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(54) BUOYANCY COMPENSATOR BELT

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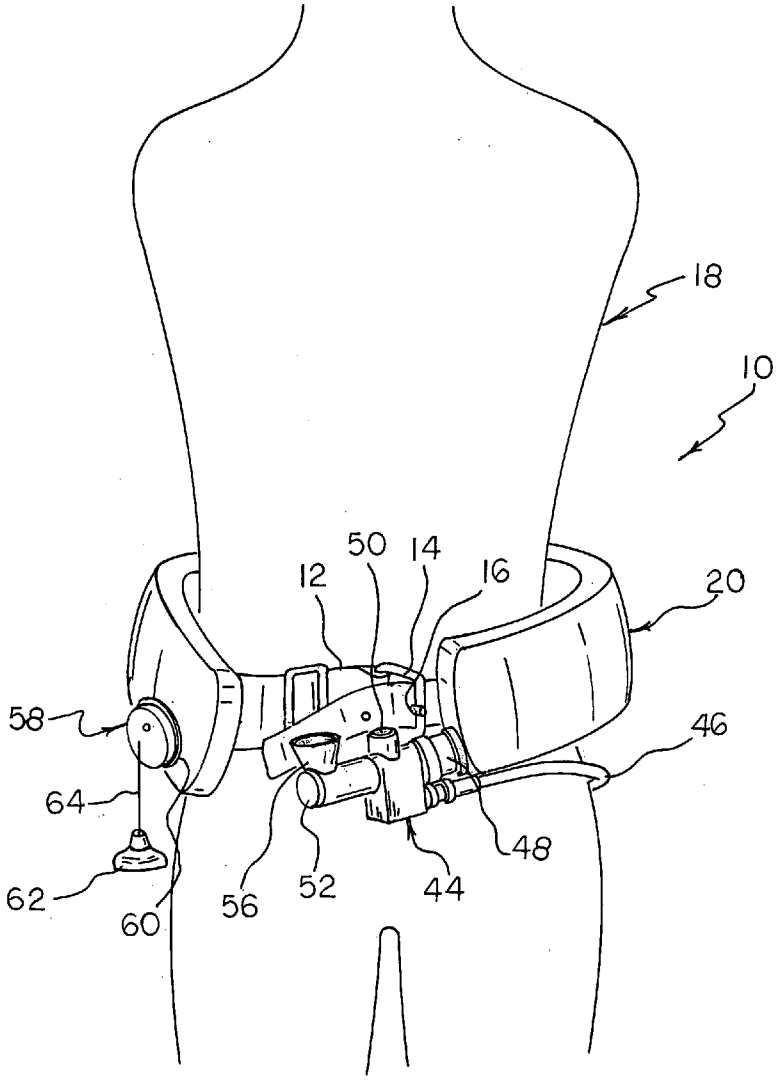
(57) **ABSTRACT**

A buoyancy compensator belt comprising a belt to which is mounted a tubular inflatable bladder positioned within a flexible housing and a small gas cylinder. In one embodiment, one or more weights are mounted onto the belt. A combination power inflation/bleed valve is operatively connected to the inflatable bladder and is fluidly connected to a first stage regulator of the gas cylinder by a hose. A dump valve is operatively connected to the bladder to prevent over-inflation and allow dumping of the air from the bladder. The buoyancy compensator belt is particularly suitable for use by free divers to allow the diver to rapidly descend to the desired depth due to the negative buoyancy produced by the weight of the belt, to allow the diver to partially inflate the inflator bladder to achieve neutral buoyancy at the desired depth, and then, when the diver wishes to ascend, to more fully inflate the inflator bladder to achieve positive buoyancy and rapidly ascend to the surface.



FREE DIVER

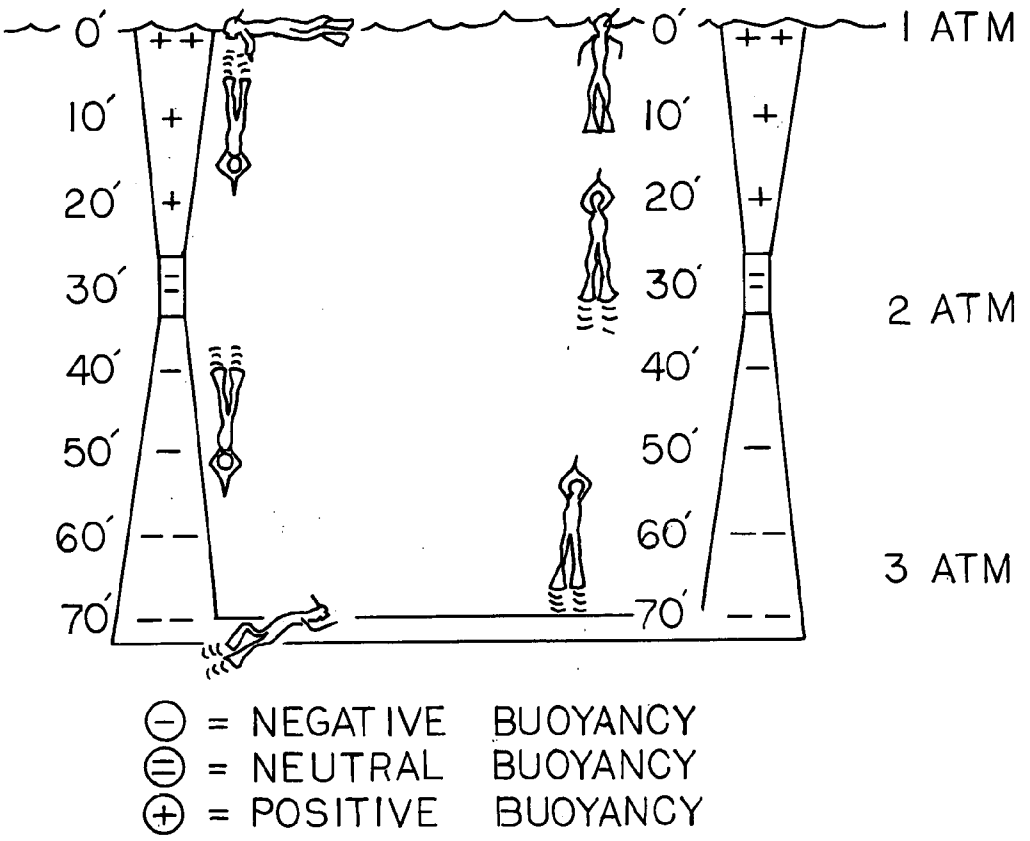
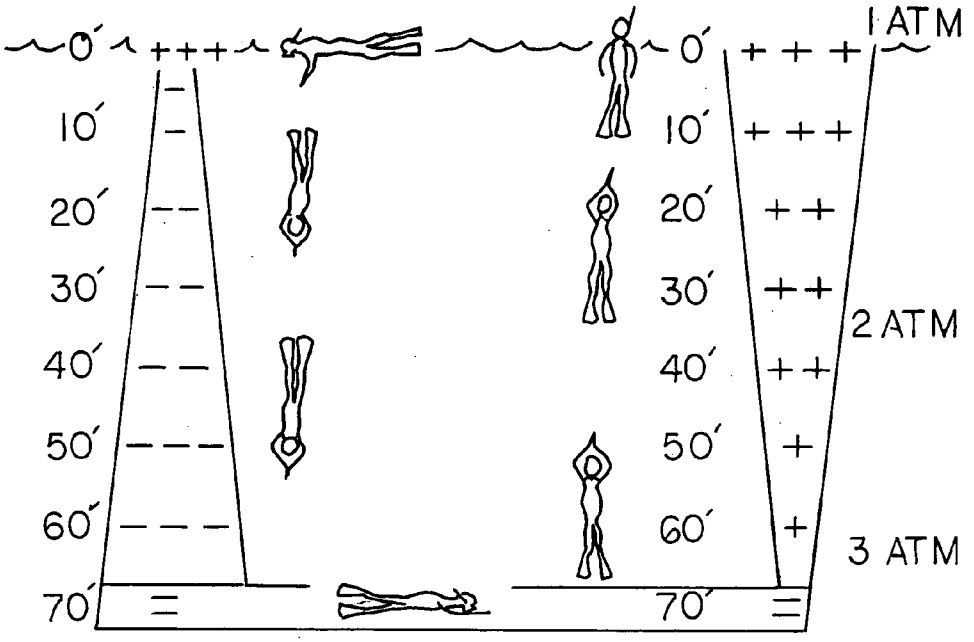


FIG. 1

VARIABLE BUOYANCY
FREE DIVER



⊖ = NEGATIVE BUOYANCY

⊜ = NEUTRAL BUOYANCY

⊕ = POSITIVE BUOYANCY

FIG. 2

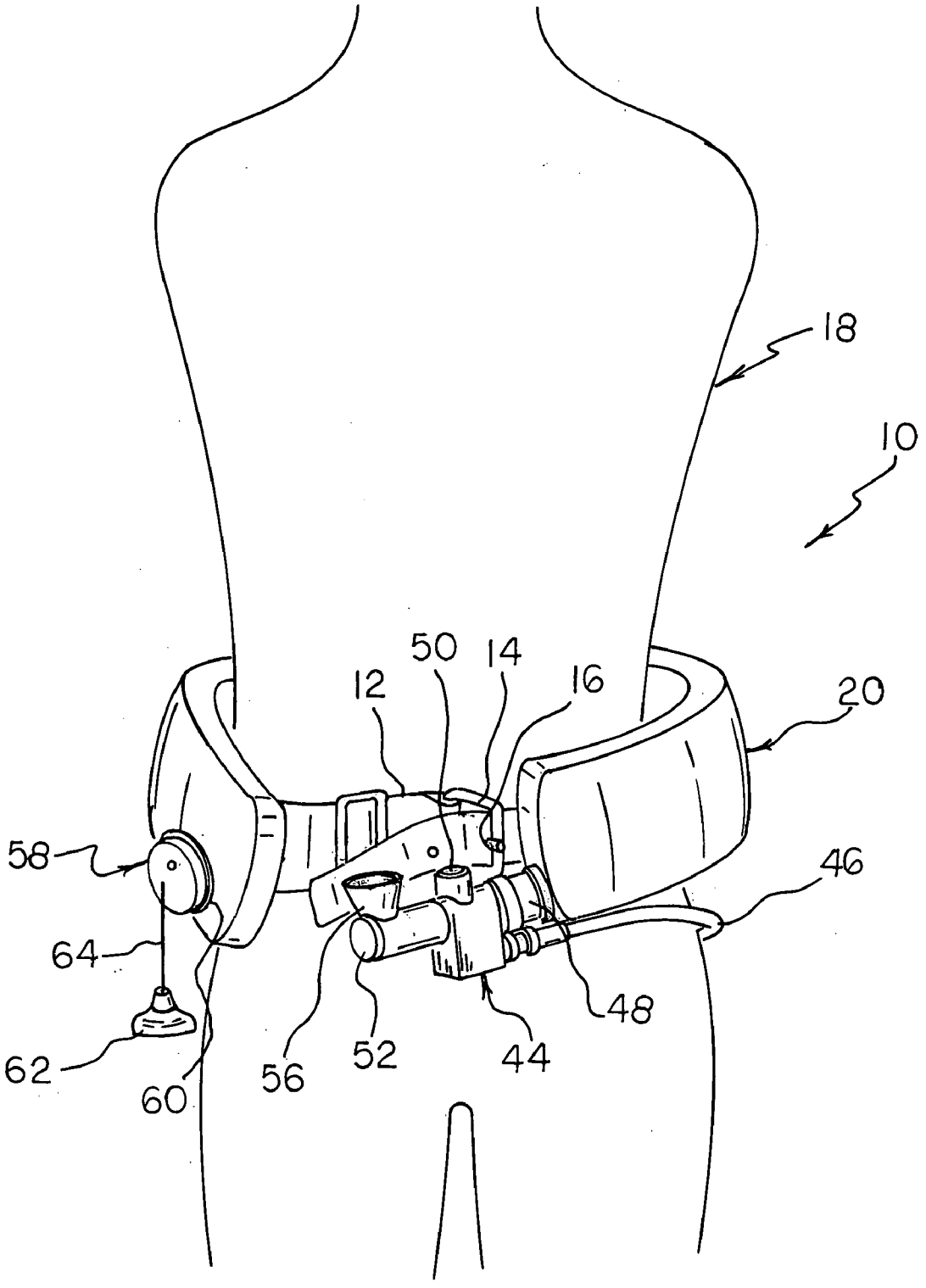


FIG. 3

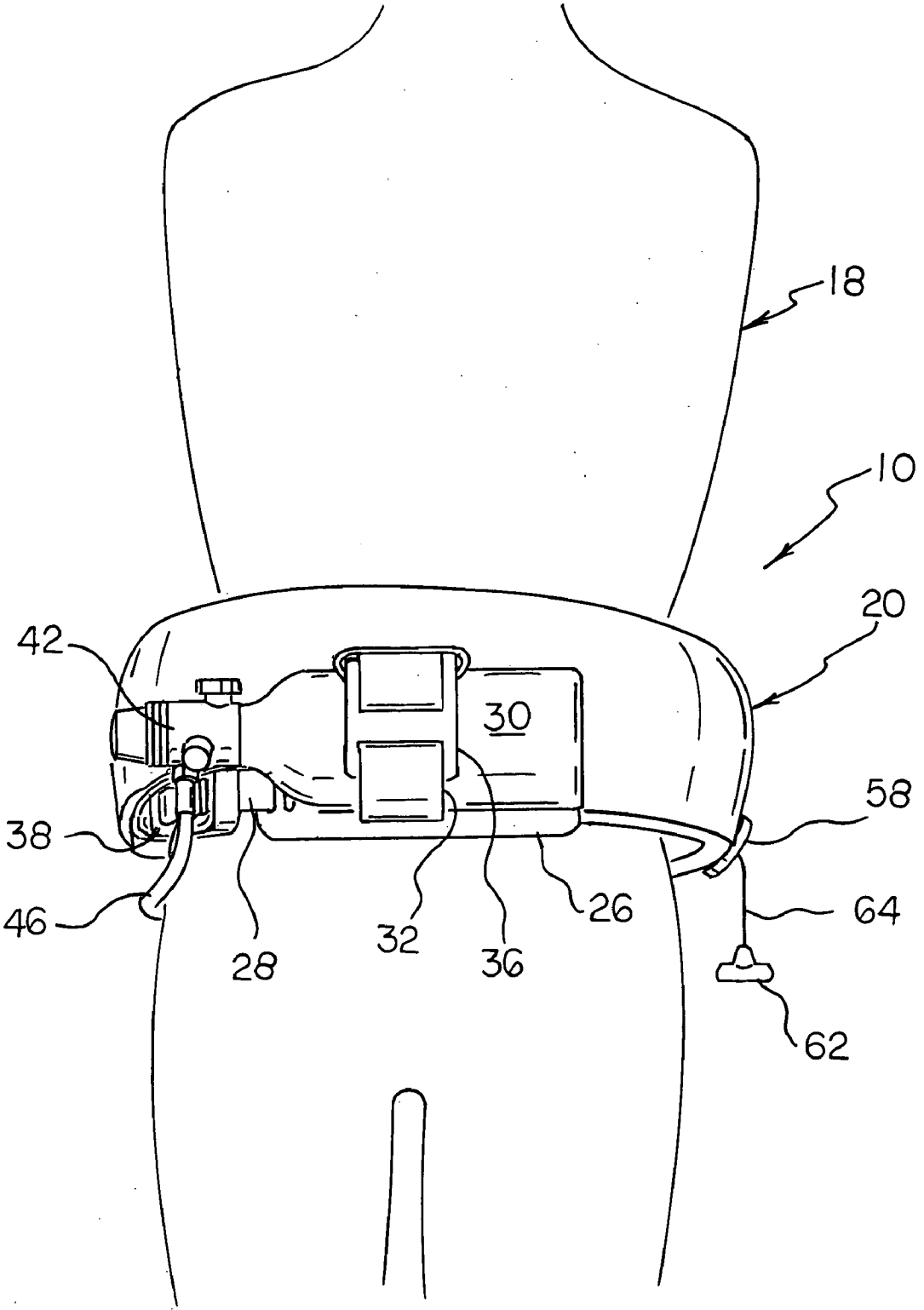


FIG. 4

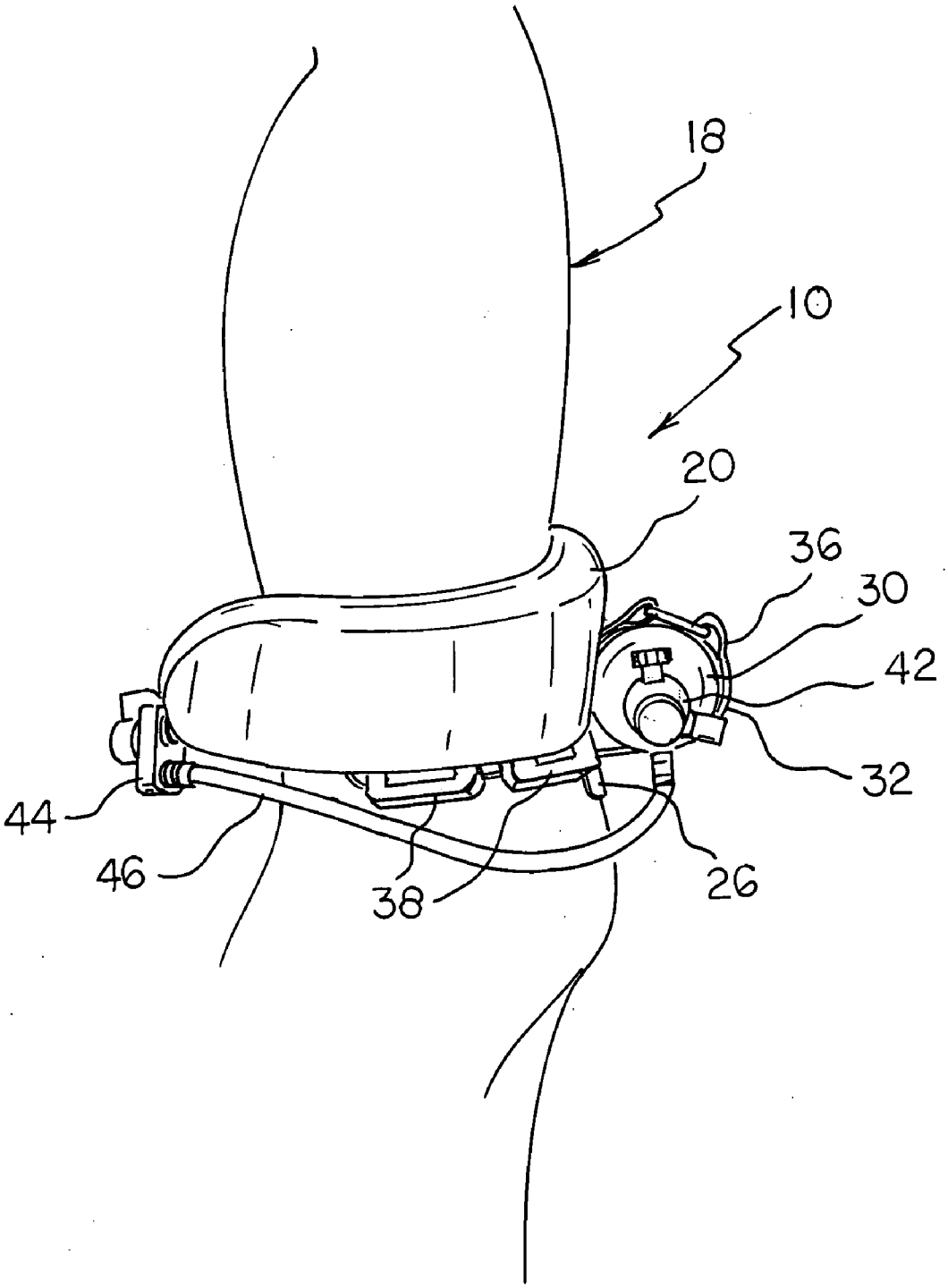


FIG. 5

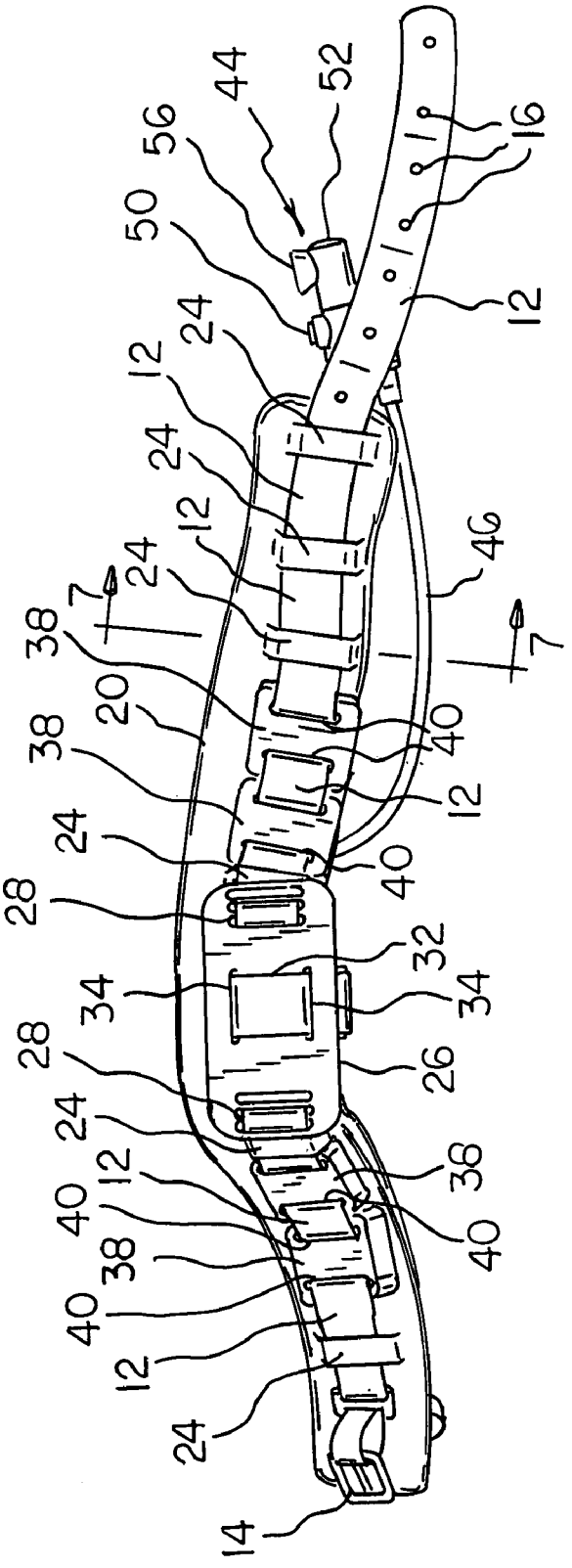


FIG. 6

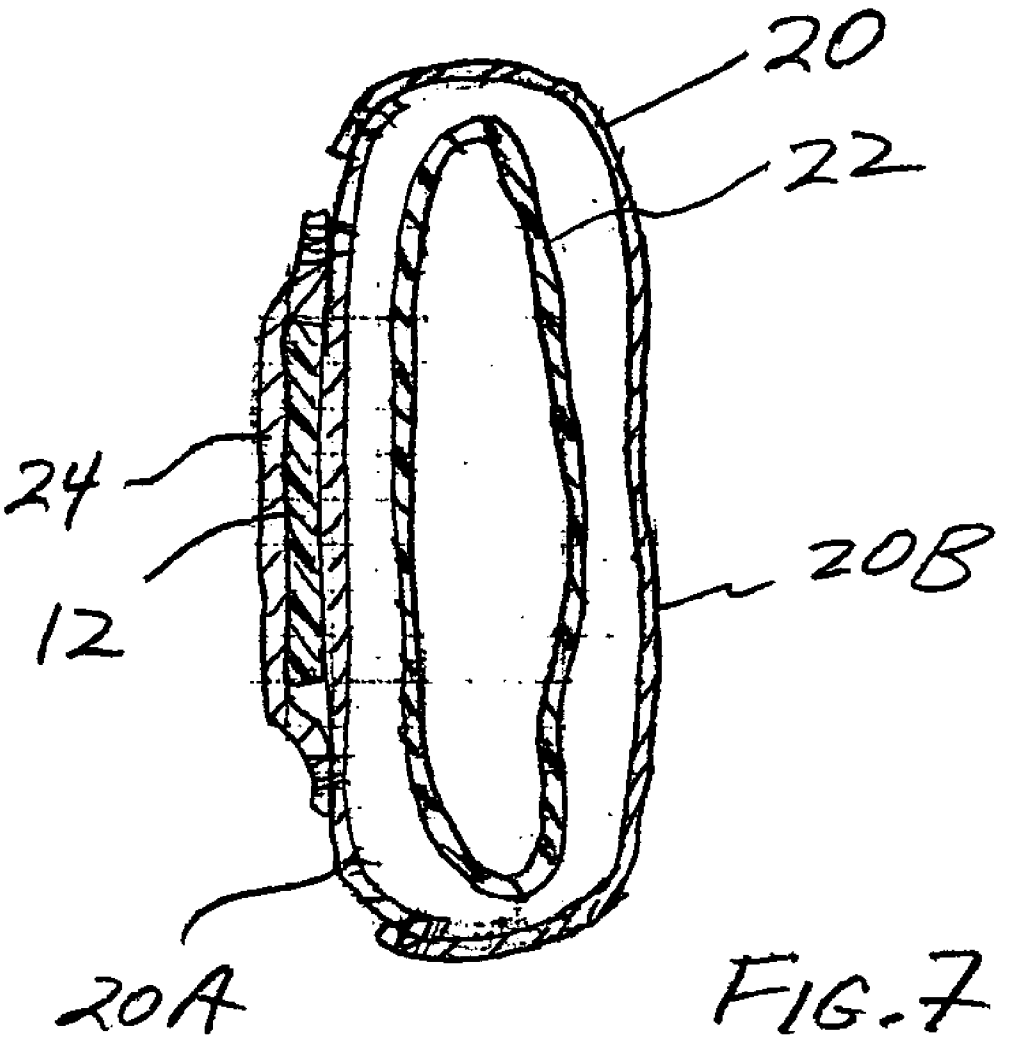


FIG. 7

BUOYANCY COMPENSATOR BELT

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] This invention relates generally to buoyancy compensators. More particularly, this invention relates to buoyancy compensators having a buoyancy bladder and an inflation valve for inflating the bladder with air to achieve a positive buoyancy.

[0003] 2. Description of the Background Art

[0004] Early scuba diving equipment typically comprised a scuba tank and a two-stage regulator allowing the diver to breathe air from the tank upon demand. To overcome positive buoyancy, particularly when a diver may don a wet suit for cold water protection, weight belts were developed that typically comprised a belt that would be fitted around the diver's waist. One or more weights, typically in the form of a rectangular blocks of lead with slots formed therein, would be threaded onto the belt to provide the desired weight sufficient to achieve negative buoyancy. The use of weight belts of this nature assured that the diver would remain negatively buoyant during diving. To remain a desired depth, negatively-buoyant divers would have to swim upwardly to some extent. Nevertheless, a negatively-buoyancy was commonly preferred over having positive buoyancy because for most divers, having to constantly swim up to overcome negative buoyancy was easier than having to constantly swim down to overcome positive buoyancy.

[0005] In response to a need for overcoming negative buoyancy, inflatable buoyancy vests or "buoyancy compensators" or "BCs" comprising an inflatable bladder, were developed. Upon inflation of the bladder of the BC, the diver could adjust the resulting positive buoyancy to equal the negative buoyancy created by the diver's weight belt, thereby achieving neutral buoyancy.

[0006] The bladders of early models of BCs were designed to be manually inflated via an inflation tube into which the diver would exhale, whereas later models were connected to the scuba tank by an inflation valve and hose such that the diver could selectively inflate the bladder of the BC with air from the scuba tank, thereby obviating the need for manual inflation. In conjunction with the inflation valve, most BCs included a bleed valve to bleed off air within the bladder to more accurately "fine tune" neutral buoyancy. BCs also commonly included an over-inflation "dump" valve which automatically opened at a certain internal pressure within the bladder to prevent the bladder from bursting in the event of over-inflation.

[0007] Presently there exist many forms and configurations for weight belts and for buoyancy compensator vests. Representative weight belts are reflected in the following U.S. Patents and Patent Applications, the disclosures of which are hereby incorporated by reference herein:

2002/00567955A1	Active Control Releasable Ballast System for Use With Dive Equipment
4,305,685	Quick Release Divers Belt
4,808,033	Flexible Pressure Compensating Divers Weight Belt
5,205,672	Diver's Weight Assembly
5,337,935	Belt Structure, Particularly for Accessories
5,746,542	Drop Weight Dive Belt
5,970,526	Adjustable Multi-Part Belt
6,132,142	Drop Weight Dive Belt

[0008] Contemporary buoyancy compensator vests, some integrated with weights, are illustrated in the following U.S. Patents and Patent Applications, the disclosures of which are hereby incorporated by reference herein:

2005/0276664A1	Retainer Device for Free Loose Ends of Tightening or Fastening Straps or Belts, or the Like, Particularly in Articles for Wearing, and Buoyancy Compensator Vest Having Such a Device
2005/0235393A1	Diving Vest
2001/0029951A1	Supplied Air Snorkeling System
2002/0013107A1	Buoyancy Compensator Weight System
2002/0009335A1	Vertically Eccentric, Horizontally Symmetric, Mobile and Fixed Buoyant in Combination With Mobile and Fixed Ballast as a Type A Personal Flotation Device
3,898,705	Convertible Inflation Control For Underwater Diving Vests
4,000,534	Buoyancy Compensator
4,523,914	Conformable Buoyancy Compensator
4,694,772	Diver's Buoyancy Compensator Belt
4,752,263	Custom Underwater Diving System
4,752,263	Custom Underwater Diving System
4,778,307	Buoyancy Compensator With An Adjustable Strap
4,810,134	Single Walled Diver's Buoyancy Compensator
4,913,589	Diver's Buoyancy Compensator And Backpack With Independent Suspension
5,046,894	Buoyancy Compensator With Interchangeable Backpack and Cummerbund
5,363,790	Buoyancy Compensator for Divers
5,516,234	Pressure Compensating Buoyancy Jacket

[0009] BCs are universally used throughout the scuba diving industry. However, BCs have not been used by "free divers" who choose not to utilize a scuba tank for breathing. Specifically, the sport of free diving typically comprises a diver who takes a deep breath of air on the surface and then swims downwardly into the water to descend to the desired depth and then, after spending the amount of time that the diver's deep breath would allow, to then swim upwardly to return to the surface for another breath of air. The eloquence of skin diving has been the diver's choice to not use a scuba tank, a BC, or any other cumbersome apparatus.

[0010] As represented in FIG. **1**, typical free diver is naturally buoyant (represented by the +signs in FIG. **1**). During a free dive, the diver's buoyancy decreases relative to the depth in which the diver descends. Ultimately, the diver descends to a depth at which the diver becomes neutrally buoyant (represented by the =signs in FIG. **1**). Upon further descent, the diver becomes increasingly negatively buoyant (represented by the −signs in FIG. **1**). Upon reaching the desired depth (e.g., just above the ocean floor), the diver is appreciably negative buoyant (represented by increased number of the −signs in FIG. **1**), thereby requiring considerable effort on the part of the diver to swim partially upwardly just to remain at the desired depth. Then, upon ascent, the diver must exert considerable effort to swim upwardly to overcome the negative buoyancy to the neutral-buoyancy depth; whereupon the diver becomes increasingly positive buoyant until the diver reaches the surface (repre-

sented by the increased width of the profile and the increased number of the +signs in FIG. **1**).

[0011] It should be appreciated that a free diver wearing a wet suit would likely not ever achieve negative buoyancy during descent due to the substantially buoyancy force of the wet suit. Accordingly, most free divers who are diving with wet suits (and some who are too buoyant even without a wet suit) wear conventional weight belts to counteract the buoyancy of the wet suit (or their inherent buoyancy). As a general rule, the weight of the weight belt is often selected so that the point of neutral buoyancy upon descent is approximately one-third to one-half of the desired depth at which the free diver will descend and swim around before swimming upwardly to return to the surface.

[0012] Consequently, as shown in FIG. **1**, a diver who is for example free diving to the ocean floor at seventy feet, would likely select the weight of his weight belt relative to his inherent buoyancy and the buoyancy of a wet suit (if one is being worn), such that the diver is appreciably buoyant at the surface of the water and progressively reduces positive buoyancy (represented by the decreased width of the profile and decreased number of the +signs in FIG. **1**) until the diver descends to about thirty feet to the point of neutral buoyancy. With the weight so selected, upon further descent, the diver achieves a progressively increasing negative buoyancy to the desired seventy foot depth (represented by the increased width of the profile and increased number of the −signs in FIG. **1**). At the seventy foot depth, the diver is appreciably negatively buoyant but is able to maintain a constant depth by slighting swimming upwardly.

[0013] Before exhausting all of the air in his lungs, the diver must then swim quite vigorously upwardly to overcome the negative buoyancy from the seventy feet depth to the point of neutral buoyancy (thirty feet) whereupon further ascents gradually increases the diver's positive buoyancy to return to the surface.

[0014] While the dive profile depicted in FIG. **1** is often employed by free divers, there is the unfortunate tendency for divers to "black out" during their ascents because of the vigorous exertion that is required to begin and maintain the ascent against the force of the negative buoyancy. Worst, upon blacking-out during ascent when the diver is negatively buoyant (or by becoming negatively buoyant at the surface upon exhausting all his air), the diver simply sinks to the ocean depths, thereby precluding any rescue.

[0015] Therefore, there presently exists a need for a streamline, unobtrusive buoyancy compensator that can be worn by a free diver without obstructing the diver's movements to assist the diver during ascents to overcome negative buoyancy and thereby eliminate the exertion that would otherwise be required of the diver to initiate and maintain the diver's ascent to the surface.

[0016] Therefore, it is an object of this invention to provide an improvement which overcomes the aforementioned inadequacies of the prior art devices and provides an improvement which is a significant contribution to the advancement of the buoyancy compensator art.

[0017] Another object of this invention is to provide a buoyancy compensator belt, comprising in combination: a belt configured to be worn around a person's waist; a generally tubular inflation bladder mounted relative to the belt to be bent around the person's waist along with the belt; optionally at least one weight mounted relative to the belt; a gas cylinder mounted relative to the belt; a power inflator sealingly connected to the inflation bladder and operatively connected to the gas cylinder to selectively allow gas from the gas cylinder to inflate the inflation bladder; and a dump valve for exhausting the gas from the inflation bladder when the pressure in the inflation bladder reaches a predetermined amount.

[0018] Another object of this invention is to provide a method for free diving using a weighted buoyancy compensator belt, comprising the steps of: positioning a weighted buoyancy compensator belt around the waist of a diver, the weighted buoyancy compensator belt comprising a belt, a generally tubular inflation bladder mounted relative to the belt and bent around the diver's waist along with the belt, at least one weight mounted relative to the belt, a gas cylinder mounted relative to the belt, a power inflator sealingly connected to the inflation bladder and operatively connected to the gas cylinder to selectively allow the diver to inflate the inflation bladder from the gas cylinder into the inflation bladder to inflate the inflation bladder and create positive buoyancy, and an exhaust valve sealingly connected to the inflation bladder for exhausting the gas from the inflation bladder to decrease buoyancy; operating the exhaust valve to exhaust gas from the inflation bladder to decrease buoyancy thereby causing the diver to descent; and operating the inflation valve to flow gas into the inflation bladder to increase buoyancy thereby causing the diver to ascend.

[0019] The foregoing has outlined some of the pertinent objects of the invention. These objects should be construed to be merely illustrative of some of the more prominent features and applications of the intended invention. Many other beneficial results can be attained by applying the disclosed invention in a different manner or modifying the invention within the scope of the disclosure. Accordingly, other objects and a fuller understanding of the invention may be had by referring to the summary of the invention and the detailed description of the preferred embodiment in addition to the scope of the invention defined by the claims taken in conjunction with the accompanying drawings.

SUMMARY OF THE INVENTION

[0020] For the purpose of summarizing this invention, this invention comprises a buoyancy compensator (BC) belt, preferably weighted, for use by snorkelers, scuba divers and free divers. When weighted, the BC of the invention is particularly suitable for use for free diving to allow the diver to rapidly descend to the desired depth due to the negative buoyancy produced by the weight of the belt, secondly, to allow the diver to partially inflate the BC to achieve neutral buoyancy at the desired depth, and then, when the diver wishes to ascend, to more fully inflate the BC to achieve positive buoyancy and rapidly ascend to the surface without exerting any effort to do so.

[0021] The buoyancy compensator belt of the invention comprises a belt to which is mounted an inflatable bladder positioned within a flexible housing and a small gas cylinder. One or more weights may optionally be mounted onto the belt. A combination power inflation/bleed valve is operatively connected to the inflatable bladder and is fluidly connected to a first stage regulator of the gas cylinder by a hose. A dump valve is operatively connected to the bladder to prevent over-inflation and allow dumping of the air from the bladder. Notably, the gas cylinder is small and compact and is intended to be used to inflate the bladder. The gas cylinder is not intended to be used by the diver for breathing.

[0022] FIG. **2** illustrates the dive profile of a free diver using the weighted buoyancy compensator of the invention. Referring to FIG. **2**, during use, the diver may upon entering the water inflate the bladder to create significant buoyancy to relaxingly float on the surface of the water (represented by the =signs in FIG. **2**). When the diver desires to descend, the air from the bladder may be "dumped" via the dump valve (or slowly bleed off via the bleed valve) whereupon the diver begins to achieve negative buoyancy (represented by the −signs in FIG. **2**). As the diver descends, greater negative buoyancy is attained due to the increasing depth of the water (represented by the increased dive profile and the increased number of the −signs in FIG. **2**).

[0023] As the diver approaches the desired depth, the diver may power inflate the bladder via the power inflator to slow his descent such that upon reaching the desired depth, the diver is substantially neutrally buoyant (represented by the =signs in FIG. **2**). The diver may fine tune his neutral buoyancy via the bleed valve. While neutrally buoyant, the diver may swim around as desired (observing the reef, spear fishing, etc.) at a constant desired depth without having to constantly swim up to counteract the affects of negative buoyancy as would otherwise occur without the positive buoyancy created by the air in the bladder.

[0024] When the diver wishes to surface, the diver would normally kick up slightly while at least partially inflates the bladder via the power inflator to thereby begin to achieve positive buoyancy (represented by the +signs in FIG. **2**). As the diver ascends, the volume of air in the bladder expands due to the decreasing water pressure, whereupon additional positive buoyancy is achieved to more rapidly cause the diver to ascend (represented by the increased dive profile and the increased number of +signs in FIG. **2**). Once the bladder fully expands due to the increasing volume of air, the dump valve opens to dump (i.e., exhaust) air from the bladder and thereby prevent it from bursting. The diver is thus rapidly ascending to the surface (and continues to increase his rate of ascent until reaching the surface of the water due to the decreasing water pressure). Upon reaching the surface, the bladder is fully inflated such that the diver may relax at the surface until he is ready for his next free dive.

[0025] It is noted that while the diver is rapidly ascending, there is no concern that the diver's lungs will suffer an embolism since he simply descended from surface with a deep breath of air and, unlike conventional scuba diving, never breathed compressed gas from the gas cylinder.

[0026] It should be appreciated that the weighted buoyancy compensator belt of the invention allows a free diver to (1) produce significant negative buoyancy to rapidly descend to the desired depth, (2) produce a neutral buoyancy to maintain a constant depth and then (3) produce a significant positive buoyancy to rapidly ascend to the surface of the water and relaxingly float on the surface for a period of rest until the next free dive.

[0027] The buoyancy compensator belt of the invention is suitable for use as a BC for conventional scuba diving and for snorkelers, as well as for free divers as described above, because it comfortably fits around the person's waist to achieve a streamlined assembly that does not interfere or otherwise create a hindrance. Specifically, the BC belt of the invention provides an upright stable floatation for the person on the surface and eliminates the face forward or backward floatation that would often occur if the person was using a vest-type buoyancy compensators with rear- or chest-mounted internal bladders. The belt of the BC belt of the invention is elastic to allow it to be tightly fitted around the person's waist to expand or contract during diving. Accordingly, use of the BC belt of the invention eliminates "riding-up" of the BC as often occurs with vest-type BCs.

[0028] The use of the weighted buoyancy compensator belt of the invention by a free diver allows the diver to safely descend to the desired depth and return to the surface with minimal effort, thereby reducing the possibility of the diver blacking-out upon ascent as sometimes occurs without the benefit of the weighted buoyancy compensator belt of the invention. Moreover, if the free diver were to black out upon ascent, the positive buoyancy of the weighted buoyancy compensator belt of the invention may provide sufficient buoyancy (assuming the diver did not black out on the bottom and was not over-weighted) to nevertheless cause the diver to ascend to and float onto the surface of the water to be rescued (instead of sinking to the bottom as would otherwise occur without the benefit of the weighted buoyancy compensator belt of the invention).

[0029] The foregoing has outlined rather broadly the more pertinent and important features of the present invention in order that the detailed description of the invention that follows may be better understood so that the present contribution to the art can be more fully appreciated. Additional features of the invention will be described hereinafter which form the subject of the claims of the invention. It should be appreciated by those skilled in the art that the conception and the specific embodiment disclosed may be readily utilized as a basis for modifying or designing other structures for carrying out the same purposes of the present invention. It should also be realized by those skilled in the art that such equivalent constructions do not depart from the spirit and scope of the invention as set forth in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings in which:

[0031] FIG. **1** is a dive profile of a conventional prior art free diver;

[0032] FIG. **2** is a dive profile of a free diver employing the benefit of the weighted buoyancy compensator belt of the invention;

[0033] FIG. **3** is a front perspective view of the weighted buoyancy compensator belt of the invention shown being fitted around the waist of a mannequin;

[0034] FIG. **4** is a rear perspective view of the weighted buoyancy compensator belt of the invention shown being fitted around the waist of a mannequin;

[0035] FIG. **5** is a left side perspective view of the weighted buoyancy compensator belt of the invention shown being fitted around the waist of a mannequin;

[0036] FIG. **6** is a perspective inside view of the weighted buoyancy compensator belt of the invention showing the inside of the belt that fits against the diver's waist and the manner in which the desired number of weights and the gas cylinder mounting plate are threaded onto belt and the manner in which the belt is threaded through belt loops sewn to the inside surface of the bladder housing such that the bladder housing is supported by the belt about the waist of the diver; and

[0037] FIG. **7** is a cross-sectional view of FIG. **6** along lines **7-7** showing the cross-sectional configuration of the bladder housing and its internal inflation bladder.

[0038] Similar reference characters refer to similar parts throughout the several views of the drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0039] Referring to the Figures, the buoyancy compensator belt **10** of the invention comprises a thick, wide belt **12**, preferably of pliable plastic that is elastic, having a belt buckle **14** at one end which adjustably engages one of a plurality of belt holes **16** at its other end to fit the waist of the free diver (shown in FIGS. **1-3** for illustrative purposes as the mannequin **18**). The preferred elasticity of the belt **12** is such that when tightly fitted around the diver's waist, it will expand and contract along the conventional expansion and contraction of the diver's waist during to the dive to thereby remain fitted around the diver's waist without riding-up the diver's chest during head-up ascent or riding-down onto the diver's legs during head-down decent. It is noted that other forms of belts (e.g., fabric or other materials) and belt buckles may optionally be employed without departing from the spirit and scope of this invention.

[0040] The buoyancy compensator belt **10** of the invention comprises a generally tubular bladder housing **20** in which is positioned an inflation bladder **22** (see FIG. **7**). The bladder housing **20** preferably comprises a non-elastic fabric material **20**A on its inner surface adjacent the diver's **18** waist and an elastic fabric material **20**B on its outer surface. The elastic material **20**B is flexible to expand when the inflation bladder **22** is filled with air and then, when the air is exhausted, the elastic material **20**B provides a contraction force to urge air contained in the inflation bladder **22** to be exhausted whereupon the bladder housing **20** returns to its streamlined configuration once the bladder **22** is deflated. The length of the bladder housing **20** and its internal bladder **22** preferably approximates the length of the belt **12** to be fitted around a normal-sized free diver's **18** waist (e.g., about 34 inches).

[0041] The bladder housing **20** includes a plurality of belt loops **24** sewn to its inside surface through which the belt **12** may be threaded as described below in more detail. The length of the belt loops **24** approximates the width of the belt **12** such that when the belt **12** is threaded therein the tendency for the bladder housing to rotate on the belt **12** in minimized.

[0042] The diameter of the tubular bladder housing **20** and its internal bladder **22** is such that when the bladder **22** is fully inflated, the housing **20** achieves a substantially round or oval uniform cross-sectional tubular configuration (e.g., of about 6 inches) that can be easily bent around the diver's **18** waist as the belt **12** is tighten around the diver's **18** waist. In this regard, the fabric material constituting the bladder housing **20** is preferably non-elastic to retain the substantially round or oval uniform cross-sectional configuration when the inflation bladder **22** is inflated.

[0043] A generally rectangular air-cylinder mounting plate **26** with opposing vertical belt slots **28** at each end is provided to which is mounted a small gas cylinder **30** (e.g., 5 cubic feet). The mounting plate **26** is supported by the belt **12** by threading the belt **12** through the belt slots **28** in the plate **26**. Preferably, for best support, the layout of the belt loops **16** of the bladder housing **20** is such that belt loops **16** are positioned on opposing sides of the mounting plate **26**. Also preferably, the layout is such that the mounting plate **26** and hence the gas cylinder **30** is mounted at the small of the diver's **18** back (see FIG. **4**) when the weighted buoyancy compensator belt of the invention is worn by the diver **18**.

[0044] The gas cylinder **30** is horizontally mounted to the mounting plate **26** by a conventional tank strap **32** that is threaded through corresponding horizontal slots **34** formed in the mounting plate **26** to releasably secure the gas cylinder **30** to the mounting plate **26** by a conventional releasable tank buckle **36**. It is noted that other forms of tank straps and tank buckles may be employed without departing from the spirit and scope of this invention.

[0045] In one embodiment of the buoyancy compensator belt **10** of the invention, at least one weight **38**, but usually several weights **38**, such as a conventional rectangular lead weights **38** with vertical belt slots **40** formed therein, are threaded onto the belt **12**. It is noted that other forms of weights **38**, such as bagged shot weight, may be employed without departing from the spirit and scope of this invention. Preferably, the layout of the belt loops **24** of bladder housing **20** is such that they are positioned on opposing sides of the weights **38** to provide support. It is also noted that the use of weights **38** is optional in that the buoyancy compensator belt **10** of the invention may be used with a conventional weight belt thereby obviating the need for weights **28** mounted onto the belt **12** of the buoyancy compensator belt **10** of the invention.

[0046] The gas cylinder **30** for inflating the inflation bladder **22** is fitted with a first stage regulator **42** to reduce the gas cylinder pressure to a usable level. The first stage regulator **42** preferably includes an internal pressure gauge indicating to the diver **18** the amount of internal pressure remaining in the gas cylinder **30**. Also, the first stage regulator is preferably configured to be refilled with air from a scuba tank or other source of air. In this regard, it is noted that the size and hence the volume of the gas cylinder **30** is very small compared to conventional scuba tanks because it is only used to inflate the inflation bladder **22** and is not used by the diver **18** to breathe from as in the case of a conventional scuba tank. The gas cylinder **30** need only be of sufficient volume to inflate the inflatable bladder **22** a small number of times (e.g., 10-15) consistent with the number of times a free driver would dive before getting back on the boat, whereupon it may then be easily refilled from a conventional scuba tank.

[0047] A power inflation/bleed valve **44** is positioned at one end of the bladder housing **20** operatively fed by a quick-disconnect hose **46** that runs around the side of the diver's **18** waist to the first stage regulator **42**. The power inflation/bleed valve **44** includes an output that is sealingly connected through an opening **48** in the bladder housing **20** to the inflation bladder **22**. The power inflation/bleed valve **44** comprises an inflation valve **50** allowing the diver **18** to inflate the inflation bladder **22** with air from the gas cylinder **30**. The power inflation/bleed valve **44** preferably includes a bleed valve **52** to allow the diver to bleed air from the inflation bladder **22** to reduce or fine tune the buoyancy created by the air in the inflation bladder **22**. The power inflation/bleed valve **44** may also include a manual inflator **56** to allow the diver **18** to manually inflate the inflation bladder **22** via its mouthpiece.

[0048] A dump valve **58** is fitted through an opening **60** of the bladder housing **20** and is sealingly connected to the

inflation bladder **22**. The dump valve **58** comprises an internal over-pressurization valve (not shown) that limits the air pressure inside the inflation bladder **22** by opening to "dump" or exhaust air when the internal pressure reaches a predetermined amount, thereby preventing bursting of the inflation bladder **22**. Preferably, the dump valve **58** includes a pull handle **62** that is operatively connected to the internal over-pressurization valve by a tether **64** that allows the diver **18**, upon pulling of the pull handle **62**, to manually dump air from the inflation bladder **22**. As best shown in FIG. **1**, the dump valve **58** is preferably positioned near the other end of the bladder housing **20** opposite the power inflator/bleed valve **44** where its pull handle **62** may be easily grasped by the diver's **18** hand.

[0049] The present disclosure includes that contained in the appended claims, as well as that of the foregoing description. Although this invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention.

[0050] Now that the invention has been described,

What is claimed is:

1. A buoyancy compensator belt, comprising in combination:

a belt configured to be worn around a person's waist;

a generally tubular inflation bladder mounted relative to said belt to be bent around the person's waist along with said belt;

a gas cylinder mounted relative to said belt;

a power inflator sealingly connected to said inflation bladder and operatively connected to said gas cylinder to selectively allow gas from said gas cylinder to inflate said inflation bladder; and

a dump valve for exhausting said gas from said inflation bladder when the pressure in said inflation bladder reaches a predetermined amount.

2. The buoyancy compensator belt of the invention, further comprising at least one weight mounted relative to said belt.

3. The buoyancy compensator belt of claim **1**, further including a bladder housing in which said inflation bladder is positioned, said bladder housing including at least one belt loop through which said belt is threaded to mount said inflation bladder relative to said belt.

4. The buoyancy compensator belt of claim **2**, wherein said weight comprises a belt slot through which said belt is threaded to mount said weight to said belt.

5. The buoyancy compensator belt of claim **1**, further including a first stage regulator operatively connected to said gas cylinder to which said power inflator is operatively connected to selectively allow gas from said gas cylinder to inflate said inflation bladder.

6. The buoyancy compensator belt of claim **5**, wherein said first stage regulator allows refilling of said gas cylinder.

7. The buoyancy compensator belt of claim **6**, wherein said gas cylinder to mounted midway on said belt to be positioned at the small of the diver's back, wherein said inflation valve is mounted relative to one end of said inflation bladder, and wherein said inflation valve is operatively connected to said gas cylinder by a hose that extends around the side of the waist of the diver to the inflation valve.

8. The buoyancy compensator belt of claim **7**, wherein said dump valve is mounted relative to another end of said inflation bladder.

9. The buoyancy compensator belt of claim **1**, wherein said inflation valve includes a bleed valve.

10. The buoyancy compensator belt of claim **1**, wherein said dump valve includes a manual dump valve operable upon pulling on a pull handle.

11. The buoyancy compensator belt of claim **1**, wherein said gas cylinder is mounted relative to said belt by a mounting plate to which said gas cylinder is removably mounted by a tank strap and buckle.

12. The buoyancy compensator belt of claim **1**, wherein said mounting plate comprises at least one slot through which said belt is threaded.

13. The buoyancy compensator belt of claim **2**, wherein said weight is mounted relative to said belt by at least one slot through which said belt is threaded.

14. A method for free diving using a weighted buoyancy compensator belt, comprising the steps of:

positioning a weighted buoyancy compensator belt around the waist of a diver, the weighted buoyancy compensator belt comprising a belt, a generally tubular inflation bladder mounted relative to the belt and bent around the diver's waist along with the belt, at least one weight mounted relative to the belt, a gas cylinder mounted relative to the belt, a power inflator sealingly connected to the inflation bladder and operatively connected to the gas cylinder to selectively allow the diver to inflate the inflation bladder from the gas cylinder into the inflation bladder to inflate said inflation bladder and create positive buoyancy, and an exhaust valve sealingly connected to the inflation bladder for exhausting said gas from said inflation bladder to decrease buoyancy;

operating the exhaust valve to exhaust gas from the inflation bladder to decrease buoyancy thereby causing the diver to descent; and

operating the inflation valve to flow gas into the inflation bladder to increase buoyancy thereby causing the diver to ascend.

15. The method as set forth in claim **14**, wherein the exhaust valve comprises a dump valve to dump gas from the inflation bladder when the gas pressure in the inflation bladder reaches a predetermined amount such that upon ascent, the increasing volume of gas inside the inflation bladder is exhausted and does not burst the inflation bladder.

16. The method as set forth in claim **15**, wherein the exhaust valve comprises a bleed valve allowing the diver to exhaust gas from the inflation bladder to decrease positive buoyancy thereby allowing the diver to achieve a neutral buoyancy by bleeding gas from the inflation bladder.

17. The method as set forth in claim **16**, wherein the gas cylinder is mounted midway on said belt to be positioned at the small of the diver's back, wherein the dump valve comprises a manual dump valve having a pull handle to allow manual exhaustion of gas from the inflation bladder.

18. The method as set forth in claim **17**, wherein the inflation valve is mounted relative to one end of the inflation bladder, wherein the dump valve is mounted relative to the other end of the inflation bladder, and wherein the inflation

valve is operatively connected to the gas cylinder by a hose that extends around the side of the waist of the diver to the inflation valve, whereby the gas cylinder is mounted away from the diver's hands, and whereby the inflation valve and the dump valve may each be easily operated by one of the diver's hands, respectively.

19. A method for free diving using a buoyancy compensator belt, comprising the steps of:

positioning a buoyancy compensator belt around the waist of a diver, the weighted buoyancy compensator belt comprising a belt, a generally tubular inflation bladder mounted relative to the belt and bent around the diver's waist along with the belt, a gas cylinder mounted relative to the belt, a power inflator sealingly connected to the inflation bladder and operatively connected to the gas cylinder to selectively allow the diver to inflate the inflation bladder from the gas cylinder into the inflation bladder to inflate said inflation bladder and create positive buoyancy, and an exhaust valve sealingly connected to the inflation bladder for exhausting said gas from said inflation bladder to decrease buoyancy;

mounting at least one weight on the diver;

operating the exhaust valve to exhaust gas from the inflation bladder to decrease buoyancy thereby causing the diver to descent; and

operating the inflation valve to flow gas into the inflation bladder to increase buoyancy thereby causing the diver to ascend.

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