US 20120010049A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2012/0010049 A1

(43) Pub. Date: Jan. 12, 2012

Amalaha

(54) DEVICE FOR AN AUTOMATIC BODY FAT REDUCING AND MUSCLE BUILDING

(76) Inventor: **Leonard D. Amalaha**, Alexandria, VA (US)

(21) Appl. No.: **12/411,373**

(22) Filed: **Mar. 25, 2009**

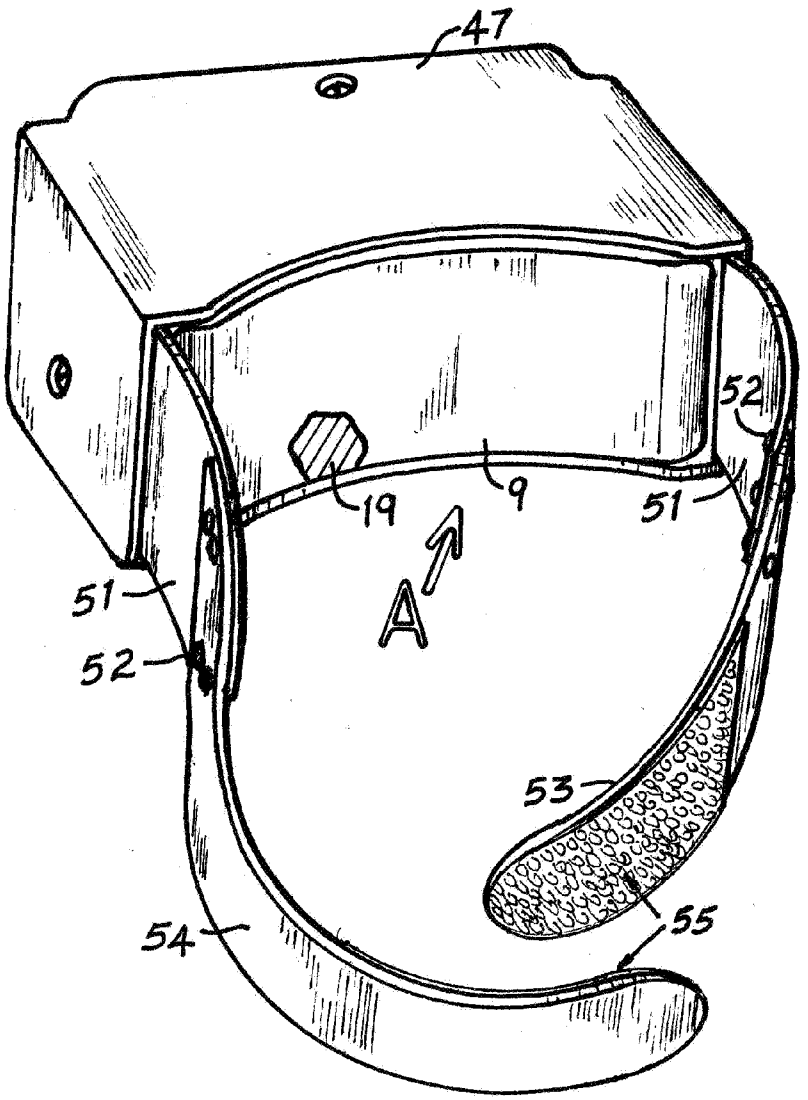
Publication Classification

(51) **Int. Cl.**
A63B 24/00 (2006.01)

(52) **U.S. Cl.** **482/4**

(57) **ABSTRACT**

An apparatus for body fat reduction and muscle building includes a bridge having a rectangular shape. A chassis is joined to the bridge and extends away from a back side. A piston having a surface for applying a load resistance to an abdomen is positioned proximate the bridge with a stem extending through a central hole. A swash plate is joined to a distal end of the stem. A return spring is in communication with the swash plate. A drive shaft is mounted to the chassis. A cam is joined to the drive shaft where the cam contacts the swash plate. A motor rotates the drive shaft and cam to move the piston in a first direction towards the abdomen and the return spring moves the piston in a second direction away from the abdomen. A belt secures the bridge to a user with the piston adjacent to the abdomen.



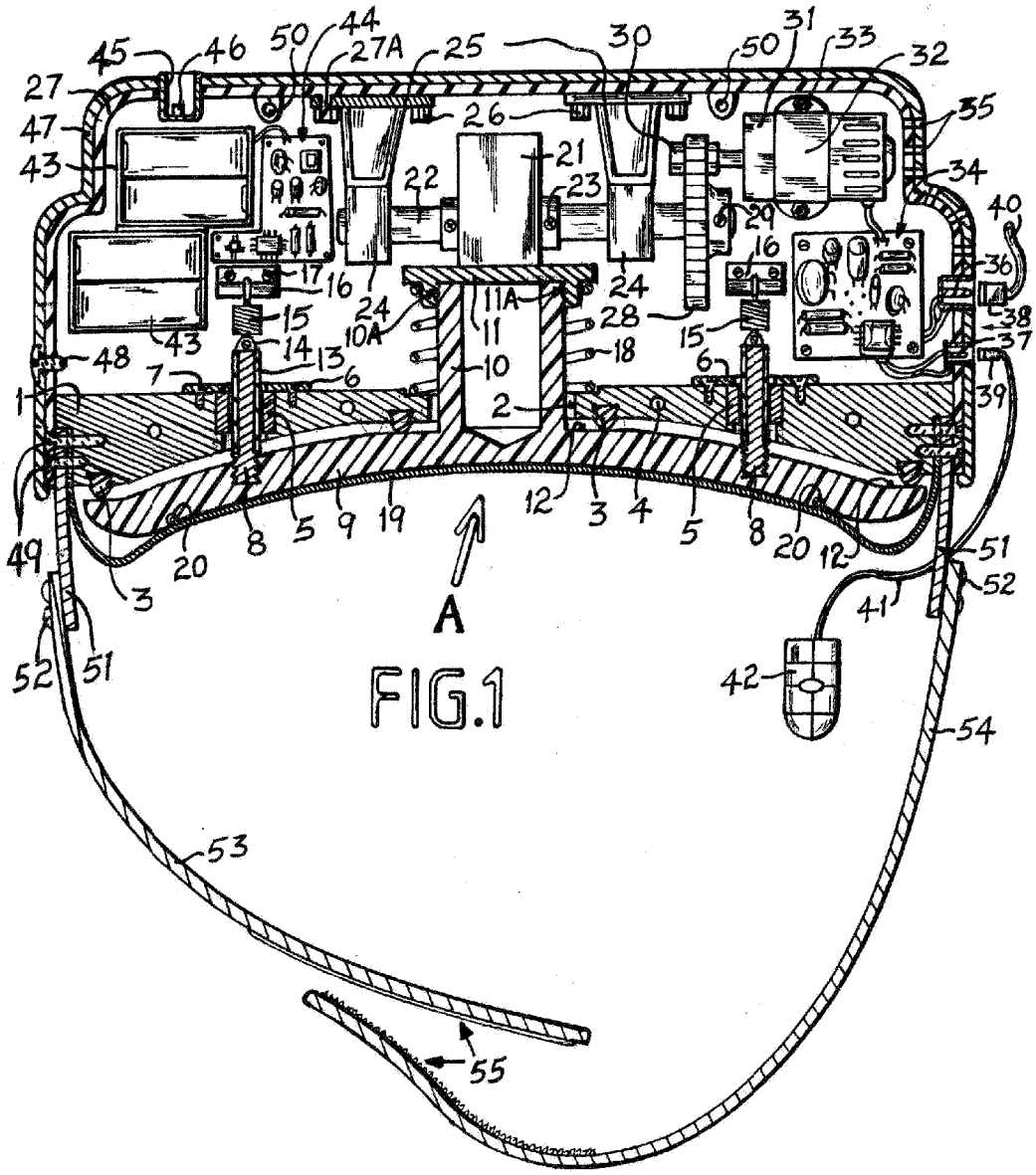

45
46
50
44
27A
25
30
50
31
33
32
27
47
43
26
35
34
40
22
21
23
29
16
36
38
37
39
17
16
24
11A
24
28
15
15
14
13
10A
11
18
48
7
6
10
6
1
2
49
20
8
5
9
19
12
3
4
5
8
20
12
51
52
3
41
A
52
51
42
54
53
55

FIG.1

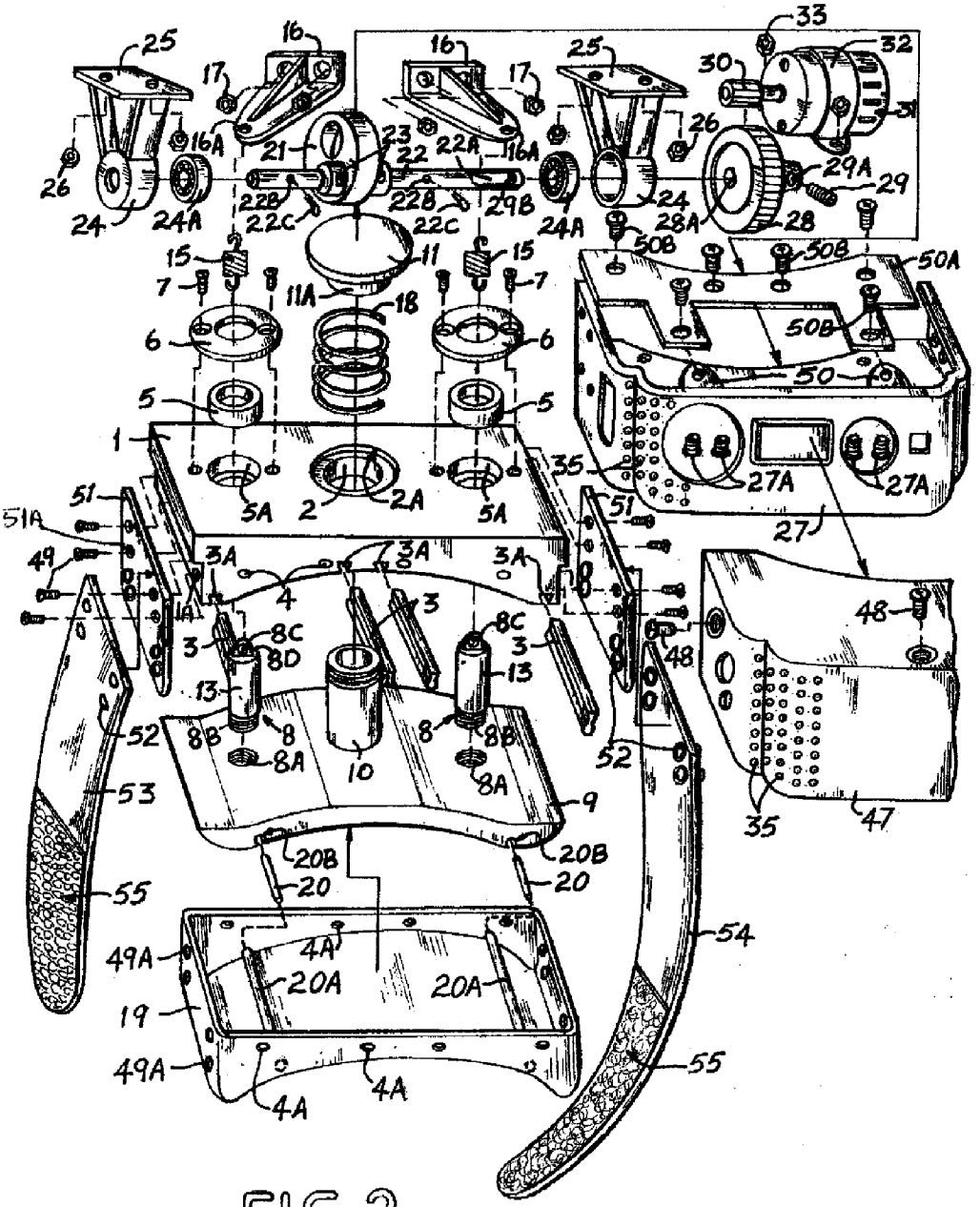

25
16
17
16A
21
23
22
22A
22B
22C
24
24A
26
33
32
30
31
29A
29
28
28A
50B
50A
50
27A
27
35
51
51A
49
3A
4
1A
3
8C
8D
13
8
8B
8A
10
52
53
55
9
20B
20
4A
20A
49A
19
54
48
47
2
2A
5A
5
6
7
15
11
11A
18
1

FIG. 2

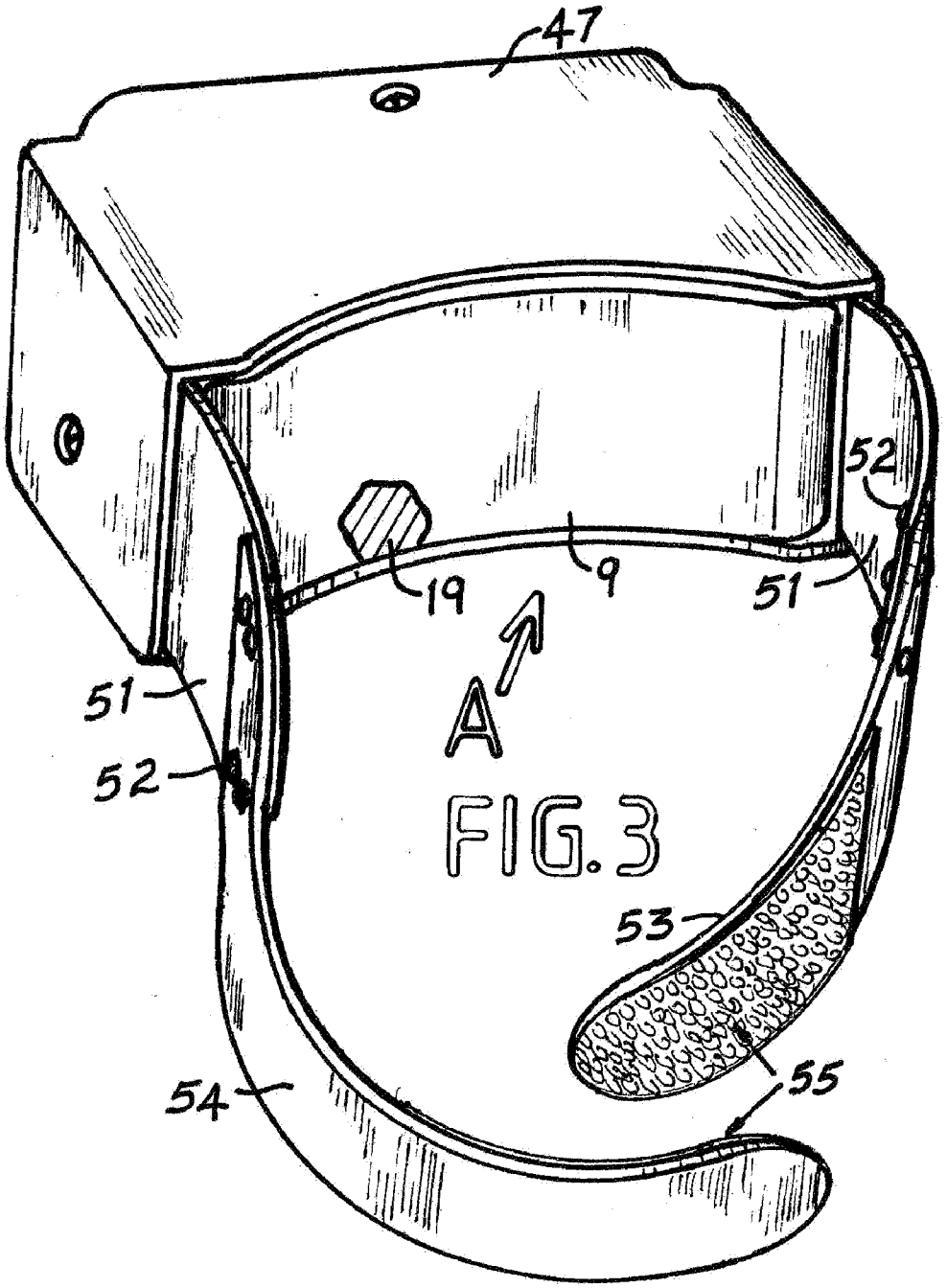


FIG. 3

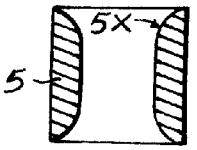


FIG.4

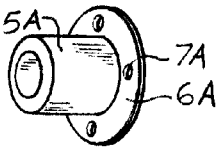


FIG.4A

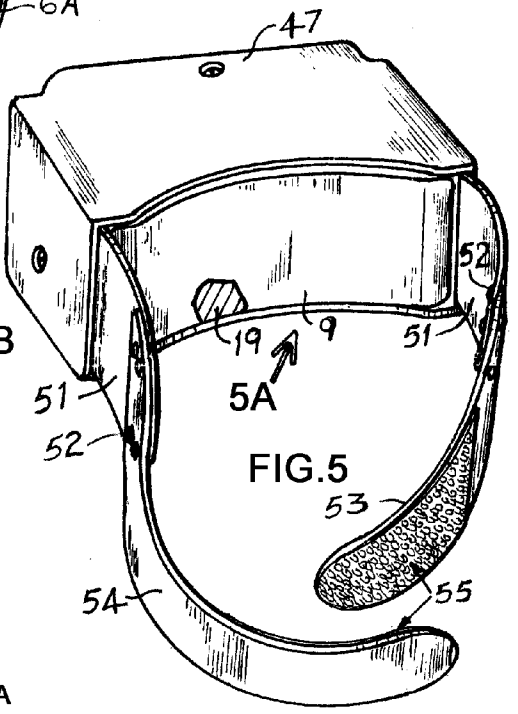


FIG.5

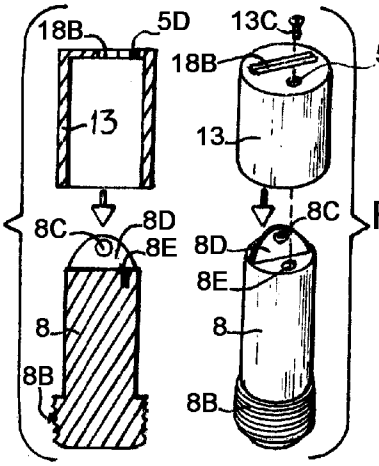


FIG.6A FIG.6B

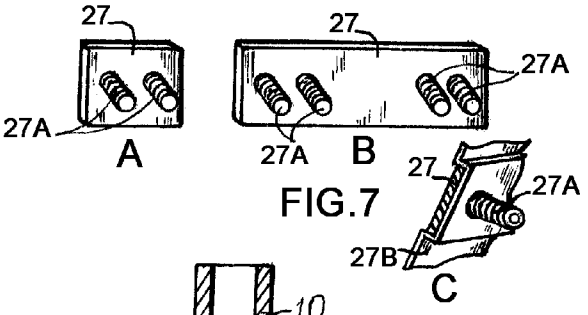


FIG.7

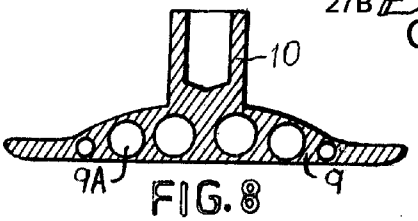
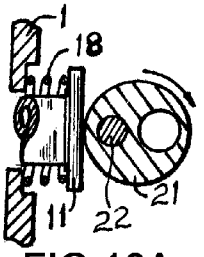


FIG.8



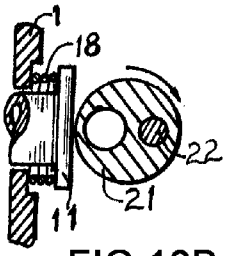


FIG.10A FIG.10B

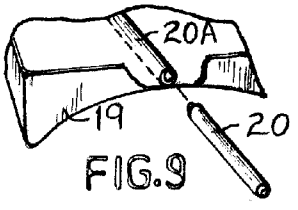


FIG.9

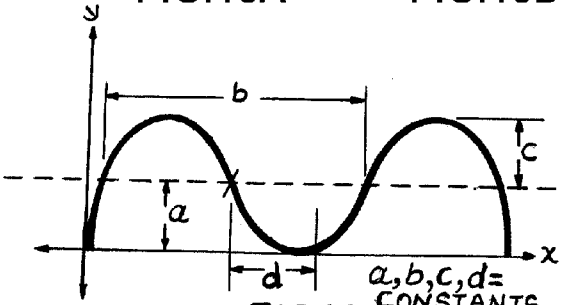


FIG.11

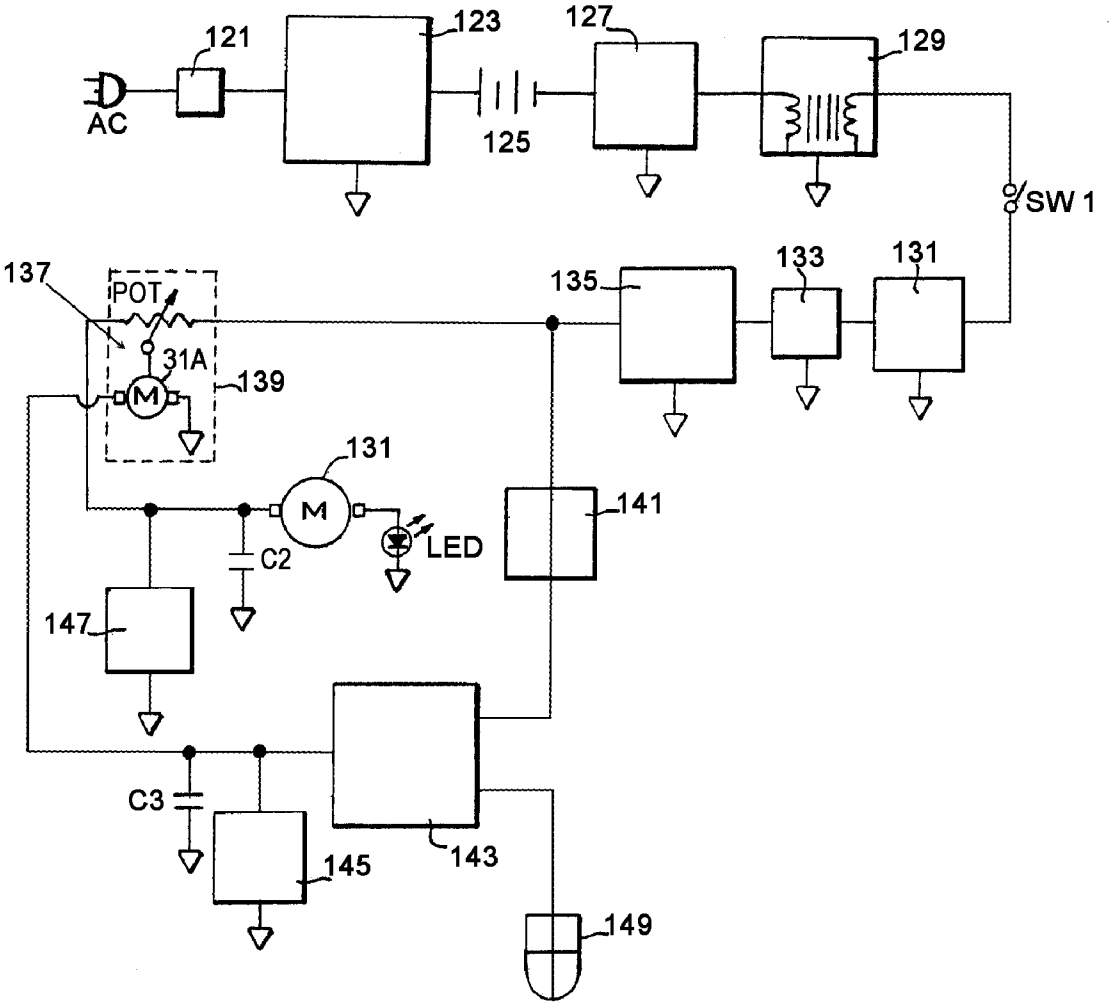

AC
121
123
125
127
129
SW 1
137
POT
31A
139
135
133
131
M
131
M
LED
C2
141
147
C3
145
143
149

FIG.12

DEVICE FOR AN AUTOMATIC BODY FAT REDUCING AND MUSCLE BUILDING

FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0001] Not applicable.

REFERENCE TO SEQUENCE LISTING, A TABLE, OR A COMPUTER LISTING APPENDIX

[0002] Not applicable.

COPYRIGHT NOTICE

FIELD OF THE INVENTION

[0004] The present invention relates generally to exercise equipment. More particularly, the invention relates to a personal, automatic body fat reducing and muscle building machine.

BACKGROUND OF THE INVENTION

[0005] Various machines and exercise regimens have been developed to help reduce body fat, in the stomach area in particular. Many of these machines have largely failed to achieve the necessary results despite claims to the contrary. Some of the compact machines are massage belts that can be worn around the waist while others are large equipment placed in the gym that require lengthy and rigorous exercise workouts. As evidenced by recent statistics that show that a huge percentage of the population is either overweight or obese, many of these prior art machines and regimens are ineffective.

[0006] One prior art weight control system provides an inflatable waist encircling, relatively wide belt to be worn during exercising for reducing weight. The continuous contact of the inflated belt with the body of the wearer in conjunction with the exercise routine is claimed to result in weight loss. Another prior art weight control system provides a waist worn elastic band that is claimed to produce a vacuum effect over the area of the body to be treated, as well as providing resistance to muscle movements. Another prior art weight control system provides a buckle that fits over the abdomen and stomach; said buckle having one or more air bladders with pressure sensors, an air pump, and a massager. The air bladders are maintained at a constant pressure as signals from the pressure sensors activate the air pump to fill or deflate the air bladders. The effect on the abdomen is claimed to reduce hunger and thus the craving for food, which results in weight loss. It is also claimed that hunger between meals is controlled by the activation of the massager. Another prior art weight control system provides a belt with a toggle take up mechanism as well as an adjusting dial mechanism, which permits tensioning of the belt with various waist diametrical profiles, and a bulging pressure pad, which presses against the stomach or abdomen. This invention is claimed to help the wearer lose weight. It is further claimed that another object of this invention is to provide an abdominal restrainer that, when worn by a person while eating and a few minutes thereafter, will allow said person to eat as much of any kind of food he desires and at any and all times he desires, therefore never feeling hungry, but still losing weight. In yet another prior art weight control system, a special belt is claimed for effecting weight loss in the wearer. It consists of a central body having a convex side that presses into the wearer's abdomen and above the navel in such a manner that a strap on belt holds it in place.

[0007] The aforementioned prior art inventions are ineffective in their attempts to effect true, sustained and duplicated weight loss in any individual suffering from highly reduced quality of life from excessive weight. One major flaw with these designs is that they behave like blood pressure cuffs squeezing the abdomen by employing air bladder inflation techniques. This could in fact choke off blood supply to the midsection if sustained for very long periods of time. During true and effective weight loss and/or muscle mass building exercises, the flow of blood to the target area should not be interrupted but rather enhanced. The burning of fat and building of muscles require dynamic load mechanical resistance presented to the muscle group and fat buildup in the targeted area. In this case, the target area is the stomach. With the exception of cardiac (heart) muscles, the stomach muscles are indeed one of the strongest muscle groups in the human body, contrary to their negative reputation for retaining fat. It is this muscle group employed by a woman's womb to retain a baby for nine months before delivery. Essentially, stomach muscles are capable of sustaining high mechanical load resistance (i.e., force) applied to them during rigorous weight loss exercises. Unfortunately, the above-mentioned inventions and others like them do not present substantial force gradients to the stomach or midsection of a human, against which to resist.

[0008] Another prior art weight control system consists of an adjustable gastric banding device driven by an air pump that is used for contracting a patient's stomach in order to fight obesity. The gastric band is implanted around the stomach, has a cavity filled with liquid and connects to a control box via a tube. The control box as well as a balancing reservoir is implanted underneath the patient's skin. The box contains an electric pump and an electronic control unit that communicates via radio frequency with a monitor carried by the patient, as well as with a controller carried by the physician. The pump can be remotely controlled by the controller so as to transfer predetermined volumes of liquid in a closed circuit from the gastric band to the reservoir or vice versa, to adjust the diameter of a passage in the stomach. The monitor receives signals (e.g., alarms or otherwise) from the control box. This technique it is claimed is used to control appetite and thus weight loss. However, the complexity and cost of this invention may outweigh the benefit of weight loss. There is also the risk of infection that comes with every surgery performed on the skin during implantation.

[0009] In view of the foregoing, there is a need for improved techniques for providing an effective and safe weight control system that does not interrupt blood flow and provides a suitable amount of force to the area being treated.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The present invention is illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings and in which like reference numerals refer to similar elements and in which:

[0011] FIG. **1**, FIG. **2**, and FIG. **3** illustrate an exemplary stomach fat burning and muscle toning device A, in accordance with an embodiment of the present invention. FIG. **1** is a cross-sectional view. FIG. **2** is an exploded view, and FIG. **3** is a perspective view;

[0012] FIG. **4** is a cross-sectional view of an exemplary nylon sleeve bearing employed in a stomach fat burning and muscle toning device, in accordance with an embodiment of the present invention;

[0013] FIG. **5** shows an exemplary commercially available flange mount linear bearing of the sleeve or ball type employed in a stomach fat burning and muscle toning device, in accordance with an embodiment of the present invention;

[0014] FIGS. **6**A and **6**B illustrate an exemplary guide pin that aids efficient axial pistonic movements in a stomach fat burning and muscle toning device, in accordance with an embodiment of the present invention;

[0015] FIGS. **7**A, **7**B and **7**C represent flange plates and threaded bolt members that may be used to mount some drive components in a stomach fat burning and muscle toning device, in accordance with an embodiment of the present invention. FIG. **7**A is a front perspective view of a two-bolt flange plate. FIG. **7**B is a front perspective view of a four-bolt flange plate, and FIG. **7**C is a side perspective view of a flange plate;

[0016] FIG. **8** is a cross-sectional view of an exemplary flat piston that may be employed in a stomach fat burning and muscle toning device, in accordance with an embodiment of the present invention;

[0017] FIG. **9** is a partially cutaway view of an exemplary dust boot and a tubular fold for a securing pin for use in a stomach fat burning and muscle toning device, in accordance with an embodiment of the present invention;

[0018] FIGS. **10**A and **10**B are partial cross-sectional views of an exemplary return spring and a drive shaft of a stomach fat burning and muscle toning device in operation, in accordance with an embodiment of the present invention. FIG. **10**A shows the return spring fully extended in a rest position, and FIG. **10**B shows the return spring in a contracted position;

[0019] FIG. **11** illustrates an exemplary stomach fat burning and muscle toning machine being worn and operated by a user while in a standing position, in accordance with an embodiment of the present invention; and

[0020] FIG. **12** is a circuit diagram for an exemplary stomach fat burning and muscle toning device, in accordance with an embodiment of the present invention.

[0021] Unless otherwise indicated illustrations in the figures are not necessarily drawn to scale.

SUMMARY OF THE INVENTION

[0022] To achieve the forgoing and other objects and in accordance with the purpose of the invention, an apparatus for body fat reduction and muscle building is presented.

[0023] In one embodiment, an apparatus for body fat reduction and muscle building is presented. The apparatus includes a bridge including a generally rectangular shape including a front side, a back side and at least one central hole extending from the front side to the back side. A chassis is joined to the back side and extends away from the back side. A piston including a surface for applying a load resistance to an abdomen of a user and a stem centrally located and extending back from the surface is positioned proximate the front side with the stem extending through the central hole. A swash plate is joined to a distal end of the stem. A return spring is in communication with the swash plate. A drive shaft is mounted to the chassis in proximity to the swash plate. A generally circular cam is joined to the drive shaft where the cam contacts the swash plate. A motor is mounted to the chassis for rotating the drive shaft where a rotation of the drive shaft rotates the cam in contact with the swash plate to move the piston in a first direction towards the abdomen and the return spring moves the piston in a second direction away from the abdomen. A belt secures the bridge to the user with the piston adjacent to the abdomen. In another embodiment the piston further includes a generally concave surface. Another embodiment further includes a plurality of guide pins joined to the piston for maintaining alignment of the piston with the bridge. Yet another embodiment further includes a plurality of return springs coupled to the plurality of guide pins for assisting in moving the piston in the second direction. Still other embodiments further include control circuitry for controlling the motor and a remote unit for controlling the control circuitry. Another embodiment further includes at least one battery for operating the apparatus from a DC source. Still other embodiments include a dust boot joined to the piston and the bridge for enclosing the front side and the surface and an outer cover joined to the chassis for enclosing the chassis.

[0024] In another embodiment an apparatus for body fat reduction and muscle building is presented. The apparatus includes means for supporting components of the apparatus, means for applying a load resistance to an abdomen of a user the means being positioned proximate a front side of the supporting means, first means for moving the applying means in a first direction towards the abdomen, second means for moving the applying means in a second direction away from the abdomen and means for securing the supporting means to the user. Another embodiment further includes means for maintaining alignment of the applying means. Yet another embodiment further includes means for assisting in moving the applying means in the second direction. Still other embodiments further include means for controlling the first means and means for remotely controlling the means for controlling the first means. Another embodiment further includes means for operating the apparatus from a DC source. Yet another embodiment further includes means for enclosing the front side and the applying means. Still another embodiment further includes means for enclosing a back side of the supporting means.

[0025] In another embodiment an apparatus for body fat reduction and muscle building is presented. The apparatus includes a bridge including a generally rectangular shape including a front side, a back side, a central hole extending from the front side to the back side and a plurality of guide holes extending from the front side to the back side. A chassis is joined to the back side and extends away from the back side. A piston including a surface for applying a load resistance to an abdomen of a user and a stem centrally located and extending back from the surface is positioned proximate the front side with the stem extending through the central hole. A plurality of guide pins is joined to the piston for maintaining alignment of the piston with the bridge. A plurality of guide springs is coupled to the plurality of guide pins. A swash plate is joined to a distal end of the stem. A return spring is in communication with the swash plate. A drive shaft is rotatably mounted to the chassis in proximity to the swash plate with an axis of rotation of the drive shaft being substantially parallel to a top surface of the swash plate. A generally circular cam is joined to the drive shaft at an off center position

where the cam contacts the swash plate. A motor is mounted to the chassis for rotating the drive shaft where a rotation of the drive shaft rotates the cam in contact with the swash plate to move the piston in a first direction towards the abdomen and the return spring and the guide springs move the piston in a second direction away from the abdomen. Control circuitry is provided for controlling the motor. A dust boot is joined to the piston and the bridge for enclosing the front side and the surface. An outer cover is joined to the chassis for enclosing the chassis. A belt secures the bridge to the user with the piston adjacent to the abdomen. In another embodiment the piston further includes a generally concave surface. Still another embodiment further includes a remote unit for controlling the control circuitry.

[0026] Other features, advantages, and object of the present invention will become more apparent and be more readily understood from the following detailed description, which should be read in conjunction with the accompanying drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0027] The present invention is best understood by reference to the detailed figures and description set forth herein.

[0028] Embodiments of the invention are discussed below with reference to the Figures. However, those skilled in the art will readily appreciate that the detailed description given herein with respect to these figures is for explanatory purposes as the invention extends beyond these limited embodiments. For example, it should be appreciated that those skilled in the art will, in light of the teachings of the present invention, recognize a multiplicity of alternate and suitable approaches, depending upon the needs of the particular application, to implement the functionality of any given detail described herein, beyond the particular implementation choices in the following embodiments described and shown. That is, there are numerous modifications and variations of the invention that are too numerous to be listed but that all fit within the scope of the invention. Also, singular words should be read as plural and vice versa and masculine as feminine and vice versa, where appropriate, and alternative embodiments do not necessarily imply that the two are mutually exclusive.

[0029] The present invention will now be described in detail with reference to embodiments thereof as illustrated in the accompanying drawings.

[0030] Preferred embodiments of the present invention provide a stomach or midsection fat reducing and muscle toning device that affects weight loss by burning fat in the targeted area by presenting a high factor load mechanical resistance to said targeted area. Stomach fat burning and muscle building machines according to preferred embodiments also do not interfere with blood circulation in the targeted area during the process of accomplishing its objectives.

[0031] FIG. **1**, FIG. **2**, and FIG. **3** illustrate an exemplary stomach fat burning and muscle toning device A, in accordance with an embodiment of the present invention. FIG. **1** is a cross-sectional view. FIG. **2** is an exploded view, and FIG. **3** is a perspective view. In the present embodiment, device A comprises a piston **9** with a concave front fascia integrally formed with a stem **10** having a threaded upper edge **10**A for accepting a matching tubular edge **11**A of a swash plate **11**. The edges of the front face of piston **9** are tapered outwards so as to prevent injury to the user. The back surface of piston **9** is convex having flat areas **12** beside stem **10** and at the outer edges thereof. These flat areas **12** serve as seats for dampers **3** that fit into matching slots **3**A on a connecting beam herein referred to as a bridge **1**. Stem **10** of piston **9** passes through a central hole **2** on bridge **1** such that stem **10** can move back and forth without touching bridge **1**. A high-tension return spring **18** sits on a recess **2**A on bridge **1** and next to central hole **2** such that return spring **18** applies tension on the inner radial edge of swash plate **11**. Nylon sleeve or axial roller bearings **5** are located in matching snugly fitting holes on bridge **1** and are prevented from lateral movements by radial securing washers **6** held rigidly in place by screws **7**. Efficient axial movements and accurate trajectory of piston **9** is effected by alignment members herein referred to as guide pins **8**. In alternate embodiments, the trajectory of the piston may be affected by alternate means such as, but not limited to a track on which the piston slides, etc. In the present embodiment, lower threaded edges of guide pins **8** screw rigidly into matching threaded holes on the convex backside of piston **9** such that guide pins **8** extend upwardly, well past the upper flat surface of bridge **1**. The concave lower surface of bridge **1** approximates the convex shape of the back surface of piston **9**. Guide pins **8**, which are preferably made of steel, have an outer nylon shell **13** whose outer diameter presents close tolerances with the inner diameter of bearings **5** for smooth operation. In alternate embodiments the guide pins may be made of various different materials such as, but not limited to, other types of metal, and also may have shells made of different materials such as, but not limited to, other types of plastic. Other alternate embodiments may not employ shells on the guide pins and may instead use a lubricant to aid in smooth operation between the guide pins and the bearings or may use different types of bearings that do not require a sleeve. In the present embodiment, an edge flange **14** on the upper end of guide pins **8** is provided with a hole for the purpose of coupling return springs **15** to tension posts **16**, which are also provided with holes for springs **15** and are rigidly held in place to the floor of a chassis **27** by means of screws or bolts **17**.

[0032] In the present embodiment, slots **3**A between the lower surface of bridge **1** and the inner surface of piston **9** are filled with dampers **3** made of a damping material such as, but not limited to, foam or rubber; however, in some embodiments dampers may not be included. Furthermore, in some embodiments all or part of the gap between the lower surface of bridge **1** and the inner surface of piston **9** may be filled with a damping material such as, but not limited to, foam or rubber bonded to one of said surfaces rather than or in addition to having dampers in slots. In the present embodiment, a dust boot **19** is secured to piston **9** with a suitable bonding agent such as, but not limited to, glue, epoxy, rubber cement, etc., in such a manner that securing pins **20** inserted into matching holes on boot **19** are placed slideably into matching holes on piston **9**, thereby enabling the ends of boot **19** to move freely during excursions of piston **9**. Holes **4** may be used to locate chassis mounting screws **49**. Mounting screws **49** attach the ends of boot **19** and belt members **51** to bridge **1** in such a manner that the combined thickness of boot **19** and belt members **51** aligns with the side edges of bridge **1**. In the present embodiment, interchangeable belt members **53** and **54** are coupled to non-interchangeable belt members **51** by means of buttons **52**. However, the non-interchangeable belt members may be coupled to the interchangeable belt members using various different means in alternate embodiments including,

but not limited to, buckles, snaps, Velcro, etc. In the present embodiment, interchangeable belt members **53** and **54** are provided with a Velcro system **55** that enables a wide range of differently sized individuals to use the system in a conventional manner.

[0033] In the present embodiment, a drive shaft **22** is connected to roller bearings **24**A at either end of said shaft **22**. Roller bearings **24**A are housed inside bearing housings **24** and mounted laterally on chassis **27** by means of integral mounting flanges **25**, threaded bolts **27**A and nuts **26**. Bolts **27**A may be welded to chassis **27** or to separate flanges, as shown by way of example in FIGS. **7**, **7**A and **7**B. Individual bolts may also be employed to hold bearing housings **24** in place. Shaft **22** terminates near the edge of the left bearing and extends past the right bearing, inside their respective housings **24**, such that the extending length of shaft **22** on the right side provides spacing for a toothed wheel **28**, which is rigidly held to shaft **22** by means of a locking screw **29**. In alternate embodiments, different means may be used to attach the toothed wheel to the drive shaft; for example, without limitation, in one embodiment the wheel may be welded to the drive shaft. In the present embodiment, additional rigidity of toothed wheel **28** is effected by means of matching flat sides on both ends **22**A of shaft **22** and a hole **28**A in wheel **28**, as shown by way of example in FIG. **2**.

[0034] A drive motor **31** is rigidly mounted on chassis **27** by means of a hold down clamp **32** and screws or bolts **33**. Integrally coupled to the shaft of motor **31** is a drive gear **30**, which meshes with wheel **28** in such a manner as to smoothly drive shaft **22** in operation. Coupled to shaft **22** is a circular cam **21**, which is rigidly coupled to shaft **22** by means of locking screws **23** at tubular edge-ears of said cam **21**. However, alternate means may be used to attach cam **21** to shaft **22** such as, but not limited to, welding or adhesive. Shaft **22** passes through cam **21** at an off center position such that regardless of the distance of shaft **22** from swash plate **11**, cam **21** remains in constant contact with swash plate **11**. This action allows for smooth operation and is made possible by the counteracting action of return springs **15** and **18**. When cam **21** moves swash plate **11** to compress main return spring **18**, the excursion of piston **9** and guide pins **8** causes auxiliary return springs **15** to extend fully when shaft **22** is farthest from swash plate **11**, as illustrated by way of example in FIG. **10**B. When piston **9** and guide pins **8** have returned to their rest position, which means that shaft **22** is now at its closest position to swash plate **11**, main spring **18** is fully extended and auxiliary return springs **15** are fully compressed, as illustrated by way of example in FIG. **10**A.

[0035] In the present embodiment, battery compartments **43** and a power boosting circuit board **44** are mounted on one side and an AC/motor control board and circuit **34** are mounted on the opposite side next to motor **31**. However, these components may be mounted in various different locations in alternate embodiments. Motor **31** preferably may use AC and DC voltages; however, in alternate embodiments the motor may use only AC or DC voltage. In the present embodiment, an AC cord **40** and a plug **38** transmits power to circuit **34** via a socket **36**, which in turn supplies power to motor **31**. A second socket **37** is also connected to circuit board **34** and accepts a plug **39**, which is linked by a cable **41** to a hand held remote control **42**, which may be provided with controls such as, but not limited to, an on/off switch, and high, medium and low motor speed switches. Alternate embodiments may be implemented without remote controls. In these embodiments the device may be operated by controls such as, but not limited to, buttons or dials on the device itself In the present embodiment, a battery power boosting/inverting circuit **44** as well as a voltage selector switch **46** with a housing **45** mounted on an outer cover **47** are connected to circuit board **34** via wire cables (not shown). Alternate embodiments may be implemented that are powered only by batteries or only by a power cord plugged into an electrical outlet rather than both. In the present embodiment, studs **50** are included in the present embodiment for mounting a chassis reinforcing plate **50**A to chassis **27** using screws **50**B, as shown by way of example in FIG. **2**. Heat from motor **31** and electronic circuit board **34** is vented through perforations **35**.

[0036] Referring now to FIG. **2** this exploded view of the present embodiment shows outer cover **47** having perforations **35** that align with matching perforations **35** on chassis **27**. Screws **48** on outer cover **47** attach outer cover **47** to chassis **27**. Gear **30** of motor **31** engages toothed wheel **28**, which also serves as a reduction gear and is provided with through hole **28**A with one flat side to defeat slippage on drive shaft **22**. Wheel **28** is also provided with an end stem having a threaded hole **29**A for accepting locking screw **29**, which engages a flat end surface **22**A and a threaded matching hole **29**B on drive shaft **22**. However, embodiments in which the toothed wheel is attached to the drive shaft using means other than a locking screw may not comprise these holes.

[0037] In the present embodiment, bearing housings **24** are provided with integral mounting flanges **25** for mounting with threaded bolts **27**A and nuts **26**. Roller ball bearings **24**A fit onto drive shaft **22** and are pressed into housings **24**. In the present embodiment, cotter pins **22**C fit into holes **22**B on shaft **22** and act as stops to generally prevent bearings **24**A from walking out of housings **24**. In alternate embodiments different means may be used to generally prevent the bearings from walking out of the housings such as, but not limited to, welded stops on the shaft, screws, bolts, etc. In the present embodiment, tension posts **16** are mounted to the floor of chassis **27** with threaded bolts **27**A and nuts **17**. Coupling holes **16**A engage one end of the hooks of return springs **15**, the opposite hooks of which engage holes **8**C of end flanges **8**D of guide pins **8**, which are preferably provided with nylon outer shells **13** and threaded lower edges **8**B, which are rigidly screwed into threaded holes **8**A on piston **9**. Nylon bearings **5** are pressed tightly into matching holes **5**A on bridge **1** and are generally prevented from lateral movements by radial securing washers **6**, which are held in place by screws **7**. In operation, cam **21** remains in continuous contact with swash plate **11**, which is provided with threaded lower tubular edge **11**A for coupling to the threaded upper edge of stem **10** of piston **9**. Main return spring **18** sits in recess **2**A and applies tension to swash plate **11** such that piston stem **10** moves back and forth within central hole **2** without touching bridge **1**. In the present embodiment, dampers **3** fit tightly into matching slots **3**A on bridge **1** and serve as the rest position of piston **9** during excursions. Dust boot **19** is provided with mounting holes **4**A that align with holes **4** on bridge **1** and are held in place with screws (not shown). Aligning pins **20** fit tightly into tubular holes **20**A on boot **19** and are in turn then forced into tight fitting holes **20**B on piston **9**, such that the outer edge areas of boot **19** are left to move freely while the inner arched area is bonded to the matching arched area of piston **9**. Boot **19** is also provided with mounting holes **49**A that align with holes

1A on the sides of bridge **1** as well as holes MA on non-interchangeable belt members **51**, which are firmly held in place with screws **49**.

[0038] In the present embodiment, belts **51**, **53** and **54** are preferably made of woven cloth fibers, plastics or leather; however, belts in alternate embodiments may be made of different materials. Boot **19** is preferably made of a stretch fabric material such as, but not limited to, Lycra or a highly yieldable rubber material; however, the boot in alternate embodiments may be made of various different materials such as, but not limited to, woven cloth or plastic. Piston **9** and bridge **1** are preferably made of high strength aluminum or rigid plastics such as ABS; however, in alternate embodiments these elements may be made of different materials such as, but not limited to, other metals, other rigid plastics, composites, etc. Swash plate **11**, cam **21** and drive shaft **22** are preferably made of hardened and ground polished steel in the manner conventionally employed in internal combustion engines; however, alternate materials may be suitable. Bearing housings **24** are preferably made of cast aluminum or plastics; however, the bearing housings in alternate embodiments may be made of various other materials such as, but not limited to, different types of metal. Tension posts **16** are preferably made of steel or high strength aluminum, although other materials may be suitable in alternate embodiments. Plastics or metals may be used for gear **30** and wheel **28** in the conventional manner known to those skilled in the art. Chassis **27** may be made of a rigid material such as, but not limited to, stamped steel or cast aluminum while outer cover **47** is preferably made of a plastic. However, in alternate embodiments, the chassis may be made of different rigid materials such as, but not limited to, other types of metal or rigid plastic and the outer cover may be made of various different materials including, but not limited to, various metals, heavy cloths, rubber, etc. Motor **31** is preferably a high output, high torque type of motor to overcome counter resistance from the stomach muscles of certain users. However, various different types of motors may be used in alternate embodiments.

[0039] Referring to FIG. **3**, the perspective view of the present embodiment shows outer cover **47**, drive piston **9** covered by boot **19** and non-interchangeable belt members **51** connected to interchangeable belt members **53** and **54** by buttons **52**. Interchangeable belt members **53** and **54** are provided with Velcro system **55**. Velcro system **55** enables belt members **53** and **54** to be adjustably attached to a user. However, those skilled in the art, in light of the present teachings, will readily recognize that a multiplicity of suitable systems may be used to adjustably attach the belt members to a user in alternate embodiments such as, but not limited to, buckles, snaps, buttons, etc.

[0040] FIG. **4** is a cross-sectional view of an exemplary nylon sleeve bearing **5** employed in a stomach fat burning and muscle toning device, in accordance with an embodiment of the present invention. In the present embodiment, nylon sleeve bearing **5** comprises burrs **5**X at each end. In alternate embodiments, nylon sleeve bearings may be employed that do not comprise burred edges. And in yet other alternate embodiments, nylon sleeve bearings **5** may be replaced with different types of bearings.

[0041] FIG. **5** shows an exemplary commercially available flange mount linear bearing **5**A of the sleeve or ball type employed in a stomach fat burning and muscle toning device, in accordance with an embodiment of the present invention. In the present example, a flange **6**A of bearing **5**A is provided with mounting holes **7**A. Commercially available flange mount linear bearings are many and varied; types include, without limitation, sleeve, ball, no lube linear plain, replaceable insert, pillow block, ceramic coated, closed or open, Frelon lined, Rulon lined, PTFE lined, fixed, and self aligning types. Any of these flange mount linear bearings may be employed in preferred embodiments of the present invention.

[0042] FIGS. **6**A and **6**B illustrate an exemplary guide pin **8** that aids efficient axial pistonic movements in a stomach fat burning and muscle toning device, in accordance with an embodiment of the present invention. FIG. **6**A is an exploded cross-sectional view, and FIG. **6**B is an exploded perspective view of the members of guide pin **8**. In the present embodiment, guide pin **8** comprises a threaded lower edge **8**B, an upper edge flange **8**D having a coupling hole **8**C for attaching a return spring, and a threaded hole **8**E for accepting a securing screw **13**C for an outer nylon shell **13**. Outer shell **13** is also provided with at least one hole **13**D for inserting screw **13**C. There is also a racetrack type slot **18**B for accepting edge flange **8**D of guide pin **8**. Guide pins in alternate embodiments may have various different designs.

[0043] FIGS. **7**A, **7**B and **7**C represent flange plates **27**C and threaded bolt members **27**A that may be used to mount some drive components in a stomach fat burning and muscle toning device, in accordance with an embodiment of the present invention. FIG. **7**A is a front perspective view of a two-bolt flange plate **27**C. FIG. **7**B is a front perspective view of a four-bolt flange plate **27**C, and FIG. **7**C is a side perspective view of a flange plate **27**C. Bolt members **27**A may be pre-threaded and then welded onto flange plates **27**C or may be integrally cast and then threaded. These configurations present more rigid platforms for mounting bearing housings, such as, but not limited to bearing housings **24** shown by way of example in FIGS. **1** and **2**, than employing single bolts; however, in some embodiments single bolts may be used. Flange plates **27**C and threaded bolt members **27**A may be made of various materials including, but not limited to, steel, aluminum or plastic.

[0044] FIG. **8** is a cross-sectional view of an exemplary flat piston **89** that may be employed in a stomach fat burning and muscle toning device, in accordance with an embodiment of the present invention. Unlike arched piston **9** shown by way of example in FIGS. **1** and **2**, piston **89** in the present embodiment comprises a flat frontal profile, which increases the overall thickness of piston **89** over a curved piston. However, piston **89** is easier to manufacture than a piston with a curvature. As with the piston design having a curvature, a stem **10** is also integral to piston **89**. In order to reduce weight without sacrificing strength, high strength aluminum is the material of choice, though other materials may be employed such as, but not limited to, other metals or rigid plastics. Holes **89**A are integrally cast or machined into piston **89** as a means to further reduce weight without sacrificing strength.

[0045] FIG. **9** is a partially cutaway view of an exemplary dust boot **19** and a tubular fold **20**A for a securing pin **20** for use in a stomach fat burning and muscle toning device, in accordance with an embodiment of the present invention. In the present embodiment, securing pin **20** is inserted into tubular fold **20**A of dust boot **19** in order to secure dust boot **19** to a piston, for example, without limitation, pistons **9** and **89** shown by way of example in FIGS. **1** and **8**, respectively.

[0046] FIGS. **10**A and **10**B are partial cross-sectional views of an exemplary return spring **18** and a drive shaft **22** of a stomach fat burning and muscle toning device in operation, in

accordance with an embodiment of the present invention. FIG. **10**A shows return spring **18** fully extended in a rest position, and FIG. **10**B shows return spring **18** contracted. In the present embodiment, a bridge **1** supports main return spring **18**, which applies tension on a swash plate **11**. Drive shaft **22** is coupled to a cam **21**, which is rotating in a clockwise direction and in continuous contact with swash plate **11** for smoothness. Referring to FIG. **10**A, when drive shaft **22** is in a position closest to swash plate **11**, cam **21** is exerting minimal pressure on swash plate **11** and return spring **18** is fully extended, and, referring to FIG. **10**B, when drive shaft **22** is in a position farthest from swash plate **11**, cam **21** is exerting maximum pressure on swash plate **11** and return spring **18** is contracted. In the present embodiment, the excursion movements of swash plate **11** and piston **9**, as shown by way of example in FIGS. **1** and **2**, are sinusoidal.

[0047] FIG. **11** illustrates an exemplary stomach fat burning and muscle toning device A being worn and operated by a user F while in a standing position, in accordance with an embodiment of the present invention. However, device A may be used in other positions such as, but not limited to, lying down on one's back or seated on a chair. In typical use of the present embodiment, user F wraps interchangeable belt members **53** and **54** around his midsection with the machine portion of device A on his stomach. A Velcro system on interchangeable belt members **53** and **54** enables user F to adjust the tightness of belt members **53** and **54**. The user then plugs device A into a wall power outlet using an AC cord **40**. Alternate embodiments may be implemented that are battery powered rather than plugged into a power outlet. In the present embodiment, a cable **41** connects a hand held remote control **42** to device A. Remote control **42** is used to select motor speed and torque settings for example, without limitation, high, medium and low, which affect the rate of toggle of the drive piston in device A. In alternate embodiments, the remote control may use wireless technology such as, but not limited to, infrared rays, to transmit signals to the device rather than being wired to device A, and other alternate embodiments may not include a remote control. In the present embodiment, while device A is on, the piston moves toward and then away from the stomach of user F.

[0048] FIG. **12** is a circuit diagram for an exemplary stomach fat burning and muscle toning device, in accordance with an embodiment of the present invention. This simple control circuit can be modified by someone skilled in the art of motor control electrical/electronic circuitry without deviating from the spirit and creative intensions employed here. In the present embodiment, the circuit comprises an AC adapter **121**, which supplies a desired voltage to a battery charging circuit **123**, which in turn charges a battery **125**. Battery power is supplied to a DC-AC converter **127**, which in turn outputs an AC voltage to a transformer **129**. For example, without limitation, two 9-volt batteries may be used to supply an 18-volt input to transformer **129** to obtain a stepped up 25-volt output. When a switch SW**1** is closed, an AC-DC converter **131** changes the AC voltage from transformer **129** back to DC voltage. After smoothing with a filter **133**, a variable voltage regulator **135** with a range of between 10V and 50V then supplies power simultaneously to an 18-volt drive motor **31** via a standard potentiometer **137** driven by a second motor **31**A in a circuit **139**, as well as to a constant voltage regulator **141** operating at 12 volts. Regulator **141** outputs to a learning control decoder **143**, which is connected to motor **31**A via an output capacitor C**3** and an overload protection circuit **145**. A second output capacitor C**2** supplies power to motor **31** via another overload protection circuit **147**. In the present embodiment, a light emitting diode (LED) indicates motor operation. A remote control **149** coupled to decoder **143** permits easy manipulation of the speed of motor **31**, aided by potentiometer circuit **139**. Remote control **149** can be an infrared controller or may be directly wired to decoder **143**. Motor **31** may also be directly driven by an AC or DC voltage in which case AC voltage is stepped down to the exact desired value using an adapter, while employed batteries may or may not be rechargeable.

[0049] Having fully described at least one embodiment of the present invention, other equivalent or alternative methods of providing a fat reducing and muscle building machine according to the present invention will be apparent to those skilled in the art. The invention has been described above by way of illustration, and the specific embodiments disclosed are not intended to limit the invention to the particular forms disclosed. For example, the particular implementation of the device may vary depending upon the particular use of the device. The devices described in the foregoing were directed to implementations for use on users' stomachs; however, similar techniques are to provide smaller devices for use on other parts of the body such as, but not limited to, arms and legs. Implementations of the present invention for use on parts of the body other than the stomach are contemplated as within the scope of the present invention. The invention is thus to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the following claims.

What is claimed is:

1. An apparatus for body fat reduction and muscle building, the apparatus comprising:

a bridge comprising a generally rectangular shape comprising a front side, a back side and at least one central hole extending from said front side to said back side;

a chassis joined to said back side and extending away from said back side;

a piston comprising a surface for applying a load resistance to an abdomen of a user and a stem centrally located and extending back from said surface, said piston being positioned proximate said front side with said stem extending through said central hole;

a swash plate joined to a distal end of said stem;

a return spring in communication with said swash plate;

a drive shaft mounted to said chassis in proximity to said swash plate;

a generally circular cam joined to said drive shaft where said cam contacts said swash plate;

a motor mounted to said chassis for rotating said drive shaft where a rotation of said drive shaft rotates said cam in contact with said swash plate to move said piston in a first direction towards said abdomen and said return spring moves said piston in a second direction away from said abdomen; and

a belt for securing said bridge to the user with said piston adjacent to said abdomen.

2. The apparatus as recited in claim **1**, wherein said piston further comprises a generally concave surface.

3. The apparatus as recited in claim **1**, further comprising a plurality of guide pins joined to said piston for maintaining alignment of said piston with said bridge.

4. The apparatus as recited in claim **3**, further comprising a plurality of return springs coupled to said plurality of guide pins for assisting in moving said piston in said second direction.

5. The apparatus as recited in claim **1**, further comprising control circuitry for controlling said motor.

6. The apparatus as recited in claim **5**, further comprising a remote unit for controlling said control circuitry.

7. The apparatus as recited in claim **1**, further comprising at least one battery for operating the apparatus from a DC source.

8. The apparatus as recited in claim **1**, further comprising a dust boot joined to said piston and said bridge for enclosing said front side and said surface.

9. The apparatus as recited in claim **8**, further comprising an outer cover joined to said chassis for enclosing said chassis.

10. An apparatus for body fat reduction and muscle building, the apparatus comprising:

means for supporting components of the apparatus;

means for applying a load resistance to an abdomen of a user said means being positioned proximate a front side of said supporting means;

first means for moving said applying means in a first direction towards said abdomen;

second means for moving said applying means in a second direction away from said abdomen; and

means for securing said supporting means to the user.

11. The apparatus as recited in claim **10**, further comprising means for maintaining alignment of said applying means.

12. The apparatus as recited in claim **10**, further comprising means for assisting in moving said applying means in said second direction.

13. The apparatus as recited in claim **10**, further comprising means for controlling said first means.

14. The apparatus as recited in claim **13**, further comprising means for remotely controlling said means for controlling said first means.

15. The apparatus as recited in claim **10**, further comprising means for operating the apparatus from a DC source.

16. The apparatus as recited in claim **10**, further comprising means for enclosing said front side and said applying means.

17. The apparatus as recited in claim **16**, further comprising means for enclosing a back side of said supporting means.

18. An apparatus for body fat reduction and muscle building, the apparatus comprising:

a bridge comprising a generally rectangular shape comprising a front side, a back side, a central hole extending from said front side to said back side and a plurality of guide holes extending from said front side to said back side;

a chassis joined to said back side and extending away from said back side;

a piston comprising a surface for applying a load resistance to an abdomen of a user and a stem centrally located and extending back from said surface, said piston being positioned proximate said front side with said stem extending through said central hole;

a plurality of guide pins joined to said piston for maintaining alignment of said piston with said bridge;

a plurality of guide springs coupled to said plurality of guide pins;

a swash plate joined to a distal end of said stem;

a return spring in communication with said swash plate;

a drive shaft rotatably mounted to said chassis in proximity to said swash plate with an axis of rotation of said drive shaft being substantially parallel to a top surface of said swash plate;

a generally circular cam joined to said drive shaft at an off center position where said cam contacts said swash plate;

a motor mounted to said chassis for rotating said drive shaft where a rotation of said drive shaft rotates said cam in contact with said swash plate to move said piston in a first direction towards said abdomen and said return spring and said guide springs move said piston in a second direction away from said abdomen;

control circuitry for controlling said motor;

a dust boot joined to said piston and said bridge for enclosing said front side and said surface;

an outer cover joined to said chassis for enclosing said chassis; and

a belt for securing said bridge to the user with said piston adjacent to said abdomen.

19. The apparatus as recited in claim **18**, wherein said piston further comprises a generally concave surface.

20. The apparatus as recited in claim **18**, further comprising a remote unit for controlling said control circuitry.

* * * * *