PERSONAL LOAD-BEARING SYSTEM

The invention provides a personally-worn load-bearing system for carrying weights adjacent to the back and front of a user, comprising front and back load-supporting panels wherein the front and back panels are secured to each other via interconnecting shoulder straps to form a garment, characterized in that the system further comprises a load-bearing weight-distribution waist belt and at least one first front weight-transferring frame element interconnecting the front load-supporting panel and the waist belt and at least one second back weight-transferring frame element interconnecting the back load-supporting panel and the waist belt, wherein the at least one first front weight-transferring frame element and the at least one back weight-transferring frame element transfer at least a major portion of the weight of the front load-supporting panel and the weight of the back load-supporting panel to the load-bearing weight-distribution waist belt.

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ABSTRACT

The invention provides a personally-worn load-bearing system for carrying weights adjacent to the back and front of a user, comprising front and back load-supporting panels wherein the front and back panels are secured to each other via interconnecting shoulder straps to form a garment, characterized in that the system further comprises a load-bearing weight-distribution waist belt and at least one first front weight-transferring frame element interconnecting the front load-supporting panel and the waist belt and at least one second back weight-transferring frame element interconnecting the back load-supporting panel and the waist belt, wherein the at least one first front weight-transferring frame element and the at least one back weight-transferring frame element transfer at least a major portion of the weight of the front load-supporting panel and the weight of the back load-supporting panel to the load-bearing weight-distribution waist belt.
PERSONAL LOAD-BEARING SYSTEM

[0001] The present invention relates to personal load-bearing arrangements, usually including armor protection.

[0002] More particularly, the present invention relates to a personally-worn load-bearing system for carrying weight adjacent to the back and front of a user, for security and combat unit personnel, and for other uses described herein-after.

[0003] As is known, and as described in U.S. Pat. No. 5,644,792, security and combat units, typically including anti-terror units, police and armor units, who are charged with carrying out high-risk operations, are usually specifically equipped, the type of equipment provided varying with the type of the mission to be performed. Such equipment falls into two categories: (a) anti-ballistic protection, and (b) pouches and straps for holding ammunition, hand weapons, accessories, grenades of various types, communication means, tools, and whatever other items can be foreseen to be of utility in relation to said mission.

[0004] Said patent describes and claims a personally-worn system for security and combat units comprising a plurality of modular, interchangeable, load-bearing front and back panels, with each of said panels having one of a plurality of differing pouch arrangements integrally formed therewith, said load-bearing panels being interchangeably secured to each other via interconnecting shoulder straps to form at least one garment having a load-bearing front panel and a load-bearing back panel, and said system further comprising a plurality of interchangeable front and back armor panels.

[0005] In such systems, the weight of the system is mainly on the shoulders and partially on the torso. When such systems rely solely on soft armor such as Kevlar® then the weight of the system would be about 2-3 kg. However, when one adds hard armor and equipment, the weight load increases to about at least 12 kg. Such a weight load on the shoulders is oppressive and restrictive and in order to partially deal with this problem, and the problem of pinched shoulder muscles, padding was added to the shoulder straps. However this did not at all solve the problem of the oppressive weight of the system.

[0006] Furthermore, while in the past, soldiers normally did not wear heavy armor as standard equipment, today with the constant threat of terrorist activity against combat personnel, the load-bearing systems usually include ceramic or similar armor, and as will be realized, the weight of such armor panels worn both front and back places a considerable burden on combat personnel, especially when standard personally-worn vests and garments have the predominant weight of the load-bearing panels being supported by shoulder straps connecting the same.

[0007] In order to obviate this problem, and to shift the weight load from the shoulders of the user, there is now provided according to the present invention a personally-worn load-bearing system for carrying weight adjacent to the back and front of a user, comprising front and back load-supporting panels wherein said front and back panels are secured to each other via interconnecting shoulder straps to form a garment, characterized in that said system further comprises a load-bearing weight-distribution waist belt and at least one first front weight-transferring frame element adjustably interconnecting said front load-supporting panel and said waist belt and at least one second back weight-transferring frame element adjustably interconnecting said back load-supporting panel and said waist belt, wherein said at least one first front weight-transferring frame element and said at least one back weight-transferring frame element transfer at least a major portion of the weight of said front load-supporting panel and the weight of said back load-supporting panel to said load-bearing weight-distribution waist belt.

[0008] In preferred embodiments of the present invention said weight-transferring frame elements are at least partially rigid.

[0009] Preferably said weight-transferring frame elements are flexible.

[0010] In especially preferred embodiments of the present invention said front load-supporting panel is attached to at least one frame element which in turn is connected to said waist belt by at least two spaced-apart frame elements.

[0011] In preferred embodiments of the present invention said two spaced-apart frame element segments are attached to side segments of the load-bearing weight-distribution waist belt.

[0012] In said especially preferred embodiments, preferably said two space-apart frame element segments are positioned along opposite ends of a single partially-rigid frame element.

[0013] Similarly, in especially preferred embodiments of the present invention said back load-supporting panel is preferably attached to at least one frame element which in turn is connected to said waist belt by at least two spaced-apart frame element segments.

[0014] In said specially preferred embodiments, preferably said two spaced-apart frame element segments are attached to back segments of the load-bearing weight-distribution waist belt.

[0015] In said especially preferred embodiments, preferably said two space-apart frame element segments are positioned along opposite ends of a single partially-rigid frame element.

[0016] In other preferred embodiments of the present invention the distance between a point of connection of a frame element to the waist belt and the load-supporting panel to which said frame element is attached, is adjustable, so that each panel can be adjusted within the system to match the specific height of the user.

[0017] In U.S. Pat. No. 6,088,831, there is described and claimed a uniform for peace officers and others requiring the wearing of both body armor and heavy gear around the waist, however, said patent provides only the partial solution of providing a duty belt held to a pants belt wherein said duty belt supports heavy gear, however the body armor, having a front part and a back part, is supported in this patent, by the shoulder straps affixed to an upper portion of said front part and said back part, which are specifically described and claimed as being designed to support the body armor on the shoulders of the wearer.

[0018] In U.S. Pat. No. 4,699,127, there is described and claimed a pack vest containing load carrying compartments,
wherein a waist belt attached to the back and front flaps of the vest through tie down loops holds the loaded vest to the wearer to prevent shifting of loads, and upward creeping of the front flaps, and to distribute a portion of the real load directly to the wearer's hip region, however the major portion of the load distribution is still on the shoulders of the wearer.

[0019] In U.S. Pat. No. 6,321,959, there is taught and claimed a low-profile quick release assembly for securing and releasing a backpack frame to and from a waist belt, and therefore said patent teaches the concept of having the weight of a backpack transferred to a waist belt. However said patent does not teach or suggest the transfer of weight of a front armor panel to a waist belt worn by a user.

[0020] In U.S. Pat. No. 4,303,186, there is described and claimed a triaxially pivotable backpack carrier comprising a backpack frame and shoulder harness which is pivotably attached to a hip yoke. However, said patent also does not teach or suggest a carrier which would enable the transfer of weight of a front armor panel worn by a user, since the two axis pivot member which is taught in said patent for attaching a backpack frame to a hip yoke, would be positioned adjacent the groin of the user if transferred to the front of a carrier system.

[0021] In the entirely different field of body harnesses for a cinematographer, there are described in U.S. Pat. Nos. 4,158,488 and 4,298,149 front frame harnesses which connect a camera and camera arm positioned in front of a camera man and which function to place most of the vertical load on the hips of the user and most of the horizontal load on the shoulders and upper back of the user. However, as will be realized, these harnesses and the arrangements taught in said patents, while being useful for shifting weight of a front weight harness from the shoulders to the waist of the user, do not teach or suggest a system for transferring weight from both front and back armor panels and simple modification and/or multiplication of the arrangements thereof would result in a system which would severely limit the mobility of the user.

[0022] Furthermore, the waist belts of said systems are designed to be closed at the back with the frame elements attaching to the front of said belt, as opposed to the present invention wherein, despite the presence of weight panels and of front weight-transferring frame elements, the belt can nevertheless be conveniently closed in front and the two spaced-apart frame element segments which transfer weight from said front load-supporting panel are attached to side elements of the load-bearing weight-distribution waist belt.

[0023] Thus the system of the present invention provides for the first time an arrangement wherein both the weight of a back armor panel and the weight of a front armor panel are effectively shifted from the shoulders of the user to his waist.

[0024] More specifically, in preferred embodiments of the present invention, the shoulder straps can serve solely for stability and not have any significant weight-bearing function.

[0025] Also in preferred embodiments of the present invention, there is enabled a free sliding movement between components of the frame element and the belt so that the user can bend to both sides, kneel and have the mobility necessary for combat situations.

[0026] Furthermore, since the frame elements serve to support the armor panels from the waist belt of the user, ventilation between the system and the user is possible, since space can be left between the torso of the user and the vest and front and back panels of the system, as these weighted components are supported from the hip rather than by the chest and back of the user, which is the case when such panels depend from shoulder straps.

[0027] The illustrations provided refer to the more common applications of personal armor worn by personnel undertaking some particularly dangerous task. However application of the present invention is not limited to armor used by police, security forces and army units on such missions but may be applied to civilian users, such as hikers and mountain climbers who do not use armor protection.

[0028] The invention will now be described in connection with certain preferred embodiments with reference to the following illustrative figures so that it may be more fully understood.

[0029] With specific reference now to the figures in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of the preferred embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the invention. In this regard, no attempt is made to show structural details of the invention in more detail than is necessary for a fundamental understanding of the invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the invention may be embodied in practice.

[0030] In the drawings:

[0031] FIG. 1 is a perspective view of the front of a preferred embodiment of the system according to the invention;

[0032] FIG. 2 is as FIG. 1 seen from the rear;

[0033] FIG. 3 is an elevational inside view of an embodiment of the front panel;

[0034] FIG. 4 is an elevational external view of an embodiment provided on the back panel with side panels;

[0035] FIG. 5 is an internal view of the panel seen in FIG. 4; and

[0036] FIG. 6 is an internal view of an adjustable size arrangement.

[0037] There is seen in FIGS. 1 and 2 a general view of a personally worn load-bearing system 10 for carrying weights adjacent to the back and the front of a user 12.

[0038] The weights shown in the figure comprise a front panel 14 and a back panel 16. Additional weights typically held in pouches attached to the panels, comprise items such as firearms, ammunition, grenades, an ax, a spade, a radio, handcuffs, first aid box and other equipment needed according to the nature of the mission to be accomplished by the user as well as personal items such as water, food, goggles and gloves. FIG. 1 shows a pouch 18 for holding grenades 20, while in FIG. 2 retainers 22 are seen holding an axe 24.
[0039] Front and back load-supporting panels 14, 16 are secured to each other via interconnecting shoulder straps 26 to form a garment. In the figures both panels 14, 16 are armor panels, which can be configured to support any desired additional load.

[0040] An additional set of side interconnecting straps is optional.


[0042] Two second back weight-transferring frame elements 32 interconnect the back load-supporting panel 16 and the waist belt 28. Both the front and the back frame elements can transfer a major portion of respective weights of the panels themselves and the loads carried thereby, to the load-bearing weight-distribution waist belt.

[0043] The weight-transferring frame elements 30, 32 are at least partially-rigid so as to enable them to carry the compressive forces applied thereto. Suitable materials are an aluminum rod, stave or a plastic (e.g., acetal) tube.

[0044] Where increased flexibility is desired the weight-transferring frame elements are suitably made, for example, of nylon rod.

[0045] The frame elements 30, 32 terminate in a substantially spherical body 34 and are connected to the waist belt 28 by a T-shaped socket 36. Front to back body movements of the user are thus accommodated by rotation of the body 34 in socket 36. The exact location of socket 36 can be set by the user according to his body size and shape.

[0046] With regard to the rest of the figures, similar reference numerals have been used to identify similar parts.

[0047] Referring again to FIG. 1, and now also to FIG. 3, there is seen the inner part of the front load-supporting panel 14 which forms a part of the personally-worn load-bearing system 10.

[0048] The panel 14 is attached to two frame elements 30. These in turn are connected to the waist belt 28 by two spaced-apart frame element segments 34.

[0049] The two spaced-apart frame element segments 34 are attached to side segments 36 of the load-bearing weight-distribution waist belt 28, and are positioned along opposite ends of a single partially-rigid frame element 30. The distance between the segment 34 and the panel 14 can be adjusted to fit different body sizes and to assure that the panel 14 is set in the correct height above the waist belt 28. The adjustment can be done by sliding the segment 34 along the element 30 or by setting the length of the element 30 itself.

[0050] In the present embodiment the support system takes the form of a curved housing 38 supporting the load. Each end of the housing 38 contains a telescopic joint 40. Thus the user is free to lean towards either side without being restricted by the support system. If for example the user leans towards the right, the telescopic joint 40 on the right side closes while the joint 40 on the left opens (expands).

[0051] Padding units 42 are positioned on the interior face of the panel 14 as shown to spread the forces generated by the weight load and to allow ventilation of the chest area of the user.

[0052] Seen in FIG. 4 in an external view and in FIG. 5 in an internal view is an embodiment including side protective panels 52 of a back load-supporting panel 44, being part of a further personally-worn load-bearing system 46.

[0053] The back panel 44 is attached to two frame elements 48 which in turn are supported by two spaced-apart connector sockets 50.

[0054] The connector sockets 50 are attached to the load-bearing weight-distribution waist belt 54.

[0055] An extended pad 56 positioned to contact the central and lower portion of the back of a user is attached to the belt 54. The pad 56 extends to the panel 44.

[0056] A further pad 58 is positioned to contact the upper part of the back of the user. Further pads 60 are seen inside the side panels 52.

[0057] The primary function of the various pads is to provide a ventilation space between the panel 44 and the body of the user and of course to prevent sharp local pressure on his body. However it is further possible and feasible to provide pads made of a strong artificial fiber to enhance the ballistic protection afforded by the panels.

[0058] FIG. 6 illustrates a detail of the back part 66, including side protective panels 52 of a personally-worn load-bearing system 62 wherein the height difference between a frame element 64 to the waist belt 28 and the load-supporting panel 66 to which the frame element 64 is attached, is adjustable.

[0059] In the arrangement seen in the figure the holder 68 of the frame element 64 is provided with a pair of adjustable tongues 70 (not to be confused with the shoulder straps 26). While the height of the holder 68 above the waist belt 28 remains constant, the height of the panel 66 relative to the holder 68, and therefore also relative to the waist belt 72, is adjusted to match the height of the specific user.

[0060] Strap adjustment and re-anchoring is carried out by known methods such as by buckles 74, press studs or by Velcro® pads.

[0061] Alternatively, the holder 68 can be affixed to the back panel 66 and the height may be adjusted by setting the length of the element 64 or by allowing the element 64 to be inserted into sockets 50 (as seen in FIG. 4) up to a certain required extent.

[0062] It will be evident to those skilled in the art that the invention is not limited to the details of the foregoing illustrative embodiments and that the present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.
What is claimed is:

1. A personally-worn load-bearing system for carrying weights adjacent to the back and front of a user, comprising front and back load-supporting panels wherein said front and back panels are secured to each other via interconnecting shoulder straps to form a garment, characterized in that said system further comprises a load-bearing weight-distribution waist belt and at least one first front weight-transferring frame element interconnecting said front load-supporting panel and said waist belt and at least one second back weight-transferring frame element interconnecting said back load-supporting panel and said waist belt, wherein said at least one first front weight-transferring frame element and said at least one back weight-transferring frame element transfer at least a major portion of the weight of said front load-supporting panel and the weight of said back load-supporting panel to said load-bearing weight-distribution waist belt.

2. A personally-worn load-bearing system according to claim 1, wherein said weight-transferring frame elements are at least partially rigid.

3. A personally-worn load-bearing system according to claim 1, wherein said weight-transferring frame elements are flexible.

4. A personally-worn load-bearing system according to claim 1, wherein said front load-supporting panel is attached to at least one frame element which in turn is connected to said waist belt by at least two spaced-apart frame element segments.

5. A personally-worn load-bearing system according to claim 4, wherein said two spaced-apart frame element segments are attached to side segments of said load-bearing weight-distribution waist belt.

6. A personally-worn load-bearing system according to claim 4, wherein said two spaced-apart frame element segments are positioned along opposite ends of a single partially-rigid frame element.

7. A personally-worn load-bearing system according to claim 1, wherein said back load-supporting panel is attached to at least one frame element which in turn is connected to said waist belt by at least two spaced-apart frame element segments.

8. A personally-worn load-bearing system according to claim 7, wherein said two spaced-apart frame element segments are attached to back segments of said load-bearing weight-distribution waist belt.

9. A personally-worn load-bearing system according to claim 6, wherein said two spaced-apart frame element segments are positioned along opposite ends of a single partially-rigid frame element.

10. A personally-worn load-bearing system according to claim 1, wherein the distance between a point of connection of a frame element to the waist belt and the load-supporting panel to which said frame element is attached, is adjustable, so that each panel can be adjusted within the system to match the specific height of the user.

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