suitable place being light in weight and portable.

Prior art:

The urban lifestyle has changed drastically due to various professions involving sitting jobs and having no scope for physical exercise and also eating styles which are leading to various ailments such as blood pressure, diabetes, arthritis, obesity etc resulting in cardiovascular and respiratory disorders which may cause fatal complications. People are no doubt becoming more health conscience and desire to take daily exercise by walking, jogging, running and at times exercising at various Gyms as per the availability of time. Various indoor exercising equipments are employed such as tread mills, individual variety of equipments using gravity weights etc. however, having such weights though simple have their limitations as not being safe while handling and injurious at time, voluminous and bulky and further the said weights having moment of inertia leading to uneven reaction force which is not desirable.

The conventional multi-purpose gym apparatuses comprising pulleys, cables, cable system wherein weights may be lifted in variety of directions however, require large inventory of weights, strong structure to bear the weight, strong floor to bear the heavy equipment, tall structural height for the movement of weights, grouting to the floor,

/wall and large floor space render them immovable, bulky and occupies big space becoming a major disadvantage to popularize or possess such apparatuses.

Method of using an exercise device having an adjustable incline is described in US 8323157 B2. This device uses guidelines from a selected strength table, hypertrophy table, power table, or endurance table. The exercise device includes a vertical support member, an adjustable incline having a first end and a second end and adjustably supported by the vertical support member for adjusting the incline of the adjustable incline, and a user support platform for engagement by a user movably attached to the adjustable incline and configured for movement along the incline. A user selects parameters including a loading parameter from the selected table, adjusts the incline to an inclination corresponding to the selected loading parameter, and mounts the support platform and engages the exercise device for performance of exercise training according to the selected parameters.

One variation of the above-described type of exercise apparatus is disclosed in U.S. Pat. No. 5,967,955. The disclosed apparatus includes a movable carriage mounted on generally parallel tracks and a foot rest of the type described above. The apparatus does not use resilient members to provide resistance; instead, resistive bias is provided by inclining the tracks at one of a number of angular orientations, thereby allowing the user to move the carriage by working against a corresponding fraction of his or her own weight bias under the influence of gravity using a pulley system that is coupled to the carriage. As the angular orientation of the carriage changes, the fraction of the user's weight bias changes correspondingly, such that at greater inclinations, the weight bias that the user works against is greater.

Another variation of the above-described type of exercise apparatus is shown in U.S. Pat. No. D. 382,319 to Gerschefske et al., the contents of which are incorporated by reference in their entirety. The apparatus includes a frame having a pair of generally parallel tracks that support a movable carriage which is mounted on the tracks with rollers for rolling horizontal movement along the tracks. A set of tensile resilient resistance elements is connected to the frame at one end and to the carriage at the other, thereby biasing the carriage towards a particular position. A pulley system and associated pull lines are coupled to the carriage, such that the carriage may be moved by application of force to the pull lines. A foot bar is provided at one end of the frame, and shoulder blocks are provided at one end of the carriage, allowing the user to position him or herself in a supine position to move the carriage against the resilient bias provided by the tensile resilient resistance elements using the muscles of either the legs or the arms.

Exercise apparatus with resilient foot support is disclosed in US 8562492 B2. An exerciser including a movable body carriage mounted on an exerciser frame for movement along tracks provided by the frame. A resilient foot engaging assembly extends from the exerciser frame. The resilient foot engaging assembly is adapted to be engaged by the user's feet to absorb the energy of movement in a first direction and to provide the user with a bouncing movement, which the user may translate into a movement of the movable body carriage in the opposite direction. The resilient foot engaging assembly may be provided as an attachment and retrofitted to existing exercisers. The resilient foot engaging assembly includes a unit mounting frame assembly and an independent usable exercising unit, such as an inflated dome or trampoline unit, removable secured thereon. The exerciser may include a resilient resistance system coupled to the movable body carriage and a

set of pull lines with user grips trained over pulleys carried by the exerciser frame. Also disclosed are methods for enabling users to exercise in either one of two different modes.

Multi-purpose training apparatus is disclosed in US 6348028 B1. A training apparatus has a primary frame structure including a pair of base members, first and second vertical post assemblies each including a lower vertical post member attachable to a respective base member and an upper vertical post member telescopically received within the lower vertical post members and selectively position able relative thereto to adjust a height of a top end of the upper vertical post member, and a horizontal cross beam assembly including a pair of elongate cross beam members. The top ends of the upper vertical post members are provided with receptacles for receipt of outboard ends of the cross beam members so that the horizontal cross beam assembly spans between the spaced apart vertical post assemblies at a selected, adjusted height above the floor. The frame structure is fully collapsible and can be reconfigured to accommodate a wide variety of accessory components which removable attach to the frame structure to facilitate workouts and training in a vast array of sports and activities. The frame structure collapses and assembles on a dolly to form a cart for transporting the apparatus, including the frame structure and accessory components.

Hence there was a long felt need in the art to have such an apparatus means device when installed would replace gravity weights thereby reducing the overall weight, minimizing the structural loading, reducing the height of conventional apparatus/equipment, etc. Therefore the present invention intends to replace/simulate the conventional gravity weights and combinations their off and to provide a light weight, compact, portable apparatus offering constant means uniform but adjustable tension means force provision, throughout the pulling

operation by an apparatus comprising Bungee cord or similar elements, profile pulley/s with tension manipulator attached to a take up pulley to facilitate large degree varying direction of applied tension.

Object:

1. Primary object of the present invention is to provide gym equipment for various single or multipurpose physical exercises incorporating weight simulator using much lighter and simple bungee cord.
2. Another object of the present invention is to replace weights means stockpile of gravity weights by weight simulator using much lighter and simple bungee cord.
3. Yet another object of the present invention is to simulate gravity loaded weights means associated stockpile of gravity weights means for loading thereby avoiding accidents during handling and to provide a safe and secured apparatus without gravity weights.
4. Yet another object of the present invention is to simulate loading weights by stretchable elements means springs like rubber, rubber band, rubber cord, Bungee cord, metallic or non-metallic tension springs or the alike.
5. Yet another object of the present invention is to convert lineally increasing tension while stretching as in case of tension spring into a constant tension/force in uniform force/tension by a novel designed profile pulley.

6. Yet another object of the present invention is to provide a large degree of pulling angle thereby tension be applied in variety of directions without changing the position of the apparatus.
7. Yet another object of the present invention is to get rid of number of gravity weights used for tension adjustment either in steps or stepless by providing a novel tension adjustment mechanism.
8. Yet another object of the present invention is to function irrespective of the mounting position means orientation unlike gravity load weights.
9. Yet another object of the present invention is to have flexibility of grouting position by means to floor, wall, roof without changing the apparatus orientation by providing separately fixable feet.
10. Yet another object of the present invention is to make it comfortable, easy and safe to make use of and make it easy to install.
11. Yet another object of the present invention is to be foldable in nature while not in use.
12. Yet another object of the present invention is to provide a simple apparatus which will not occupy much floor/wall space.
13. Yet another object of the present invention is to make it in the form of knock-down kit and easy to assemble.

14. Yet another object of the present invention is to make it light in weight, easy to manufacture, transport and cost effective.

Other objects, features and advantages will become apparent from detail description and appended claims to those skilled in art.

STATEMENT:

Accordingly following invention provides various exercising equipment and more specifically to gym equipment for various single or multipurpose physical exercises incorporating weights means stockpile gravity weights being replaced by weight simulator using much lighter and simple bungee cord means elastic rubber tape/cord/band means stretchable nonmetallic/metallic spring that enables the user to perform various different exercises at any suitable place being light in weight and portable likewise, the said invention is equally applicable in similar situations including physio-therapy and others applications elsewhere. It provides a large degree of pulling angle thereby tension be applied in variety of directions without changing the position of the apparatus. A single/double groove pulley as tension pulley, having a novel profile similar to helical profile means having gradually varying radius consisting of a higher radius and lower radius, and the tension pulley is mounted on its center to a center hub having shaft extensions on either side and the shaft extensions are rotably mounted in the concentric holes of supporting end-plates and the said end-plates provide enclosure to the apparatus and provided with supporting members for grouting to any suitable support means platform, preferably a double strong tension cord, is looped through the hole provided on the center ridge at higher radius of the said tension pulley and suitably laid in the grooves therein and taken up to the lower radius of the said tension pulley and further

laid over a suitably grooved round pulley, rotably mounted on one of the cylindrical end-plate separators and taken to a handle for pulling operation, means when the tension cord is pulled by the said handle the said tension pulley revolves on the central holes provided on the said end-plates and further during such rotation the cord remains tangential to the tension pulley profile whereas the radius of the profile gradually increases with the angle of rotation. The preferred embodiment mainly comprises of pulley, bungee cord, pulling cord, supporting element, side supporting structure, mounting structure, bungee cord stretching pulley, etc.

BRIEF DESCRIPTION OF DRAWING:

This invention is described by way of example with reference to the following drawing where,

Figure 1 and 2 of sheet 1 show the front and side elevation of supporting end-plate with grouting angles.

Where,

300 denotes side plate

301, 302, 303, 304, 305, 320, 321, 324, 330, 331 and 339 denote holes

350 denotes hole centre marking curved profile.

Figure 3 and 4 of sheet 1 shows the remaining end plate.

Where,

400 denotes end plate

401, 402, 403, 404 and 405 denote holes

406 denotes projection for stopper

450 denotes spacer/cord pulley shaft

Figure 5 and 6 of sheet 2 shows the front and side elevation of bungee pulley in the back ground of endplate.

Where,

100 denotes bungee pulley

130, 120 and 140 denote holes

145 denotes bungee cord groove

146 denotes slot.

Figure 7 and 8 of sheet 2 shows front and side elevation of bungee pulley with bungee cord in the back ground of endplate.

Where,

220 denotes common pulley

222 denotes groove

252 denotes one end of bungee cord

340 denotes je bolt.

Figure 9 and 10 of sheet 3 shows the front and side elevation of cord pulley.

Where,

210 denotes common pulley

206 to 213 denote radial arms

216 denotes stopper

275 denotes cord pulley

276 and 277 denote grooves

454 denotes one of the spacers

255 denotes pin/nut bolt

Figure 11 and 12 of sheet 3 shows cord pulley with tension cord.

Where,

208 denotes lower end
250 denotes tension cord
453 denotes spacer
255 denotes cord handle
270 denotes combined angle
272 and 203 denote direction
274 denotes direction H
275 denotes direction V.

Figure 13 and 14 of sheet 4 shows the front and side elevation of the assembly of the various embodiments.

Where,

205 denotes hub

Figure 15 and 16 of sheet 4 shows front and side elevation of the assembly in working condition.

Where,

131 to 139 denote slots

270 denotes tension pulley

Figure 17 of sheet 5 shows the perspective view of the apparatus after end-plate is removed.

Where,

145 denotes groove

202 and 203 denote double groove.

Figures 18 and 19 of sheet 6 show the front and top elevation of the variation of bungee pulley embodiment in the back ground of endplate 300 after end-plate 400 is removed.

Where,

Where,

521, 522, 523, and 524 denotes bungee cord support pulleys

150 bungee cord with respect to bungee support pulleys

500 denotes C clamp for clamping bungee end 150A

510 denotes C clamp for intermediate clamping of bungee cord

150B denotes remaining bungee cord end anchored to common pulley

210 by pin 211

206 denotes hub shaft

550 denotes clamping plates rigidly mounted on end plate 300

501, 502, 503, 504 denotes C shaped part, bungee clamping shoe, bolt and tightening hole respectively for clamping bungee cord 150 between clamping shoe 502 and plate 550

In order that the manner in which the above-cited and other advantages and objects of the invention are obtained, a more particular description of the invention briefly described above will be referred, which are illustrated in the appended drawing. Understanding that these drawing depict only typical embodiment of the invention and therefore not to be considered limiting on its scope, the invention will be described with additional specificity and details through the use of the accompanying drawing.

Detailed description:

The present invention provides a bungee cord apparatus for simulating gym gravity weights, hereinafter referred to as apparatus, wherein preferably a double groove pulley, herein after referred to as tension pulley, having a novel profile similar to helical profile means having gradually varying radius wherein the larger one is referred to as higher radius and the smaller one is referred to as lower radius , and the tension

pulley is mounted on its center to a center hub having shaft extensions on either side and the shaft extensions are rotably mounted on respective concentric holes of supporting end-plates and the said end-plates further provide enclosure to the apparatus and provided with supporting members for grouting to any suitable support means platform, preferably a double flexible but strong cord, hereinafter referred to as tension cord, is preferably looped means anchored through the hole provided on the center ridge at higher radius of the said tension pulley and suitably laid in the grooves therein and taken up to the lower radius of the said tension pulley and further laid over preferably a double groove round pulley, hereinafter referred to as cord pulley, rotably mounted preferably on one of the cylindrical end-plate separators, hereinafter referred to as separator, and taken to a handle for pulling operation, means when the tension cord is pulled by the said handle the said tension pulley revolves on the concentric central holes provided on the said end-plates and further during such rotation the cord remains tangential to the tension pulley profile whereas the radius of the profile gradually increases with the angle of rotation and further the length of the groove means said tension pulley is designed to be equal to the desired length of the pulling cord such that at the end of the maximum pull it finally end up at the said higher radius, and a circular pulley, hereinafter referred to as common pulley, is rigidly fixed to the said center hub and placed at certain axial distance of the said tension pulley so that it rotates along with the said tension pulley, and another embodiment comprises preferably single groove pulley, here in the form of helical profile, having highly polished groove and lubricated by suitable lubricant to assist the smooth sliding of the bungee cord(s) means elastic rubber tape/cord/band means stretchable nonmetallic/metallic spring, hereinafter referred to as bungee cord, without damage, is rigidly

mounted on one of the end-plates such that the said common pulley groove and said bungee pulley groove are radially and axially aligned, and the said cord pulley is provided with fixing holes at certain degrees on its periphery for rigidly mounting to the said end-plate and the said bungee cord is laid in the groove of said cord pulley further the said cord pulley is provided with holes at certain degrees on its periphery for mounting means anchoring the said bungee cord and further provided with slots at certain the positions according to desired tension to be exerted by said tension cord, and an anchoring embodiment preferably in the form of 'J' bolt , hereinafter referred to as je bolt, goes through the slot and the hook of the said je bolt is tightened by a nut the said bungee cord is pulled through the slot between the cord pulley groove and said side-plate such that its linear motion is impaired or prohibited means anchored such that a different length of said bungee cord is subjected to action and one anchoring slot is provided at the higher radius of the said cord pulley where remaining free end of the bungee cord is anchored in similar fashion while its remaining end is anchored to the pin provided on groove of the common pulley, such that when the said pulley rotates it pulls the bungee cord in its periphery means groove and tension means torque means force is gradually means linearly exerted on the common pulley and the length of the cord extended means stretched means pulled linearly increases with the its degree of rotation irrespective of the anchored bungee cord anchored length, means longer the free length lesser will be the maximum tension seen by the take up cord pulley for the same degree of rotation of the common pulley means lesser the anchored length more the maximum tension exerted by the cord pulley, thus adjusting the anchored bungee cord length the desired tension on cord pulley be adjusted, hence anchoring slots for selection of the bungee cord anchored lengths required for tension adjustment

provided on the said cord pulley at specific locations, further a stopper provided on tension pulley to provide limited rotation within limits and when the tension cord is pulled over the cord pulley the tension pulley starts rotating in the holes provided side-plates along with the hub and common pulley, wherein one end of the bungee cord is anchored by means of a pin or nut-bolt, pulls the bungee cord which slides over the smooth groove of cord pulley exerting or reacting gradually by increasing tension, alternatively in one of the variation of bungee cord mounting, one end of the bungee cord is clamped to supporting plate and taken over the supporting pulleys and remaining end is anchored to common pulley by pin and the desired tension means force is adjusted means by adjusting free bungee cord length by another clamp supported on supporting plate, which gets reflected on the tension cord such that when the degree of movement of the cord pulley is less, less is the radius offered by tension pulley against lower counter balancing torque by bungee cord means constant torque means tension reflected on the tension cord and while gradually increasing the pull means increasing the radius of the tension pulley from lower radius to higher radius while the tension on bungee pulley goes on increasing linearly such that the tension on the tension cord remains constant means irrespective of the degree of movement of the tension pulley means to emulate gravity weights and when tension cord is released the bungee cord tension will reverse the action and restore the original position of the tension cord.

Sheet 6/1 comprises front and side elevation of side plate 300 as shown in Figure- 1 and Figure-2 preferably in a square in shape and having a hole 305 in the center for rotably mount the tension pulley hub shaft (not shown) and holes 301, 302, 303, and 304 preferably at the corner for the hardware for the assembly of the remaining embodiments (not

shown) and for fixing of the said apparatus (not shown) mounting angle 407 having suitable holes to match with said side plate for grouting the apparatus to some rigid surface (not shown) wherein the said angle can be fixed on any side of the said end-plate. Holes 320 to 324 are provided at a suitable locations for fixing of the said bungee pulley (not shown) and holes 330 to 339 are provided at a suitable location for fixing of said je bolts (not shown) for anchoring the bungee cord (not shown) on the curve 350. Sheet 6/1 further comprises front and side elevation of side plate 400 as shown in Figure- 3 and Figure-4 preferably identical to side-plate 300 being square in shape and having a hole 405 in the center for rotably supporting other embodiments (not shown) and holes 401, 402, 403, and 404 preferably at the corner for the hardware for the assembly of the remaining embodiments (not shown) and fixing of the apparatus (not shown) said mounting angle 307 having suitable holes to match with said side plate for grouting the apparatus to some rigid surface (not shown) wherein the said angle can be fixed on any side of the said end-plate. A projection 406 is provided as stopper for the tension pulley (not shown).

Sheet 6/2 illustrates the front and side elevation of bungee pulley 100 in the back ground of endplate 300 in Figure-5 and Figure-6 and front and side elevation of bungee pulley 100 with bungee cord 150 in the back ground of endplate 300 and common pulley 220 in Figure-7 and Figure-8 respectively where bungee pulley 100 preferably in helical shape, however can have other structure/arrangement for placing the said bungee cord, having a groove 145 on its outer curvature is provided for laying said bungee cord 150. The surface of the groove 145 is super smooth and preferably lubricated for frictionless sliding of the bungee cord 150 in the said groove. Holes 120 to 124 are provided for rigidly

fixing the said bungee pulley to end-plate 300 by means of nut-bolts (not shown) and slots with holes 140 to 139 are provided for fixing said je bolts (not shown) and the holes are provided on the curve 350 center of which matches with the center hole 305 of end-plate 300. The typical slot cross section is shown in the inset having a slot 146, hole 130, 140 and groove 145. The bungee pulley is having a larger radius 'A' and a smaller radius 'B'. A common pulley 220 is concentrically located on the hub of cord pulley (not shown) and groove 222, having a hole 221, is axially aligned with the bungee pulley groove 145. A bungee cord 150 is laid in the groove 145 and the one end 152 is anchored to the common pulley 220 by pin/nut-bolts in the hole 221 provided therein and the remaining end of the said bungee cord is anchored in slot 130 by means of je bolt 340 to the end-plate 300 as shown in the inset. Remaining je bolts are placed in slot 131 to 139 in loose condition however depending upon the tension requirement respective je bolt anchors the said bungee cord at the respective location whilst the remaining je bolts are kept loose except the one in slot 130. When common pulley 220 rotates it pulls the bungee cord 150 and winds it in the groove 221 and vice versa.

Sheet 6/3 illustrates the front and side elevation of cord pulley 200 in the back ground of endplate 400 in Figure-9 and Figure-10 and front and side elevation of cord pulley 200 with tension cord 250 in the back ground of endplate 400 and tension pulley 480 in Figure-11 and Figure-12 respectively where cord pulley 200 preferably in helical shape such that its radius gradually increases with the degree of rotation from smaller radius 'D' up to larger radius 'C' and having double parallel grooves 202, 203 and a center ridge 204. A stopper preferably a projection 216 is provided on the pulley near 'C' which is aligned with

stopper 410 of end-plate 400. A hole 230 is provided at the higher radius of the said pulley near 'C' to loop the said tension cord. The said pulley is attached to center hub 205 preferably by radial arms 206 to 214 and the said center hub 205 is concentrically located with respect to the center of cord pulley 200 and the center hub 205 having shaft extension 206, 207 which are rotably mounted in the center hole 301 of end-plate 300 and center hole 401 of end-plate 400. A common pulley 210 is concentrically and rigidly fitted at certain axial distance on the hub 205 so as to axially align with the groove 145 (not shown) of bungee pulley 100 (not shown). The pulley 210 is having a groove 221 and holes 222 and hole 221 is provided to fit pin/nut-bolt 255 for fixing one end of the bungee cord 250 (not shown). A cord pulley 275 having two grooves 271, 272 is rotably mounted on spacer 353. A tension cord 250 comprising looped cord is looped means fixed through the hole 230 and laid in the respective grooves 204 and 205 of tension pulley 200 up to lower end 208 and is taken over the said cord pulley 275 grooves 276 and 277 respectively. The remaining end 255 of tension cord 250 is utilized for said pulling operation for exercising on the said apparatus. The said end 255 can be taken over the cord pulley on either side and pulled in direction 'V' 275 or direction 'H' 274 and can be moved through a combined angle 270. When the cord handle 255 the tension cord moves in direction 272, 273 thus rotating the tension pulley along with common pulley 210.

Sheet 6/4 illustrates the front and side elevation of the assembly of the various embodiments so far described in Figure-13 and Figure-14 in neutral condition and front and side elevation of the assembly in working condition in Figure-15 and Figure-16 respectively where bungee pulley 100 with bungee cord 150 rigidly fixed to the end-plate

300 and tension pulley 200 with tension cord 250 and common pulley 210 fitted on hub 205 are aligned and rotably mounted on end-plates 300 and 400 respectively. The common pulley 210 being aligned with bungee pulley 100 is attached by bungee cord 150 to form a complete assembly. The tension cord is taken over the tension pulley 270 grooves 271 and 272 and further taken to the tension cord handle 255. In working condition means when cord handle 255 is pulled it rotates to a new degree of angle and the active radius increases whilst the common pulley 210 rotates by the same angle pulling the bungee cord 150 on its periphery thus reacting to the change of rotation thus exerting a force on the cord handle 255 such that the ratio of torque on the common pulley 210 and tension pulley remains the same whilst the radius of the tension pulley varies in such a manner that the force remains same irrespective of the degree of rotation means extension of the tension cord thus emulating a gravity weight. By the principle of elasticity the tension increases when spring length is decreased for the same length of strain means length. Slots 131 to 139 are provided at different cord lengths in decreasing order so as to increase the tension means force on the cord handle 255.

Sheet 6/6 illustrates the front and top elevation of the variation of bungee cord mounting arrangement on supporting plate 550 rigidly fixed to of endplate 300 wherein bungee cord 150 is laid on support pulleys 521, 522, 523, 524 in Figure-18 and Figure-19. End 150A of bungee cord is clamped means anchored to support plate 550 and its remaining end 150B is anchored to common pulley 210 by pin. A common pulley 220 is concentrically located on the hub of cord pulley (not shown) and groove 222, having a hole 221, is axially aligned with the bungee pulley groove 145. A bungee cord 150 is laid in the grooves of support

pulleys. Each support pulleys 522 is rotably mounted on respective spacer 422. Depending upon the tension requirement the C clamp 510 is placed on support plate and the bungee cord is clamped to specific length by tightening the bolt such bungee cord is pinched between the clamp shoe and support plate so as to get step less variation of the tension. When common pulley 220 rotates it pulls the bungee cord 150 and winds it in the groove 221 and vice the versa.

Additional advantages and modification will readily occur to those skilled in art. Therefore, the invention in its broader aspect is not limited to specific details and representative embodiments shown and described herein. Accordingly various modifications may be made without departing from the spirit or scope of the general invention concept as defined by the appended claims and their equivalents.

CLAIMS

We claim:-

1. Bungee cord apparatus for simulating gym gravity weights thereto for body exercise, muscle toning comprising a pulley, a pulling cord, bungee cord supporting element, bungee cord mounting and stretching support, side supporting structure, mounting structure etc.

2. Bungee cord apparatus for simulating gym gravity weights as claimed in claim 1 for body exercise, muscle toning comprising:
 - (a) A pair of structural members mounted parallel to each other at a suitable distance and having holes for grouting to any solid structure like floor, wall, roof and further having number of holes at suitable angle to the said grouting holes for mounting, fixing other embodiments;
 - (b) Other embodiment means a profile pulley preferably having double grooves having a center hub and shaft extensions on either side for rotably mounting in the structural members as claimed in claim 2(a); further another embodiment means a sturdy cord laid in the said grooves where one end rigidly anchored to the one end means having larger radius of the said profile pulley by suitable arrangement and other end is taken over to the smaller radius and further taken over a guiding pulley mounted on spacer on the said structure as claimed in claim 2(a) and another embodiment means common pulley is concentrically mounted on the said hub for necessary use; further still another embodiment means bungee cord stretching embodiment having a groove rigidly fixed on the said structure as claimed in claim 2(a) and having suitable arrangement for anchoring another embodiment for tension adjustment; and when

the cord is pulled initially from smaller radius the said profile pulley with other embodiment means common pulley, swivel means rotates on the mounted shaft extensions such that the said the said cord experiences gradually increasing radius means smaller to larger radius of the said profile pulley;

- (c) Another embodiment means a grooved mounting structure for bungee cord, rigidly fixed to the structure as claimed in claim 2(a) and one end of the said bungee cord anchored to the said mounting structure whilst the remaining end of the bungee cord is anchored to the said common pulley as claimed in claim 2(b) and the said mounting structure having suitable anchoring arrangement of fixing the said bungee cord at desired length, for tension adjustment, by means of suitable hardware; and when the cord is pulled the said common pulley mounted shaft extensions as claimed in claim 2(b) such that the said bungee cord gets pulled and wrapped on the said common pulley and experiences gradually increasing tension means pull;
- (d) Another alternate embodiment means a supporting structure having suitable arrangement for anchoring another embodiment means bungee cord at different places, and said supporting structure is rigidly fixed to the structure as claimed in claim 2(a) and one end of the said bungee cord anchored to the said supporting structure whilst the remaining end of the bungee cord is anchored to the said common pulley as claimed in claim 2(b) and the said supporting structure having suitable anchoring arrangement of fixing the said bungee cord at desired length, for tension adjustment, by means of suitable hardware however, there always remains a clearance between the bungee cord and supporting structure at all other places whilst the said bungee cord is taken over the rotably mounted pulleys on the said spacers mounted on mounting structures as claimed in claim 2(a) ; and when the said cord is pulled it swivels means rotates on the mounted shaft along with said common pulley as claimed in claim 2(b) such that the said bungee cord gets pulled and wrapped on the said common pulley and experiences gradually increasing tension means pull;

3. The profile pulley as claimed in claim-2 (b) in the form of helical shape means similar profile having fractional, single or multiple turns, plain or skewed and having single or multiple grooves preferably on the outer face.
4. The apparatus as claimed in claim 1 comprises a stopper to provide limited swivel means rotation of the said the said profile pulley as claimed in claim 2(a) and 2(b).
5. The apparatus as claimed in claim 1 comprises a bungee cord means plurality of natural /synthetic rubber bungee cord means elastic/rubber tape/cord/band means nonmetallic/metallic spring.
6. The apparatus as claimed in claim 1 comprises said bungee cord adjustable length provision to manipulate tension in steps or steplessly.
7. The apparatus as claimed in claim 1 comprises arrangement for quick replacement of said bungee cord(s).
8. The apparatus as claimed in claim 1 attributes varying force characteristic other than constant force.
9. The device as claimed in claim 1 comprises universal mounting arrangement.
10. The said embodiments as claimed in claim 1 in the form of said apparatus be folded and unfolded and be in the form of knocked down embodiments and hardware.

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Sheet 6/1



FIGURE-1

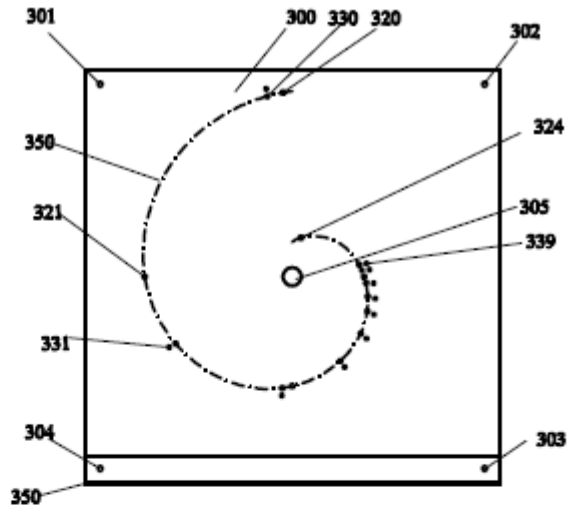


FIGURE-2

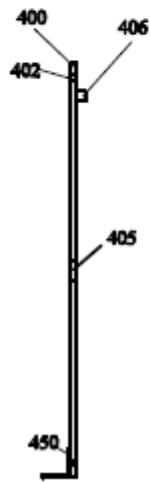


FIGURE-3

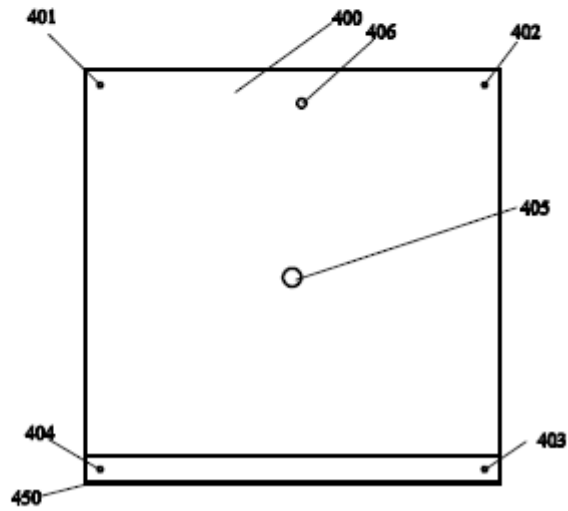


FIGURE-4

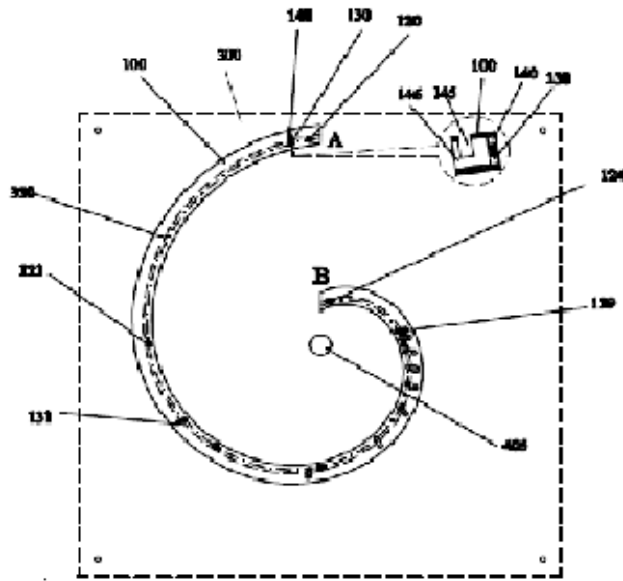


Figure 5

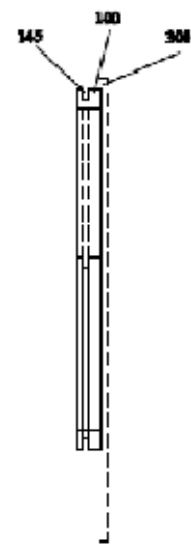


Figure 6

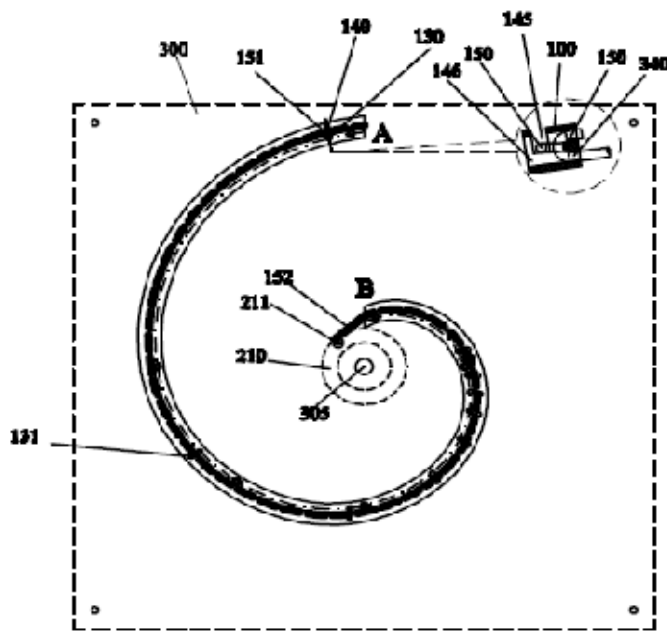


Figure 7

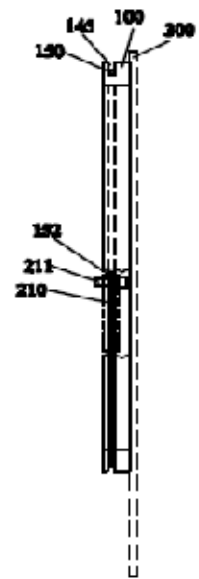


Figure 8

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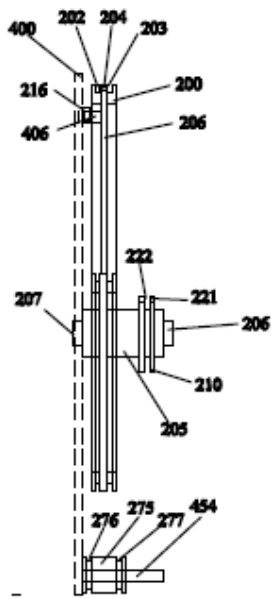


Figure 9

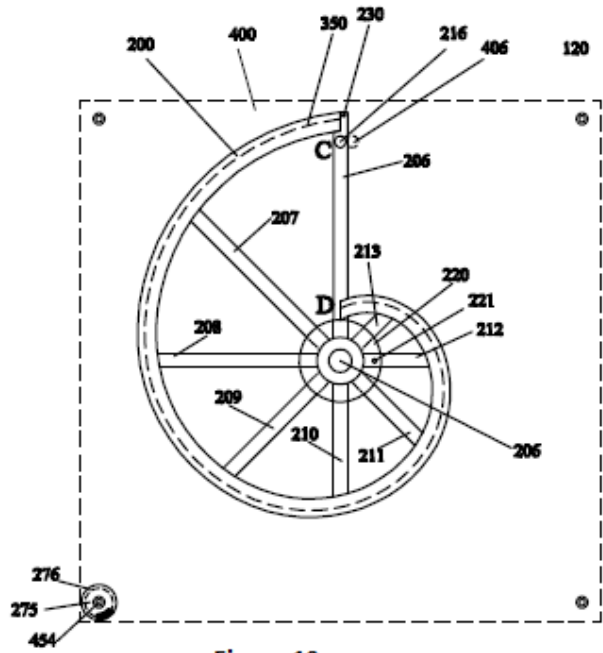


Figure 10

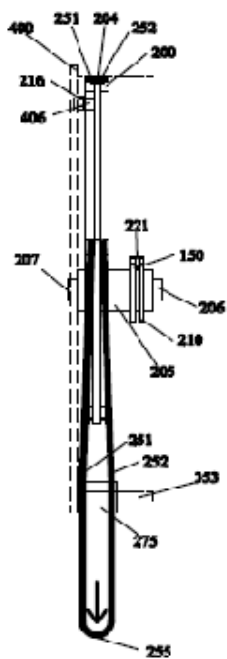


Figure 11

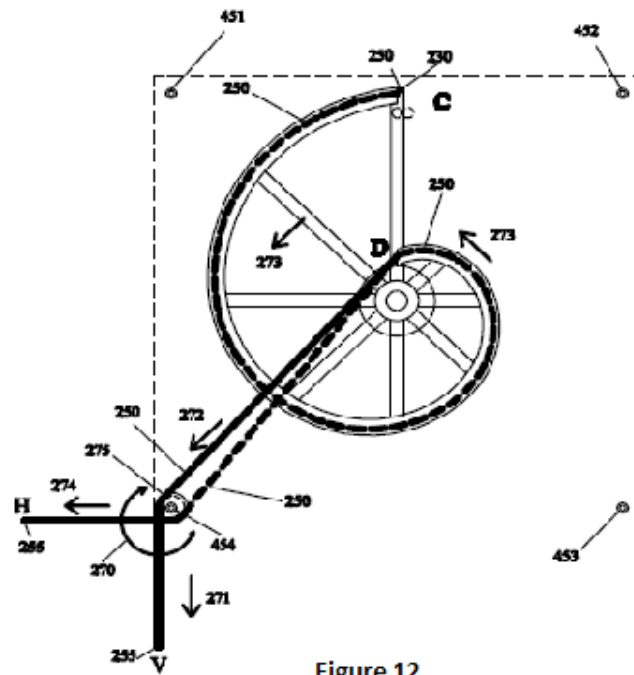


Figure 12

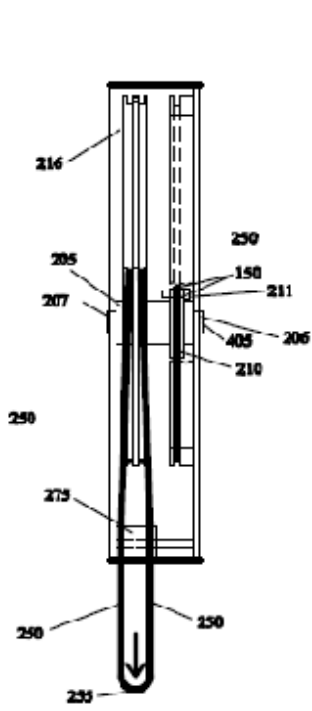


Figure 13

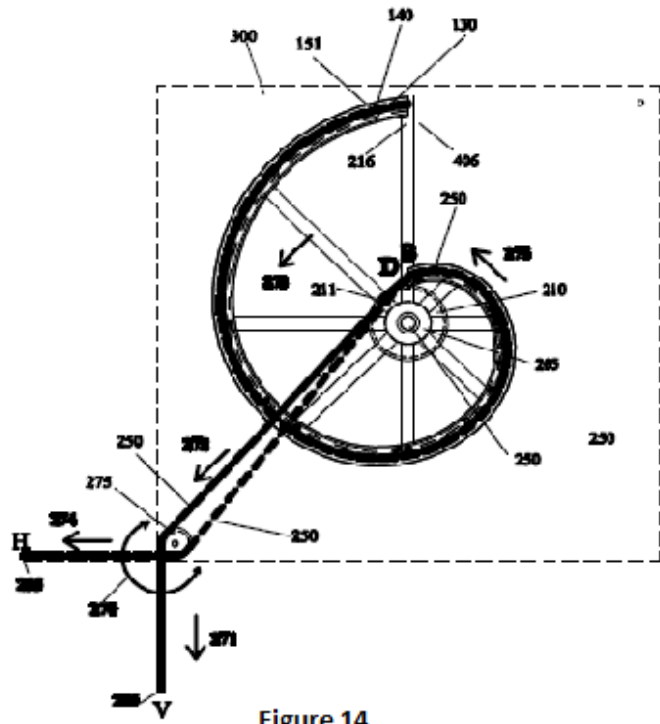


Figure 14

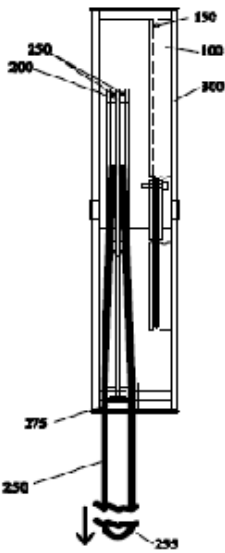


Figure 15

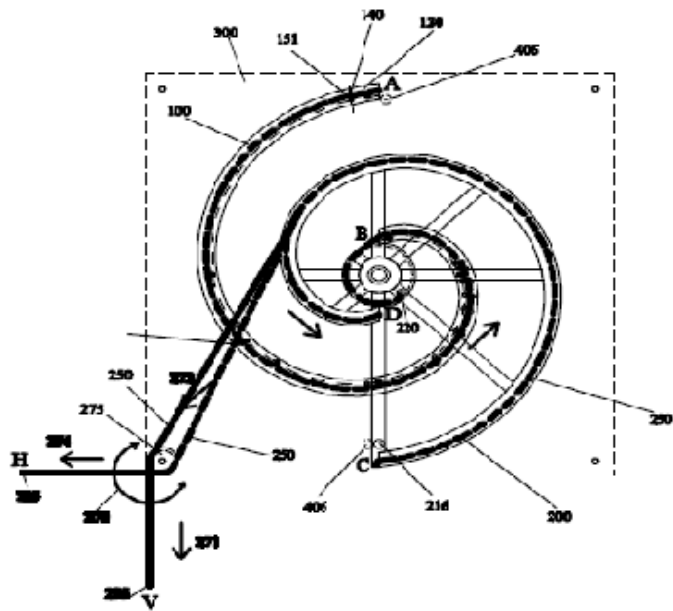


Figure 16

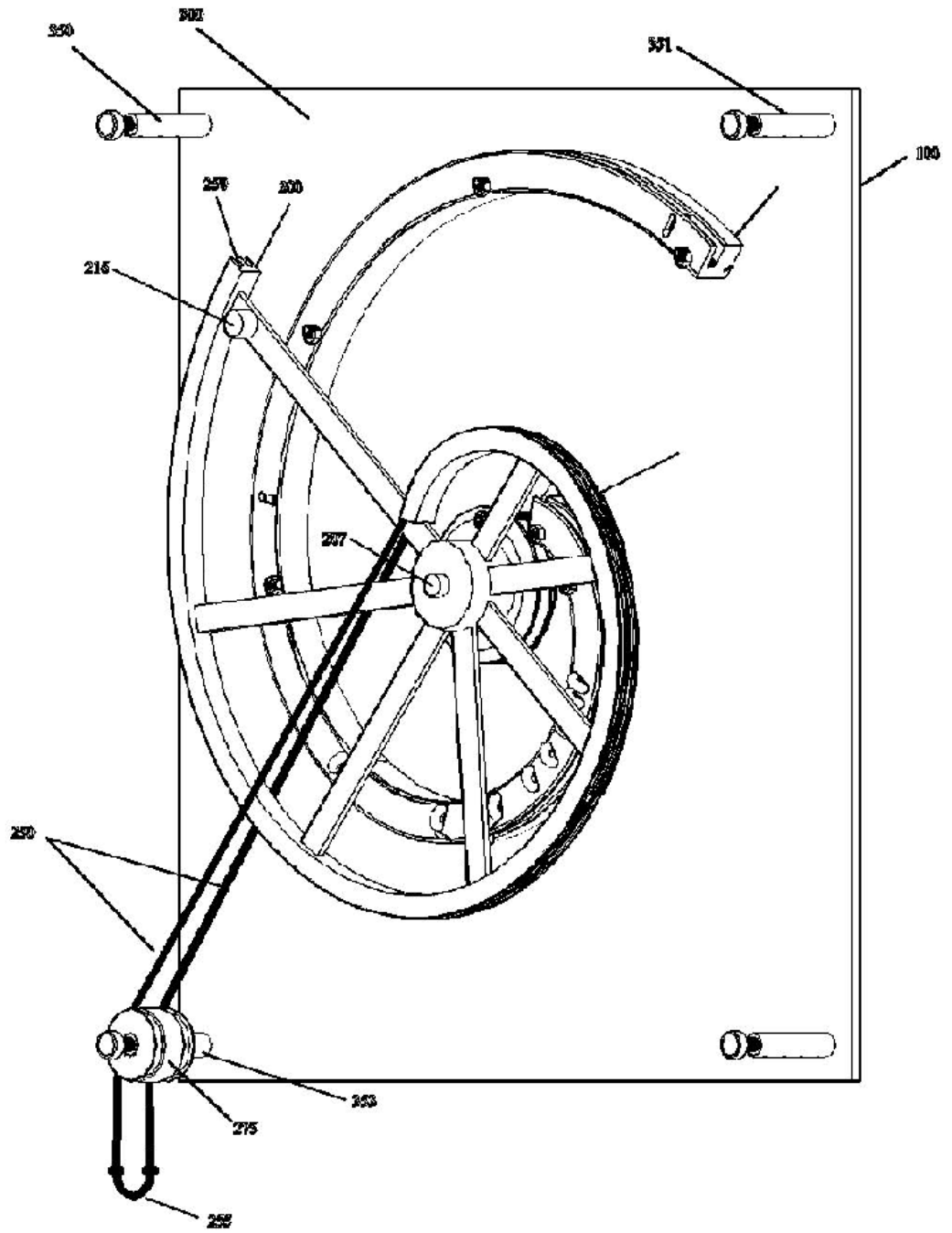


Figure 17

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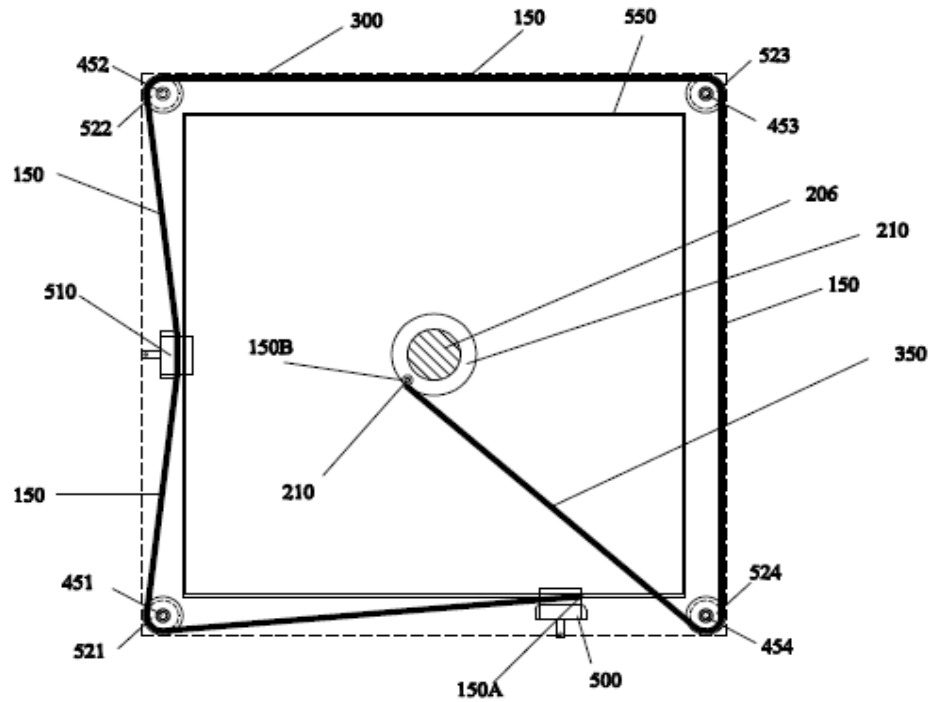


FIGURE-18

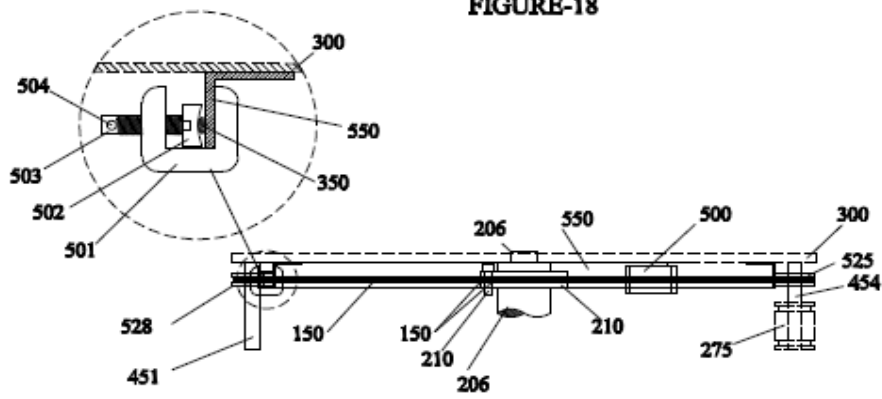


FIGURE-19

ABSTRACT

The primary object of present invention is to replace/simulate the conventional gravity weights and combinations thereof used in various gym equipment's and to provide a light weight, compact, portable apparatus offering constant means uniform but adjustable tension means force provision, throughout the pulling operation by an apparatus comprising bungee cord or similar elements, profile pulley/s with tension manipulator attached to facilitate large degree varying direction of applied tension and avoiding accidents during handling. Figure 1 and 2 of sheet 1 showing the front and side elevation of supporting end-plate with grouting angles.