



**DEPARTMENT OF THE NAVY**  
OFFICE OF COUNSEL  
NAVAL UNDERSEA WARFARE CENTER DIVISION  
1176 HOWELL STREET  
NEWPORT RI 02841-1708

IN REPLY REFER TO:

Attorney Docket No. 80036  
Date: 19 July 2002

The below identified patent application is available for licensing. Requests for information should be addressed to:

PATENT COUNSEL  
NAVAL UNDERSEA WARFARE CENTER  
1176 HOWELL ST.  
CODE 000C, BLDG. 112T  
NEWPORT, RI 02841

Serial Number      10/143,172  
Filing Date        7 MAY 2002  
Inventor            BILLY J. SHILLING

If you have any questions please contact Michael J. McGowan, Patent Counsel, at 401-832-4736.

MULTI-PURPOSE BACK BRACE

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT BILLY J. SHILLING citizen of the United States of America, employee of the United States Government, resident of Silver Spring, County of Montgomery, State of Maryland, has invented certain new and useful improvements entitled as set forth above of which the following is a specification:

PRITHVI C. LALL, ESQ.  
Reg. No. 26192  
Naval Undersea Warfare Center  
Division, Newport  
Newport, RI 02841-1708  
TEL: 401-832-4736  
FAX: 401-832-1231



23523

PATENT TRADEMARK OFFICE

20020729 193

2  
3 MULTI-PURPOSE BACK BRACE

4  
5 STATEMENT OF GOVERNMENT INTEREST

6 The invention described herein may be manufactured and used  
7 by or for the Government of the United States of America for  
8 governmental purposes without the payment of any royalties  
9 thereon or therefor.

10  
11 CROSS REFERENCE TO OTHER PATENT APPLICATIONS

12 Not applicable.

13  
14 BACKGROUND OF THE INVENTION

15 (1) Field of the Invention

16 The present invention relates to medical devices and more  
17 particularly to back braces.

18 (2) Brief Description of the Prior Art

19 Wide safety belts are now worn around the midriff of nearly  
20 all people who perform some type of labor requiring bending or  
21 lifting on a routine basis. However, these devices provide no  
22 back support or are even uncomfortable while worn seated.

23 Individuals with back problems may require support or protection  
24 from further injury while performing tasks standing or when  
25 seated with no backrest or one that is inappropriate.

1 Frequently, personnel of various occupations are required to  
2 carry or lift large loads to remote work areas or in the field  
3 and then operate or use this equipment. The use of equipment in  
4 various areas of operations may not afford many seats with  
5 backrests or proper back support. In these working conditions,  
6 heavy work involving lifting is performed followed by periods of  
7 seated activity or rest where a back brace may be most useful.

8 The prior art suggests a number of approaches to solving  
9 this problem. United States Patent No. 5,176,131 to Vote et al.,  
10 for example, discloses a back support for providing abdominal and  
11 lumbosacral support with a waistband of substantially  
12 unstretchable construction. An elastic band is operatively  
13 connected to the outer surface of the waistband. The waistband  
14 has a generally V shape, wherein the waistband resists riding up  
15 on a wearer. The elastic band is preferably releasably connected  
16 to the outer surface of the waistband. The support may also have  
17 a tool belt operatively connected thereto.

18 United States Patent No. 5,375,279 to Toso discloses a  
19 combination back support for use during stretching and/or sitting  
20 with the legs extended or not extended. The device includes a  
21 substantially rectangular lumber back support with a multiplicity  
22 of pairs of inelastic straps used in a first configuration to  
23 engage the knees of a user and with the addition of a strap  
24 extension used to engage the feet of a user. When the user is  
25 one of the various seated positions, the straps are connected to

1 form loops with are fitted over either the feet or knees of the  
2 user. As the user applies pressure with the feet or knees, the  
3 lumbar rectangular support is pulled tight around the user's  
4 lower back, providing ample support.

5 United States Patent No. 5,399,151 to Smith discloses a  
6 unisize type lifting belt containing basically three elements:  
7 the underlying wrap assembly with expandable back panel and  
8 overlapping closure ends; suspenders with four adjustable ends to  
9 secure to the underlying wrap assembly at varying positions in  
10 front and at two positions varying vertically in the rear; and  
11 expandable side pull portions, which have a pair of elastic band  
12 portions and removably secured end tabs is disclosed. The  
13 expandable side pulls are normally applied by snugly securing the  
14 side pulls to the underlying wrap assembly prior to lifting.

15 United States Patent No. 5,499,965 to Sanchez discloses a  
16 shaped lifting belt and method in which the shape is provided by  
17 deepening the central lumbar panel in the rear to a depth of at  
18 least an additional half of the depth of the side wraps, providing  
19 the lumbar panel with expandable elements, and then separating  
20 the ends of the wrap from the lumbar panel by shape panels, which  
21 are stretchable and positioned to engage the upper rear portion  
22 of the hips. The method of the invention requires the wearer to  
23 first engage the lifting belt assembly and secure the suspenders  
24 in the forward desirable position. Thereafter, the shape straps  
25 are secured to the inner portion of the wrap ends. The wrap ends

1 are then secured to a central portion of the body followed by  
2 substantially encircling the same with the side pulls. Where  
3 coloring is desired, the suspender assembly may be of a different  
4 color than the belt itself, and optionally a removable side pull  
5 may be color coded or otherwise decorated to suit the  
6 application.

7 United States Patent No. 5,503,620 to Danzger discloses a  
8 back support belt comprised of a primary support belt including  
9 fasteners for fastening the same generally at the frontal area of  
10 the waist of the wearer, and a secondary tensioning belt  
11 comprised of fasteners for fastening the same around the primary  
12 support belt generally at the frontal area of the waist of the  
13 wearer is provided, and includes back support belt color  
14 tensioning indicators on the secondary tensioning belt, which are  
15 visible only from the rear and side areas of the waist of the  
16 wearer, and thus not by the wearer, and which are operable to  
17 indicate both when the back support belt is properly tensioned  
18 around the waist of the wearer, and when the back support belt is  
19 not properly tensioned around the waist of the wearer, and when  
20 the back support belt is not properly tensioned around the waist  
21 of the wearer. The back support belt color tensioning indicators  
22 are operable to indicate proper and improper tensioning of the  
23 support belt independently of the relationship between the size  
24 of the support belt and the waist size of the wearer to thus be  
25 virtually foolproof in operation. For use in instances wherein

1 the wearer of the back support belt is forced to work in the  
2 absence of anyone qualified to observe the color tensioning  
3 indicators on the secondary tensioning belt, the back support  
4 belt will further include an additional color tensioning  
5 indicator taking the form of non-obscurable alignment marks  
6 formed on one of the primary support belt fasteners and co-  
7 operable with one of the secondary tensioning belt fasteners to  
8 indicate proper back support belt tensioning. The additional  
9 color-tensioning indicator is not, however, operable  
10 independently of the relationship between the size of the support  
11 belt and the waist size of the wearer, and is thus not foolproof  
12 in operation.

13 United States Patent No. 5,643,184 to Toso discloses a back  
14 support for engaging the lower back region of a user, including a  
15 pair of inelastic straps and/or a combination of inelastic and  
16 elastic straps structured to engage the knees and the feet of a  
17 user. When the user is in a seated position and requires  
18 additional back support, the straps are connected to the feet and  
19 knees to exert a force on the back support for supporting the  
20 user's lower back.

21 United States Patent No. 5,656,021 to Greengarg discloses  
22 various combinations of a detachable back belt, an apron and a  
23 lifting belt, which is a direct body-engaging member with ends  
24 that are closed underneath an apron. The lifting belt has  
25 vertical stays and an elastic body portion with belt loops to

1 prevent the same from riding up the torso of the user. The apron  
2 is formed with the traditional lower pocket sections and can be  
3 secured to the suspenders, which are an extension of the lifting  
4 belt. The front of the apron is provided with a loop-hook  
5 engaging section in the shape of a transverse strap. Finally, a  
6 detachable back belt secures to the rear portion of the  
7 underlying lifting belt and wraps around the same to finalize the  
8 securement by overlapping the already assembled overlapping end  
9 portions of the lifting belt and securing the ends to the apron  
10 transverse strap. A lifting belt hook central engaging member of  
11 the detachable belt engages the back of the lifting belt.

12 United States Patent No. 5,776,087 to Nelson et al.  
13 discloses a back brace having an at least partially elastic waist  
14 belt, a substantially non-elastic rear waist belt portion and a  
15 pair of arms extending from the rear portion and a pair of arms  
16 extending from the rear portion and having overlapping  
17 interconnecting end portions for holding the belt in place around  
18 the waist of a human body. Each of the arms carries a pocket,  
19 and each of the pockets is adapted to carry a still, flexible  
20 stay. A pair of non-elastic shoulder straps each having one end  
21 anchored by the rear member of the back brace or belt and another  
22 end adjustable anchored by a strap connector which is in turn  
23 connected to a non-elastic strap support mounted on each arm.  
24 Each of the pockets and its related insert has a curved upper



1 portion specifically designed to adapt to the curvature of the  
2 lower rib of the body.

3 United States Patent No. 6,083,183 to Yang discloses a  
4 waistband device having a rectangular cushion, a first connecting  
5 band disposed on a first lateral of the rectangular cushion, a  
6 second connecting band disposed on a second lateral of the  
7 rectangular cushion, a first belt connected to the first  
8 connecting band, a first keeper disposed on the first belt, a  
9 first soft pad disposed on the first belt, a male fastener  
10 disposed on a distal end of the first belt, a first loop hole  
11 defined by the first belt, a second keeper disposed on the second  
12 belt, a second soft pad disposed on the second belt, a female  
13 fastener disposed on a distal end of the second belt, and a  
14 second loop hole defined by the second belt.

15 The above prior art, however, reveals a dilemma for users who  
16 need back support but alternate between lifting and being seated  
17 in areas with no or inadequate back support. Safety belts provide  
18 back support while standing or working and provide protection from  
19 injury while lifting, but can not be worn or used for back support  
20 while being seated. Several devices have been devised to provide  
21 back support while being seated, but most are not readily portable  
22 and provide no support or protection while lifting or working.

23 A need still exists, however, for a support device which  
24 provides support or protection from back injury either while  
25 standing, lifting or when seated.

1 SUMMARY OF THE INVENTION

2 It is an object of the present invention to provide a back  
3 support device that quickly, easily and conveniently provides  
4 support for a user's back in either a standing or sitting  
5 position.

6 These and other objects are met by the present invention  
7 that is a multi-purpose back brace (MPBB), which is an all-  
8 purpose back support brace. This support device provides support  
9 and protection from injury while the user is performing lifting  
10 or manual labor. The support device functions as a safety belt,  
11 and the device will provide adjustable back support while seated,  
12 even if no backrest is available such as on a stool or even seated  
13 on base ground.

14 Also encompassed by this invention is a belt a  
15 circumferentially positioned around the waist of the user such  
16 that said belt has a front section and a rear section. There are  
17 also a pair of straps wherein each of the straps has opposed ends  
18 and is positionable in a first position wherein one of the  
19 opposed ends is attached to the rear section of the belt and each  
20 of the straps extends over one of the user's shoulders and is  
21 then attached to the other opposed end. Each of the straps is  
22 removable from this first position to an alternate second  
23 position. In this second position one of the opposed end is  
24 attached to the waist belt and the strap extends from the belt  
25 adjacent one of the legs of the user to overlap one of the knees.

1 and an upper back area 20. User 12 also has shoulders 22 and 24  
2 chest 26 and abdomen 28. Device 10 includes a belt 30. This belt  
3 30 has a front section 32 and a rear section 34. Front section 32  
4 of belt 30 is closeable by means of a lower closure flap 36 with  
5 VELCRO hooks 38 and an upper flap 40. The device 10 also includes  
6 a first strap 42 and a second strap 44. First strap 42 is  
7 removably attached to belt 30 by an upper rear attachment point  
8 46, which will preferably be comprised of VELCRO hooks. The  
9 second strap 44 will be attached to the upper rear attachment  
10 point 48. The first strap 42 and second strap 44 cross and extend  
11 upwardly over the upper back region 20 of the user 12. First  
12 strap 42 and the second strap 44 then overlap the user 12  
13 shoulders 22 and 24 respectively. The first strap 42 and second  
14 strap 44 then extend downwardly from the shoulders 22 and 24 over  
15 the chest 26 and abdomen 28 of the user 12 and can then be  
16 attached to the front section 32 of belt 30 at upper front  
17 attachment points 50 and 52 respectively. Directly beneath the  
18 upper front attachment points 50 and 52 on belt 30 there are  
19 respectively lower front attachment points 54 and 56. On the  
20 first strap 42 there is a slip ring 58 to adjust the size of strap  
21 42. Similarly on the second strap 44 there is a slip ring 60 to  
22 adjust the size of strap 44.

23         The wide belt providing back support can be worn in the  
24 desired position above the hips and below the chest or rib cage  
25 and covers the full circumference of the lower abdomen. The

1 parts of the wide belt are continuous around the back of the  
2 wearer and have overlapping end portions that meet and close in  
3 front of the wearer. One or more strips of VELCRO material fill  
4 the full width of the belt in the overlapping region. In this  
5 way, the belt can be adjusted to snugly and comfortably fit the  
6 wearer's waist. Straps attach on the backside of the wide belt  
7 and cross over before they pass over the shoulders of the wearer.  
8 The straps can then go straight down and meet the wide belt, or  
9 they can be crossed the same as in the back if desired. VELCRO  
10 material attaches both straps to the front and the back of the  
11 belt. Both straps are necessary to ensure that the wide belt can  
12 be maintained at the desired height above the hips and below the  
13 chest while it is worn. Both straps have rectangular slip rings  
14 over the VELCRO material attachment pads in the front of the  
15 wearer. Each strap passes through the slip ring on the top and  
16 the strap is doubled for a length of run like a suspender, but  
17 for each strap the far end terminates with a catch or clasp that  
18 is also attached to and adjustable on the strap passing down the  
19 front of the wearer making a full and closed loop through the  
20 slip ring.

21 Referring to FIGS. 3 and 4, the user 12 is shown in a seated  
22 position with no backrest on a stool 62. In these drawings, the  
23 leg 64 of user 12 is shown wherein the leg has an inner section 66  
24 and an outer section 68 as well as a knee 70. The user's 12 other  
25 leg 72 is also shown wherein this leg has an inner section 74 and

1 outer section 76 and a knee 78. In this second position, the  
2 alternate position of the first strap 42' is shown with its slip  
3 ring 58'. One end of first strap 42' is removably attached to the  
4 lower front attachment point 54 from where it extends outwardly  
5 along the outer section 68 of leg 64 and wraps around knee 70, and  
6 then extends inwardly adjacent the inner section 66 of leg 64 to  
7 attach to the upper front attachment point 50 of belt 30.  
8 Similarly, second strap 44' with slipring 60' is removably  
9 attached at one end to the lower front attachment point 56 from  
10 where it extends outwardly along the outer section 76 of leg 72  
11 and then wraps around knee 78 and extends inwardly along the inner  
12 section 74 of leg 72 to be then attached to the upper front  
13 attachment point 52. In this second position, the lower closure  
14 flap 36 will be disconnected from the upper closure flap 40 of  
15 belt 30. Ordinarily, the lower closure flap 36 and upper closure  
16 flap 40 will be folded rearwardly along belt 30 in opposed  
17 relation from each other.

18 The overlapping ends 36 and 40 of the wide waistband belt 30  
19 have been opened and then folded back. They are held in this new  
20 position by small dots of VELCRO material about one square inch in  
21 surface area. The straps can then be repositioned and attached to  
22 the wide belt at points on the opposite side of the belt. The  
23 strap end on the lower side of the wide belt is attached at and  
24 runs along the outside of the thigh and passes round the front of  
25 the knee, below the knee cap and then returns back to the side and

1 attaches to the top of the wide belt at position. These straps  
2 are adjustable in the same way as a pair of suspenders as when  
3 they were worn over the shoulder by using a clasp. It is  
4 desirable to have the adjustment clasp in the region where the  
5 strap passes over the top thigh for ease of adjustment by wearer.  
6 The position of waistband can be moved up or down the back to a  
7 comfortable position. The length of the leg straps and the  
8 position of the wide band can be adjusted alternately to provide  
9 the optimum position of the wide band and with the appropriate  
10 level of tension provided by the straps for comfort or needed back  
11 support while being seated. The straps in this position around  
12 the knee and attached to the top and bottom edge of the wide belt  
13 around the back of the wearer provide a firm support to the back  
14 by transferring the force generated by the wearer leaning back to  
15 the front of the leg below the knee where a counter force hold the  
16 straps in position. In so doing the wearer experiences a  
17 comfortable balance of forces between the back and the shin just  
18 below the knee.

19 The MPBB is an addition that is lightweight to shop and field  
20 workers which provides support and protection from back injury in  
21 nearly all circumstances working or being seated. This dual  
22 versatility is an important improvement over devices that are worn  
23 only during lifting or manual labor or only when seated for back  
24 support and can be easily worn with most existing work uniforms.  
25 The MPBB can also be incorporated or integral in work uniforms

1 such as coveralls or specialized uniforms or protective suits that  
2 may be required when working with special or hazardous material.

3 Several alternatives in the use of materials for construction  
4 may be available. Flame retardant, stain resistant fabrics hold  
5 promise for military and industrial use. However, comfort cannot  
6 be ignored as its absence will discourage the use of the device.  
7 Multiple fabric and future materials, even smart materials that  
8 return to a preformed shape may be incorporated into the MPBB to  
9 provide the desired properties of shape and support that  
10 specifically match the needs of a certain wearer doing specific  
11 tasks. Certain portions or regions may be semi-rigid for support  
12 of specific body areas and the connecting regions may be of a very  
13 flexible and elastic fabric.

14 In an alternate embodiment, two sets of straps may be used  
15 so that the straps over the shoulders are always worn and another  
16 set of straps is used to pass around the knees and attach to the  
17 side belt when seated. This would allow the wearer to stand up  
18 and sit down frequently without the wide belt falling off or  
19 moving from its desired position across the back. The only thing  
20 that will be required to resume its use as a seated backrest is  
21 to place the straps back over the knees. The wide belt and the  
22 straps passing over the shoulder and in front of the knee could  
23 all have some type of appropriate padding to make the MPBB even  
24 more comfortable to the wearer. Alternative types of fasteners  
25 may be considered other than VELCRO to attach the straps over the

1 shoulders and may be a requirement for the straps that pass  
2 around the knee and attach to the wide belt to provide support  
3 while being seated.

4 It will be appreciated that a support device has been  
5 described, which efficiently and cost effectively provides  
6 protection for a user from back injuries while the user is  
7 standing, lifting or while seated. This modification to the  
8 safety lifting belt will permit the wear to have adjustable back  
9 support while seated and also have all the support now afforded  
10 midriff safety belt wearers.

11 While the present invention has been described in connection  
12 with the preferred embodiments of the various figures, it is to  
13 be understood that other similar embodiments may be used or  
14 modifications and additions may be made to the described  
15 embodiment for performing the same function of the present  
16 invention without deviating therefrom. Therefore, the present  
17 invention should not be limited to any single embodiment, but  
18 rather construed in breadth and scope in accordance with the  
19 recitation of the appended claims.



2  
3 MULTI-PURPOSE BACK BRACE

4  
5 ABSTRACT OF THE DISCLOSURE

6 A lumbar support device that includes a belt  
7 circumferentially positioned around the waist of a user. There  
8 is also a pair of straps. Each of these straps has opposed ends.  
9 These ends are positionable in a first position in which one of  
10 these opposed ends is attached to the rear section of the belt.  
11 The strap extends over one of the shoulders of the user and is  
12 then attached to the other side of the belt at its other opposed  
13 end. These straps are both removable from the first position to  
14 an alternate second position. In this alternative second  
15 position, one of the opposed ends is attached to the waist belt  
16 and the strap extends from the belt adjacent one of the legs of  
17 the user to overlap one of the knees. The strap then extends  
18 back to the belt and is attached to the belt at the other of its  
19 opposed ends.

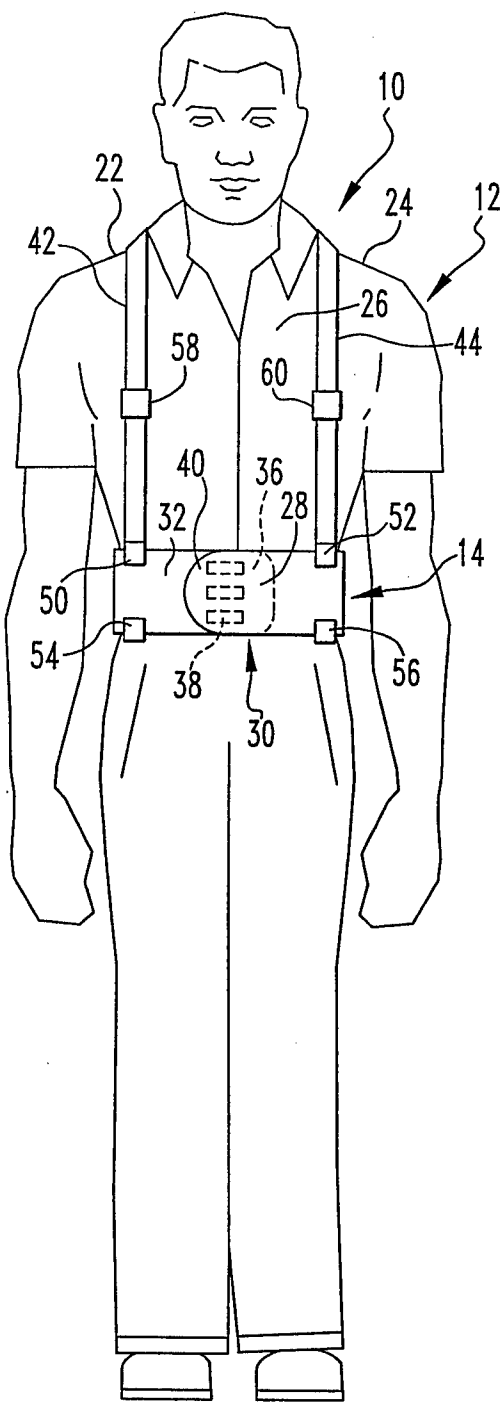


FIG.1

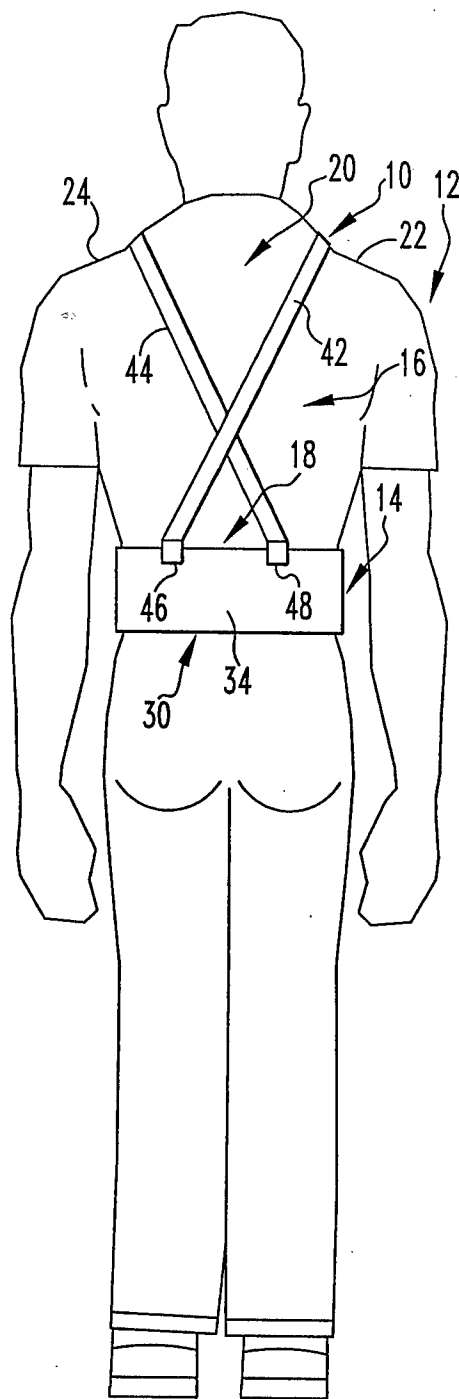


FIG.2

