WEIGHT DISTRIBUTION AND SUPPORT DEVICE AND SYSTEM FOR AN ARMOR VEST

Inventors: David E. Herbener, Birchrunville, PA (US); Andrew G. Wall, Alto, GA (US); Joseph D. Massam, Langhorne, PA (US); Jeffrey D. Payne, Canonsburg, PA (US); John F. Ficker, Philadelphia, PA (US)

Assignee: KDH DEFENSE SYSTEMS, INC., Eden, NC (US)

Filed: Mar. 1, 2011

ABSTRACT

A load distribution device for distributing the load of an armor vest worn by a wearer. The vest includes a front portion, a rear portion, and a shoulder portion. The load distribution device includes a belt, a coupling, and one or more securement straps. The coupling attaches the belt to the rear portion of the vest. Each securement strap comprises a rear securement strap and a front securement strap. Each securement strap is configured to extend from the shoulder portion of the vest to the rear portion of the vest. In another aspect, the load distribution device includes a cummerbund. Each rear securement strap extends from a shoulder portion to a securement strap loop. Each front securement strap is fixed at one end to the cummerbund, loops through the securement strap loop, and extends in an opposite direction towards the front of the wearer.
WEIGHT DISTRIBUTION AND SUPPORT DEVICE AND SYSTEM FOR AN ARMOR VEST

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority from U.S. Provisional Patent Application Ser. No. 61/309,058, filed Mar. 1, 2010, the contents of which are incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates generally to body armor and, more specifically, to a device and system for supporting the weight of an armor vest, such as a plate carrier.

BACKGROUND OF THE INVENTION

[0003] Military and police use many different types and styles of body armor systems. The mainstay armor vest serves as a primary feature of most body armor systems. The armor vest is worn to provide ballistic and fragmentation protection to the wearer of the vest. The armor vest, which is worn around the torso and over the shoulders, houses armor plates, ballistic packs, and other forms of soft armor protection. The armor plates and other forms of armor provide protection from at least small arms fire to promote survivability of the wearer of the armor vest.

[0004] In the age of modern warfare, heavy flak jackets have been replaced with lighter and more mobile forms of body armor systems. These systems include armor vests that may be equipped with devices to protect the neck, throat, and groin areas. An example of a modern body armor system is the Interceptor body armor system having ballistic packs and optional front and rear armor plates. Modern body armor systems use lighter, advanced ballistic packs and plates designed to provide soldiers with functional body armor having minimum flexibility and protection from ballistic and fragmentation projectiles.

[0005] One feature of body armor is to provide protection for at least a central region of the torso of the wearer by maintaining armor plates in strategic positions to protect vital organs. While modern technology has developed new materials for armor plates, there remains one certainty, the armor plates, which are designed to stop rounds of 7.62 mm or less, remain the heaviest component of the armor vest. Even with the advantages provided through use of Kevlar, ceramic, and other ballistic grade materials for the armor plates, the wearer must still bear the physical weight of the armor vest while maintaining combat effectiveness.

SUMMARY OF THE INVENTION

[0006] One aspect of the present invention provides a device and system for supporting the weight of an armor vest, including a plate carrier, on the wearer of the armor vest. The weight of the armor vest is distributed, by way of the device and system of the present invention, off of the wearer’s shoulders and neck and onto his or her hips. The device and system for supporting the weight of the armor vest also provide a durable and flexible functionality to the wearer. Another aspect of the present invention provides a venting function.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] For the purpose of illustration, there are shown in the drawings certain embodiments of the present invention. In the drawings, like numerals indicate like elements throughout. It should be understood, however, that the invention is not limited to the precise arrangements, dimensions, and instruments shown. In the drawings:

[0008] FIG. 1 illustrates an exemplary front view of an armor vest having an exemplary weight distribution and support device and system, the armor vest comprising a front portion and a rear portion, in accordance with an exemplary embodiment of the present invention;

[0009] FIG. 2 illustrates an exemplary view of the inside of the rear portion of the armor vest of FIG. 1, in accordance with an exemplary embodiment of the present invention;

[0010] FIG. 3 illustrates an exemplary side perspective view of a belt attached to the rear portion of the armor vest of FIG. 1, in accordance with an exemplary embodiment of the present invention;

[0011] FIG. 4 illustrates another exemplary side perspective view of the belt attached to the rear portion of the armor vest of FIG. 1, in accordance with an exemplary embodiment of the present invention;

[0012] FIG. 5 illustrates an exemplary exploded view of the belt, an interface housing, and an interface rigid support, in accordance with an exemplary embodiment of the present invention;

[0013] FIG. 6 illustrates an exemplary rear view of the interface housing of FIG. 5 as attached to the belt, in accordance with an exemplary embodiment of the present invention;

[0014] FIG. 7 illustrates an exemplary view of the inside of the rear portion of the armor vest of FIG. 1 without the belt attached, in accordance with an exemplary embodiment of the present invention;

[0015] FIG. 8 illustrates an exemplary top view of the armor vest of FIG. 1 and a cutaway view A of the weight distribution and support device and system, in accordance with an exemplary embodiment of the present invention;

[0016] FIG. 9 illustrates an exemplary perspective view of the bottom of the rear portion of the armor vest of FIG. 1, in accordance with an exemplary embodiment of the present invention;

[0017] FIG. 10 illustrates an exemplary partial view of the rear portion of the armor vest of FIG. 1, in accordance with an exemplary embodiment of the present invention;

[0018] FIG. 11 illustrates an exemplary side perspective view of the armor vest of FIG. 1 showing a flap provided along the front portion of the armor vest, in accordance with an exemplary embodiment of the present invention;

[0019] FIG. 12 illustrates an exemplary front perspective view of the armor vest of FIG. 1 in which the flap is open, in accordance with an exemplary embodiment of the present invention;

[0020] FIG. 13 illustrates another exemplary front perspective view of the armor vest of FIG. 1 in which the flap is open, in accordance with an exemplary embodiment of the present invention;

[0021] FIG. 14 illustrates yet another exemplary front perspective view of the armor vest of FIG. 1 showing a pair of
sidelines of the armor vest, in accordance with an exemplary embodiment of the present invention;

[0022] FIG. 15 illustrates an exemplary front perspective view of the armor vest of FIG. 1 in which the flap is closed, in accordance with an exemplary embodiment of the present invention;

[0023] FIG. 16 illustrates an exemplary front view of a shoulder portion of the armor vest of FIG. 1, in accordance with an exemplary embodiment of the present invention;

[0024] FIG. 17 illustrates an exemplary front view of a plate carrier having another exemplary weight distribution and support device and system, the plate carrier comprising a front portion and a rear portion and shown attached to a belt, in accordance with an exemplary embodiment of the present invention;

[0025] FIG. 18 illustrates another exemplary front view of the plate carrier of FIG. 17, in which a front flap of the plate carrier is in an upward position, in accordance with an exemplary embodiment of the present invention;

[0026] FIG. 19 illustrates yet another exemplary front view of the plate carrier of FIG. 17, in which straps are secured to the front portion of the plate carrier, in accordance with an exemplary embodiment of the present invention;

[0027] FIG. 20 illustrates an exemplary top perspective view of the plate carrier of FIG. 17, in accordance with an exemplary embodiment of the present invention;

[0028] FIG. 21 illustrates another exemplary top perspective view of the plate carrier of FIG. 17, in accordance with an exemplary embodiment of the present invention;

[0029] FIG. 22 illustrates still another exemplary front view of the plate carrier and the belt of FIG. 17 separated from one another, in accordance with an exemplary embodiment of the present invention;

[0030] FIG. 23 illustrates an exemplary rear view of the plate carrier of FIG. 17, in accordance with an exemplary embodiment of the present invention;

[0031] FIG. 24 illustrates another exemplary rear view of the plate carrier and the belt of FIG. 17, in accordance with an exemplary embodiment of the present invention;

[0032] FIG. 25 illustrates an exemplary top perspective view of the belt of FIG. 17 and a pocket of the belt, in accordance with an exemplary embodiment of the present invention;

[0033] FIG. 26 illustrates an exemplary top perspective view of the pocket of the belt of FIG. 17, in which a support belt portion is partially inserted therein, in accordance with an exemplary embodiment of the present invention;

[0034] FIG. 27 illustrates an exemplary top perspective view of the belt pocket, in which the support belt portion is secured in the belt pocket, in accordance with an exemplary embodiment of the present invention;

[0035] FIG. 28 illustrates an exemplary front perspective view of the belt of FIG. 17, the support belt portion shown secured within the belt, in accordance with an exemplary embodiment of the present invention;

[0036] FIG. 29 illustrates another exemplary front perspective view of the belt of FIG. 17, the support belt portion shown secured within the belt, in accordance with an exemplary embodiment of the present invention;

[0037] FIG. 30 illustrates an exemplary bottom perspective view of a pocket of the plate carrier of FIG. 17, in accordance with an exemplary embodiment of the present invention;

[0038] FIG. 31 illustrates another exemplary bottom perspective view of the pocket of the plate carrier of FIG. 17, in accordance with an exemplary embodiment of the present invention;

[0039] FIG. 32 illustrates an exemplary rear perspective view of the support belt portion partially inserted into the pocket of the plate carrier of FIG. 17, in accordance with an exemplary embodiment of the present invention;

[0040] FIG. 33 illustrates an exemplary rear view of the support belt portion attached to the belt and the plate carrier of FIG. 17, in accordance with an exemplary embodiment of the present invention;

[0041] FIG. 34 illustrates an exemplary view of secured straps within the rear portion of the plate carrier of FIG. 17, in accordance with an exemplary embodiment of the present invention;

[0042] FIG. 34A illustrates an exemplary partial cutaway view of a cummerbund with secured straps spanning therethrough, in accordance with an exemplary embodiment of the present invention;

[0043] FIG. 35 illustrates an exemplary view of the rear portion of the plate carrier of FIG. 17 in which the cummerbund of FIG. 34A is attached thereto, in accordance with an exemplary embodiment of the present invention;

[0044] FIG. 36 illustrates another exemplary view of the rear portion of the plate carrier and belt of FIG. 17, in accordance with an exemplary embodiment of the present invention;

[0045] FIG. 37 illustrates an exemplary view of an aspect of the cummerbund of FIG. 34A relative to the plate carrier of FIG. 17, in accordance with an exemplary embodiment of the present invention;

[0046] FIG. 38 illustrates an exemplary rear side perspective view of the plate carrier of FIG. 17 donned by a wearer, in accordance with an exemplary embodiment of the present invention;

[0047] FIG. 39 illustrates an exemplary top perspective view of the plate carrier of FIG. 17 donned by a wearer, in accordance with an exemplary embodiment of the present invention;

[0048] FIG. 40 illustrates an exemplary top perspective view of shoulder straps of the plate carrier of FIG. 17, in accordance with an exemplary embodiment of the present invention;

[0049] FIG. 41 illustrates another exemplary top perspective view of the shoulder straps of the plate carrier of FIG. 17, in accordance with an exemplary embodiment of the present invention;

[0050] FIG. 42 illustrates exemplary views of a backpack removably attached to the plate carrier of FIG. 17, in accordance with an exemplary embodiment of the present invention;

[0051] FIG. 43 illustrates exemplary views of the plate carrier of FIG. 17 donned by a wearer, in accordance with an exemplary embodiment of the present invention;

[0052] FIG. 44 illustrates further exemplary views of the plate carrier of FIG. 17 donned by a wearer, in accordance with an exemplary embodiment of the present invention;

[0053] FIG. 45 illustrates still further exemplary views of the plate carrier of FIG. 17 and its features, in accordance with an exemplary embodiment of the present invention; and
[0054] FIG. 46 illustrates additional exemplary views of the plate carrier of FIG. 17 donned by a wearer, in accordance with an exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0055] Armor vests, including plate carrier styles of body armor, provide several side straps and shoulder straps to maintain the positioning of the armor vest on the wearer. In use, whether or not in combat, and while, at times, having secured to it pouches, packets, grenades, and other devices, the armor vest and plate carrier alike submit to gravity and tend to slide downwards along the torso of the wearer. Under these circumstances, the weight of the armor vest or plate carrier and all that is attached thereto bears on the shoulders, neck, and back of the wearer. While there are clear advantages to wearing body armor in armor vests and plate carriers, armor vests and plate carriers may cause discomfort and even neck, shoulder, and back injury due to their weight.

[0056] Accordingly, a weight distribution and support device and system for armor vests, including plate carriers, that redistributes the weight of the armor vest or plate carrier off the shoulders of the wearer would be advantageous. It would be advantageous for such weight distribution and support device and system for armor vests, including plate carriers, to reduce discomfort and injury to the wearer. Furthermore, it would be advantageous for the weight distribution and support device and system for armor vests and plate armor to provide for venting of body heat of the wearer during use of the armor vest or plate carrier.

[0057] Referring generally to FIGS. 1-16, there is illustrated an exemplary embodiment of an armor vest support device and system, in accordance with an exemplary embodiment of the present invention. The armor vest support device and system comprises a back brace 310, a belt 400, and a strap support 500 for distributing the weight of an armor vest 300 away from the shoulders of a wearer 1001 and for reducing the load of the armor vest 300 on the shoulders of the wearer 1001. Exemplary views of the back brace 310 may be found in FIGS. 2, 4, and 7; exemplary views of the belt 400 may be found in FIGS. 2-6, 9, and 11-15; and exemplary view of the strap support 500 may be found in FIGS. 8-13.

[0058] The back brace 310 provides structural support for bearing at least a portion of the weight of the armor vest 300 and distributing at least a portion of the weight of the armor vest 300 to the belt 400. The strap support 500 also provides structural support for the distribution of the weight of the armor vest 300 to the belt 400. Additionally, the strap support 500 provides a mechanism for adjusting the fit of armor vest 300 around the torso of the wearer 1001. Such adjustment provides for a more comfortable fit of the armor vest 300 as compared to an armor vest lacking such adjustment.

[0059] The armor vest support device and system in accordance with the present invention may be used in connection with any style and form of armor vest or similar body armor systems which provide a level of protection to the torso of wearer 1001. It is to be understood that the exemplary views show an exemplary type and style of armor vest and that other types and styles are contemplated.

[0060] Referring to FIGS. 1, 4, 15, and 16, there are illustrated exemplary views of the armor vest 300 and its components, in accordance with an exemplary embodiment of the present invention. The armor vest 300 comprises a front portion 100 and a rear portion 200.

[0061] Referring to FIGS. 2, 4, and 7, there are illustrated exemplary views of the back brace 310 and its components, in accordance with an exemplary embodiment of the present invention. The back brace 310 comprises a generally flat structure having a main body 302 and a first arm 304 and a second arm 306 that extend away from main body 302.

[0062] The main body 302 is positioned adjacent to and extends along at least the lumbar vertebrae of the wearer 1001 and at least a portion of the thoracic vertebrae of wearer 1001. The first arm 304 and the second arm 306 extend laterally and vertically away from the main body 302 of the back brace 310. So angled, the first arm 304 and the second arm 306 are positioned adjacent to and extend along at least part of the scapular and shoulder region of the wearer 1001. In an exemplary embodiment, such as that illustrated in FIGS. 2 and 7, the back brace 310 further comprises a connector 308 which connects the first arm 304 to the second arm 306. The connector 308 provides additional structural stability to the back brace by limiting lateral movement of the first arm 304 relative to the second arm 306 and torsional movement of the first arm 304 and the second arm 306.

[0063] The back brace 310 is generally symmetrical. In the exemplary embodiment illustrated in FIG. 2, the back brace 310 has an upside down A-shape. It is to be understood that other shapes, such as a Y-shape or other suitable geometric shapes, are contemplated for supporting the weight of the armor vest 300.

[0064] The back brace 310 may be formed from any flexible and rigid material suitable for supporting and redistributing the weight of the armor vest 300 while wearer 1001 is using the armor vest 300 for training, combat, or any other use. For example, and not as a limitation, the back brace 310 may be formed from any one of plastic, polymeric, metal, rubber, polymer, fiberglass, graphite, ballistic grade material, synthetic and natural material, or other suitable material possessing sufficient density and sufficient tensile and torsional strength to withstand the various types of force placed on the back brace 310 during use with the armor vest 300. Any combination of such materials may alternatively be used to provide for a structure which is sufficiently flexible, yet rigid enough, for weight support and distribution of the armor vest 300.

[0065] In an exemplary embodiment of the armor vest support device and system, the back brace 310 is integrated within the rear portion 200 of the armor vest 300. The main body 302 is integrated within the rear portion 200 of the armor vest 300 to be positioned adjacent and extend along at least the lumbar vertebrae of the wearer 1001 and at least a portion of the thoracic vertebrae of the wearer 1001. In an exemplary alternative embodiment, the back brace 310 is not integrated with the rear portion 200. In such embodiment, the back brace 310 is a separate component from the armor vest 300.

[0066] FIGS. 2, 4, and 7 illustrate the exemplary embodiment in which the back brace 310 is integrated within the rear portion 200 of the armor vest 300. In this illustrated embodiment, the back brace 310 is positioned between an outer layer of material 250 (illustrated in FIG. 8) and an inner layer of material 260 (illustrated in FIGS. 2 and 4) of the rear portion 200 of the armor vest 300. Additionally, single or multiple layers of soft ballistic packs or materials 265 may be provided between the outer layer of material 250 and the inner layer of material 260 of the rear portion 200 of the armor vest 300. The back brace 310 may be positioned between the inner layer of material 260 and the single or multiple layers of soft ballistic
packs or materials 265 of the armor vest 300 and attached to such ballistic packs or materials 265 via hook and loop fasteners.

[0067] The inner layer of material 260 is formed from a breathable material to provide for venting the body heat of the wearer 1001 during use of the armor vest 300. In the exemplary embodiment illustrated in FIGS. 2, 4, and 7, the inner layer of material 260 is constructed from a mesh material to facilitate venting the heat of the wearer 1001. Such mesh material may be formed from synthetic fiber.

[0068] Continuing with FIGS. 2 and 7, there is illustrated an exemplary view of the inside of the rear portion 200 of the armor vest 300, in accordance with an exemplary embodiment of the present invention. More specifically, FIGS. 2 and 7 illustrate an exemplary belt attachment interface, generally designated as 226, on the armor vest 300, in accordance with an exemplary embodiment of the present invention. The belt attachment interface 226 is attached to an outer surface of the back brace 310 for attaching the rear portion 200 of the armor vest 300 to the belt 400. The belt attachment interface 226 comprises material attached to it to interface with a corresponding attachment interface of the belt 400. The attachment provided by belt attachment interface 226 allows movement to accommodate some internal, torsional, bending, and compression forces so that the rear portion 200 of the armor vest 300 may have a flexible interaction with the belt 400 to provide the wearer 1001 the ability to move while wearing the armor vest 300.

[0069] In the exemplary embodiment illustrated in FIGS. 2 and 7, the belt attachment interface 226 comprises a strap panel 230 comprising a plurality of horizontally positioned, horizontally configured webbing, such as MOLLE 228. The strap panel 230 comprises two columns of MOLLE webbing 228. In the exemplary embodiment illustrated in FIG. 7, the MOLLE webbing 228 comprises nine rows of webbing, each row including two loops of MOLLE webbing. In the exemplary view illustrated in FIG. 2, only the top two rows of the MOLLE webbing 228 are visible as the remainder of the MOLLE webbing 228 is in use to secure the belt 400 to the armor vest 300, as described in further detail below.

[0070] Referring now to FIG. 5, there is illustrated an exemplary exploded view of an interface housing or coupling, generally designated as 410, in accordance with an exemplary embodiment of the present invention. As seen in FIG. 5, the housing 410 comprises an inside portion 421 and an outside portion 422. The top halves of the inside portion 421 and the outside portion 422 are stitched together to form a pocket 424 for receiving the top half of one or more interface rigid supports 416. The one or more interface rigid supports 416 provide rigid support for interface housing 410 to provide structural support between the belt 400 and the MOLLE webbing 414 along the interface housing 410. In an exemplary embodiment, the one or more interface rigid supports 416 are formed from a rigid plastic. Alternative forms of interface rigid supports may be used to connect the belt 400 to the armor vest 300.

[0071] Attached to the top half of the outside portion 422 is a plurality of horizontally positioned, horizontally configured webbing 414, such as MOLLE 414. Attached to the outside portion 422 below the MOLLE webbing 414 is a pair of interface attachment straps 412, which are used to attach the housing 410 to the armor vest 300 via the attachment interface 226, as described in further detail below.

[0072] Also attached to the bottom of the outside portion 422 is a belt securement strap 426 for securing the housing 410 to the belt 400. The belt securement strap 426 comprises hook fasteners 428 disposed on a substantial portion of the inside surface of the belt securement strap 426 and loop fasteners 430 disposed on a substantial portion of the outside surface of the belt securement strap 426. The hook fasteners 428 are configured to releasably attach to loop fasteners (not illustrated) attached to the inside portion 421. The free end of each interface attachment strap 412 includes hook fasteners 418 configured to releasably attach to the loop fasteners 430 when the hook fasteners 428 are releasably attached to the loop fasteners attached to the inside portion 421.

[0073] Turning now to the belt 400 illustrated in FIG. 5, it is seen that the belt 400 comprises a pocket 420 for receiving the bottom half of the one or more interface rigid supports 416. The belt 400 further comprises a pair of belt straps 402 which are used to secure belt 400 around the waist of the wearer 1001 by way of belt strap clasps 404. The belt straps 402 may be adjusted for comfort by the wearer 1001 by pulling the free ends of the belt straps 402 away from the belt strap clasps 404 when secured.

[0074] Referring now to FIG. 6, there is illustrated an exemplary rear view of the interface housing 410 as attached to the belt 400, in accordance with an exemplary embodiment of the present invention. To attach the interface housing 410 to the belt 400, the bottom half of the one or more interface rigid supports 416 are placed into the pocket 420 of the belt 400. The top half of the one or more interface rigid supports 416 are placed into the pocket 424 of the housing 410. The inside portion 421 of the housing 410 is disposed inside of the rear portion of the belt 400, and the outside portion 422 of the housing 410 is disposed outside of the rear portion of the belt 400. The belt securement strap 426, which is now dangling from the rear of the belt 400, is then tightly wrapped around the underneath of the belt 400 to the inside of the belt 400 in the direction of the arrow A illustrated in FIG. 5. The hook fasteners 428 are applied to the loop fasteners on the inside portion 421 of the housing 410 to firmly attach the housing 410 to the belt 400, as illustrated in FIG. 6. Prior to attachment of the belt 400/housing 410 assembly to the armor vest 300, the interface attachment straps 412 freely dangle from the rear of the belt 400/housing 410 assembly, as illustrated in FIG. 6.

[0075] Referring again to FIGS. 2 and 7, there is illustrated the MOLLE webbing 228 of the strap panel 230 of the armor vest 300. In the exemplary view of the inside of the rear portion 200 of the armor vest 300 illustrated in FIG. 7, the MOLLE webbing 228 is not attached to the MOLLE webbing 414 of the housing 410 attached to the belt 400. In the exemplary view of the inside of the rear portion 200 of the armor vest 300 illustrated in FIG. 2, the MOLLE webbing 228 is attached to the MOLLE webbing 414 of the housing 410.

[0076] To secure the MOLLE webbing 414 to the MOLLE webbing 228, the MOLLE webbing 414 of the housing 410 is placed adjacent to and against the MOLLE webbing 228 of the strap panel 230. The interface attachment straps 412 are folded up over themselves and woven through alternating MOLLE webbing 228 and 414 from the bottom of the MOLLE webbing 228 and 414 to a topmost of one of the MOLLE webbing 228 and 414. After passing through the last of the MOLLE webbing 228 or 414, the interface attachment straps 412 are folded over the top of the housing 410, and the hook fasteners 418 of the interface attachment straps 412 are secured to the loop fasteners 430 of the belt securement strap.
426. The housing 410 is thereby secured to the strap panel 230 by the weaving of the interface attachment straps 412 through the MOLLE webbing 228 and 412.

[0077] Referring now to FIGS. 3-4, there are illustrated exemplary side perspective views of the belt 400 attached to the rear portion 200 of the armor vest 300 by the interface housing 410, in accordance with an exemplary embodiment of the present invention. FIGS. 3 and 4 more particularly illustrate how the interface attachment straps 412 are woven through the MOLLE webbing 228 and 414. After passing through the last of the MOLLE webbing 228 or 414, the interface attachment straps 412 are folded over the top of the interface housing 410 in the direction of arrow B illustrated in FIG. 3 and arrow C illustrated in FIG. 4. The hook fasteners 418 of the interface attachment straps 412 are secured to the loop fasteners 430 of the belt securement strap 426, as described above.

[0078] As illustrated in FIGS. 5 and 6, the interface housing 410 comprises five rows of MOLLE webbing 414. As described above and as illustrated in FIG. 7, the strap panel 230 of the armor vest 300 comprises nine rows of MOLLE webbing 228. The greater number of rows of MOLLE webbing on the strap panel 230 than on the interface housing 410 provides for the wearer 1001 to choose the vertical placement of the interface housing 410 relative to the armor vest 300 to provide for a fit tailored to the wearer's build. If the wearer 1001 has a shorter torso, the wearer 1001 may attach the MOLLE 414 to the top five rows of MOLLE webbing 228. If the wearer 1001 has a longer torso, the wearer 1001 may attach the MOLLE 414 to the bottom five rows of MOLLE webbing 228, as illustrated in FIG. 2. Thus, the wearer 1001 may adjust the vertical placement of the housing 410 relative to the armor vest 300 to provide a more comfortable fit.

[0079] Referring now to FIGS. 8-13, there is illustrated the strap support 500 of the armor vest support device and system, in accordance with an exemplary embodiment of the present invention. The strap support 500 comprises a first strap 502 and a second strap 518 which connect on their free ends to a securement strap 600 positioned along the front portion 100 of the armor vest 300. The strap support 500 synergistically with the back brace 510 provides support for redistribution of the weight of the armor vest 300 to the belt 400.

[0080] Referring now to FIG. 8, there is illustrated an exemplary top view of the armor vest 300 showing a cutaway view A of the weight distribution and support device and system, in accordance with an exemplary embodiment of the present invention. Specifically, the cutaway view A is a cutaway of an upper cover 238 and a lower cover 240 of the rear portion 200. The lower cover 240 covers a lower portion of the strap support 500, and the upper cover 238 covers an upper portion of the strap support 500. The upper cover 238 overlaps the lower cover 240.

[0081] As seen in the cutaway view A shown in FIG. 8, the first strap 502 is connected to a first shoulder strap 110 of the front portion 100 of the armor vest 300 by way of a connection device 522. The first strap 502 extends along the upper back surface of the rear portion 200 of the armor vest 300 through a first strap channel 234 and terminates in a strap end 532 connected to the connection device 522. The cutaway view A also reveals a portion of the second strap 518, which extends along the upper back surface of the rear portion 200 of the armor vest 300 through a second strap channel 236. Although not illustrated, the second strap 518 is connected to a second shoulder strap of the front portion 100 of the armor vest 300 by way of a connection device. The second strap 518 terminates in a strap end connected to such connection device.

[0082] The first shoulder strap 110 is connected to the first shoulder part 104 of the front portion 100. The connection device 522 provides for adjustment of the distance between the front portion 100 and the rear portion 200, i.e., between the first shoulder part 104 of the front portion and a first shoulder portion 202 of the rear portion 200, of the armor vest 300. By pulling on the free end of the first shoulder strap 110 illustrated in FIG. 8, the distance between the front portion 100 and the rear portion 200 is reduced and may overlap, as illustrated in FIG. 16. The second shoulder strap is similarly connected to the second shoulder part 106 of the front portion 100 to provide for adjustment of the distance between the front portion 100 and the rear portion 200, i.e., between the second shoulder part 106 of the front portion 100 and a second shoulder portion 204 of the rear portion 200, of the armor vest 300.

[0083] The adjustment range is constrained by the length of the first shoulder strap 110 and the second shoulder strap and by the strap end 532 and a strap block 508 attached to the first strap 502 and by similar features associated with the second shoulder strap. As seen in FIG. 8, the strap end 532 and the strap block 508 are wider than the first strap channel 234. The strap block 508 limits how close the front portion 100 can be drawn toward the rear portion 200. The strap end 532 limits how far the front portion 100 can be let out relative to the rear portion 200.

[0084] FIG. 9 illustrates an exemplary perspective view of the bottom of the rear portion 200 of the armor vest 300, in accordance with an exemplary embodiment of the present invention. FIG. 10 illustrates an exemplary partial view of the rear portion 200 of the armor vest 300, in accordance with an exemplary embodiment of the present invention. Referring now to FIGS. 9 and 10, it is seen that the first strap 502 extends further down the lower back surface of the rear portion 200 of the armor vest 300 and is redirected by and through a D-ring 232A. The D-ring 232A is attached to the rear portion 200 of the vest 300 via a D-ring attachment 233. After passing through the D-ring 232A, the first strap 502 extends toward and along a first side portion 218 of the rear portion 200. The first strap 502 extends through a first passage 220 provided within the first side portion 218. The first strap 502 terminates at the first strap clasp 510. The first strap clasp 510 is provided to connect the free end of the first strap 502 to a securement strap 600, as described below. A buckle 504 is used to extend or retract the first strap clasp 510.

[0085] The second strap 518 also extends further down the lower back surface of the rear portion 200 of the armor vest 300 and is redirected by and through a D-ring 232B, again as shown in FIGS. 9-10. The D-ring 232B is attached to rear portion 200 of the vest 300 via the D-ring attachment 233. After passing through the D-ring 232B, the second strap 518 extends toward and along a second side portion 222 of the rear portion 200. The second strap 518 extends through a second passage provided within the second side portion 222. The second strap 518 terminates at a second strap clasp 530. The second strap clasp 530 is provided to connect the free end of the second strap 518 to the securement strap 600, as described below.

[0086] Referring now to FIG. 11, there is illustrated an exemplary side perspective view of the armor vest 300 showing the first strap 502 connected on its free end to a free end 602 of the securement strap 600 via the first strap clasp 510.
As shown in FIG. 11, the first strap 502 of the strap support 500 connects the rear portion 200 to the front portion 100 of the armor vest 300. The second strap 518 of the strap support 500 also connects the rear portion 200 to the front portion 100 of the armor vest 300. (0087) The free end 602 of the securement strap 600 is removably secured to the first strap clasp 510. The free end 618 of the securement strap 600 is removably secured to the second strap clasp 530. In an exemplary embodiment, the first strap clasp 510 is a side release buckle comprising a male buckle member (a hook end) 512 and a female buckle member (a catch end) 514. In such embodiment, the second strap clasp 530 is also a side release buckle. (0088) Referring now to FIG. 12, there is illustrated an exemplary front perspective view of the armor vest 300, in accordance with an exemplary embodiment of the present invention. In the exemplary embodiment illustrated in FIG. 12, it is shown that the securement strap 600 is coupled to the front portion 100 via a housing 610 through which it slidably passes. The free ends 602 and 618 are coupled to respective strap clasps 510 and 530, e.g., to respective male ends 512 and 528, which are connected to the respective female ends 514 and 529. (0089) Referring again to FIG. 11, the free ends 602 and 618 of the securement strap 600 are secured to a portion of the front portion 100 in which hook fasteners 108A are attached. In such embodiment, the sides of the free ends 602 and 618 disposed on the hook fasteners have loop fasteners. The outer sides of the free ends 602 and 618 have hook fasteners 606 attached to them so as to increase the available surface area of the hook fasteners 108A. The free ends 602 and 618 of the securement strap 600 serve as pulls to adjust and tighten the tension on the strap support 500 via the strap clasps 510 and 530. After the wearer 1001 uses the free ends 602 and 618 to adjust and tighten the tension on the strap support 500, the wearer 1001 attaches the free ends 602 and 618 to the hook fasteners 108A. (0090) Referring now to FIGS. 11-15, there are illustrated several exemplary views of the armor vest showing a flap, generally designated as 102, in accordance with an exemplary embodiment of the present invention. The flap 102 is provided along the front portion 100 of the armor vest 300. In FIGS. 11-13, the flap 102 is folded up, i.e., open, to reveal the hook fasteners 108A, the free ends 602 and 618 of the securement strap 600, and the strap clasps 510 and 530. Hook fasteners 108B are provided along the inside surface of the flap 102 for engaging loop fasteners 207C and 213C on respective first and second side panels 206 and 212 (illustrated in FIGS. 9 and 14). (0091) Referring again to FIG. 2, there are illustrated a first side panel 206 and a second side panel 212, in accordance with an exemplary embodiment of the present invention. The first side panel 206 comprises an outer surface having loop fasteners 207A and hook fasteners 207B. The first side panel 206 extends outwardly from a central axis of the rear portion 200. A loop 208 is attached to an outward end of the first side panel 206. The second side panel 212 comprises an outer surface having loop fasteners 213A and hook fasteners 213B. The second side panel 212 extends outwardly from a central axis of the rear portion 200. A loop 214 is attached to an outward end of the second side panel 212. (0092) Referring again to FIG. 9, there is illustrated an inside surface of the first side panel 206, in accordance with an exemplary embodiment of the present invention. The first side panel 206 comprises an inner surface having loop fasteners 207C. The end of the first side panel 206 towards the central axis of the rear portion 200 is connected to a pair of straps 209. The end of the second side panel 212 towards the central axis of the rear portion 200 is connected to a pair of straps 215. The straps 209 loop around rings 219, and the straps 215 loop around rings 225. A pair of loop fasteners 221A and 221B are provided along the inside surface of the rear portion to connect the straps 209 and 215 to the rear portion 200 via the rings 219 and 225. (0093) The loop fasteners 207A and 213A of respective side panels 206 and 212 attach to the hook fasteners 108A and 606. FIG. 14 illustrates an exemplary front perspective view of the armor vest 300 in which the side panels 206 and 212 are attached to the hook fasteners 108A and 606. As can be seen in FIG. 14, an outer surface of the first side panel 206 comprises the loop fasteners 207C, and an outer surface of the second side panel 212 comprises the loop fasteners 213C. The loop fasteners 207C and 213C attach to the hook fasteners 108B on the flap 102 to thereby secure the flap 102 to the first and second side panels 206 and 212, as is illustrated in FIG. 15. (0094) The armor vest 300 having the armor vest support device and system, as shown throughout the various figures and described herein, is donned similarly to other armor vests. Here, and as shown in FIGS. 1, 2, and 16, the head of the wearer 1001 may be positioned through the space created between the first shoulder part 104 and the second shoulder part 106 of the first portion 100 and the first shoulder part 202 and the second shoulder part 204 of the rear portion 200 of the armor vest 300. The rear portion 200 nests adjacent the back of the wearer 1001 and the front portion 100 nests adjacent the front of the wearer 1001. The flap 102 of the front portion 100 of the armor vest 300 is placed in an upward position. (0095) Next, and as shown in FIGS. 11-15, the belt strap clasp 404 of the belt 400 is secured and the wearer 1001 uses the belt straps 402 as pulls to tighten and cinch belt the 400 to a comfortable fit against the hips of the wearer 1001. After the belt strap clasp 404 of the belt 400 is secured, the first side portion 218 and the second side portion 222 of rear portion 200 of the armor vest 300 are positioned adjacent the sides of the wearer 1001 so that female ends 514 and 529 are near respective male ends 512 and 528. The wearer 1001 secures the male end 512 to the female end 514 to close the first clasps 510 and secures the male end 528 to the female end 529 to close the second clasps 530. (0096) The wearer 1001 may then pull the free ends 602 and 618 of the securement strap 600 to adjust the tension of the first strap 502 and the second strap 518 to tighten the strap support 500, as shown in FIGS. 11-13. The tightening of the strap support 500 performs two functions. First, it pulls the front portion 100 of the armor vest 300 upwards along the shoulder region of the wearer 1001 by way of the force exerted on the first strap 502 connected to the first shoulder strap 110 connected to the first shoulder 104, and concurrently, on the second strap 518 connected to the second shoulder strap 106, both of the front portion 100 of the armor vest 300. (0097) Second, as the strap support 500 may be tightened, the front portion 100 and the rear portion 200 are tightened around the torso of the wearer 1001 generally along the front, side, and rear circumferential surfaces of the armor vest 300. This, in tum, lifts the weight of the armor vest 300 off of the
shoulders of the wearer 1001 and redistributes the weight onto the back brace 310. The weight is transmitted along the back brace 310 to the belt 400. In addition, the first arm 304 and the second arm 306 of the back brace 310, which lie adjacent the scapular and shoulder regions of the wearer 1001 while in use, also bend away from the rear of the wearer 1001 to support the weight of the armor vest 300 off of the shoulders of the wearer 1001.

[0098] After tightening, the loop fasteners at the free ends 602 and 618 of the securement strap 600 are attached to the hook fasteners 108A, as shown in FIG. 13. Then, the first side panel 206 and the second side panel 212 are wrapped around the side of the armor vest 300. The loop fasteners 207A of the first side panel 206 are secured to the hook fasteners 108A and 606, and the loop fasteners 213A of the second side panel 212 are secured to the hook fasteners 108A and 606, as shown in FIG. 14. Finally, the flap 102 of the front portion 100 of the armor vest 300 is flipped downward so that the hook fasteners 1083 on the inside surface of the flap 102 engage the loop fasteners 207C and 213C of respective first and second side panels 206 and 212. The armor vest 300 is thereby in place on the wearer 1001.

[0099] The armor vest 300 may be removed by reversing the aforesaid steps for donning it. The loop 208 and the loop 214 (illustrated in FIG. 2) may be pulled to pull the first side panel 206 and the second side panel 212 away from the front portion 100 of the vest 300.

[0100] An alternative embodiment of the invention is shown in FIGS. 17 through 46 in which like reference characters refer to like parts throughout the several views thereof. The embodiment of the invention is generally an armor vest and more specifically an armor vest in the nature of a plate carrier having a weight distribution and support device and system of the present invention.

[0101] Referring now to FIGS. 17, 23, and 24, a plate carrier 1300 of the invention shown. The plate carrier 1300 comprises a first shoulder portion 1202, a second shoulder portion 1204, a front portion 1100, and a rear portion 1200. Also provided with the plate carrier 1300 is a belt 1400 which connects to the plate carrier 1300 by a rigid support 1416. Adjustable belt straps 1402 and belt strap clasps 1404 are provided with the belt 1400 for securing the belt 1400 around the waist of a wearer 1001. Further, the belt 1400 may be tied to a thigh rig to help accommodate additional weight.

[0102] The plate carrier 1300, as shown throughout FIGS. 17 through 46, also includes a cummerbund 700 comprising a first side panel 704 and a second side panel 702, wherein each side panel 702, 704 is attached to rear portion 1200 of armor vest 700 with securement straps 1600. This cummerbund 700 is a portion of the plate carrier 1300 that can also be configured to removably attach the rear portion 1200 to the front portion 1100 of the plate carrier 1300 as shown throughout the various figures.

[0103] Both the front portion 1100 of the plate carrier 1300 and the back sides of side panels 702, 704 comprise hook and loop fasteners such that the side panels 702, 704, when wrapped around the wearer 1001, can be removably attached to the front portion 1100 of the plate carrier 1300. FIG. 18 also shows that the back side of the front flap 1102 and the fronts of the side panels 702, 704 can comprise hook or loop fasteners such that the front flap 1102, when lowered, may attach to corresponding hook or loop fasteners on the fronts of the side panels 702, 704.

[0104] The plate carrier 1300 comprises the first shoulder portion 1202 and the second shoulder portion 1204 as shown specifically in FIGS. 20-21. As shown in FIGS. 38-41, each shoulder portion 1202, 1204 comprises a shoulder front slide 1201 and a shoulder rear slide 1203 for allowing the wearer 1001 to adjust the length of a shoulder strap 1205. Decreasing the length of the shoulder straps 1205 can allow armor plates to sit higher on the body and decrease the size of the head opening for the wearer 1001. The shoulder strap 1205 can use hook and loop fasteners to secure the adjusted shoulder strap 1205 at a desired position.

[0105] The plate carrier 1300 may optionally include a rear handle 730 that can be used by another to drag the wearer 1001 in the event the wearer 1001 becomes immobilized.

[0106] The rear portion 1200 can further comprise a back brace to provide structural support for bearing at least a portion of the weight of plate carrier 1300 and distributing the weight to belt 1400. The back brace can have a similar shape, form, and function to the back brace 310 discussed above with regard to the previously described embodiment, but the back brace can be adapted to fit within the rear portion 1200 of the currently described plate carrier 1300. The back brace may or may not be integrated with the rear portion 1200. The back brace may comprise a flexible yet partially rigid structure that facilitates support and redistribution of the weight of plate carrier 1300. The back brace is generally a flat structure and may have a main body with a first arm and a second arm that each extend away from main body. The main body may be integrated within the rear portion 1200 to be positioned adjacent and extend along at least a portion of the thoracic vertebrae of wearer 1001. The first arm and second arm may extend laterally and, possibly also, vertically away from main body of the back brace. The back brace may be generally symmetrical and may take on a y-shape or other suitable geometric shape for supporting the weight of plate carrier 1300. The first arm and second arm can be integrated within the rear portion 1200 of the plate carrier 1300 to be positioned adjacent and extend along at least part of the scapular and shoulder region of wearer 1001. Additional support may be positioned between the first arm and the second arm to lend support to maintain the flexibility and rigidity of the back brace.

[0107] The back brace may be positioned between an outer layer of material and an inner layer of material of rear portion 1200 of plate carrier 1300. Optionally, single or multiple layers of soft ballistic packs or materials may be provided between an outer layer of material and an inner layer of material of rear portion 1200 of plate carrier 1300. The back brace may be positioned between an inner layer of material of rear portion 1200 of plate carrier 1300 and single or multiple layers of soft ballistic packs or materials of plate carrier 1300.

[0108] The back brace may comprise any flexible and rigid material suitable for supporting the weight of plate carrier 1300 while wearer 1001 is using plate carrier 1300 for training, combat, or any other use. For example, and not as a limitation, the back brace may comprise any one of plastic, polymeric, metal, rubber, polymer, fiberglass, graphite, ballistic grade material, synthetic and natural material, or other suitable material possessing sufficient density and sufficient tensile and torsional strength to withstand the various types of force placed on the back brace during use with plate carrier 1300, or any combinations thereof. The materials should provide a structure sufficiently flexible, yet rigid enough, for weight support and distribution of plate carrier 1300.
The back brace may be affixed to rear portion 1200 of plate carrier 1300. As an example, affixation may occur through attachment to an adjacent pocket of rear portion 1200 of plate carrier 1300. The pocket may comprise material attached, or affixed to, the front surface of rear portion 1200. A belt attachment interface may provide a mechanism to attach rear portion 1200 of plate carrier 1300 to belt 1400 with rigid support 1416. The attachment should allow movement to accommodate some lateral, torsional, bending, and compression force so that rear portion 1200 of plate carrier 1300 may have a flexible interaction with belt 1400 and provide wearer 1001 the ability to move while wearing plate carrier 1300.

The rigid support 1416 is attached to both the rear portion 1200 and the belt 1400 as shown throughout FIGS. 24 through 33. The rigid support 1416 is configured to position the plate carrier 1300 relative to the belt 1400 as shown throughout FIGS. 24 through 33. The rigid support may comprise any rigid material, such as a plastic, ballistic grade, polymeric, or other suitable rigid material capable of providing structural support between the belt 1400 and the cummerbund 700. The rigid support 1416 may comprise a first flat arm and a second flat arm pivotably attached to one another by way of a suitable fastener that allows for movement of the first arm, which comprises a rigid support vest portion 1420, relative to the second arm, which comprises a rigid support belt portion 1418, to provide for flexibility between plate carrier 1300 and belt 1400. A suitable fastener may comprise a rivet 1422 or comparable device that allows the portions 1418, 1420 to rotate independently about the connection, thereby increasing the mobility of the wearer 1001. Hook and loop fasteners may be provided along the surfaces of the rigid support 1416. These hook and loop fasteners are positioned to correspond with hook and loop fasteners provided within the cummerbund pocket 706 and the belt pocket 1406 of belt 1400.

FIG. 25 shows that the belt 1400 can be separated from the cummerbund 700 by removing the connection between the hook and loop fasteners of the rigid support and the corresponding hook and loop fasteners provided within and lining the belt pocket 1406.

Referring now to FIG. 26, the insertion of the rigid support belt portion 1418 into the belt pocket 1406 is shown. Both the belt pocket 1406 and rigid support belt portion 1418 can comprise hook and loop fasteners such that, when the rigid support belt portion 1418 is inserted into the belt pocket 1406, the rigid support belt portion 1418 can remain substantially stationary within the belt pocket 1406. One can use shims to aid with insertion of the rigid support 1416. The shims can be made of plastic or another material resistant to adhesion to hook and loop fasteners. To insert the rigid support belt portion 1418, a user can simply sandwich the rigid support belt portion 1418 between two shims, insert rigid support belt portion 1418 into the belt pocket 1406, and then remove the shims to allow adhesion between the hook and loop fasteners portions of the rigid support belt portion 1418 and belt pocket 1406.

Referring now to FIGS. 27-29, the insertion of the rigid support belt portion 1418 into the belt pocket 1406 is shown. FIGS. 28 and 29 also show the cummerbund pocket 706 into which the rigid support vest portion 1420 can be inserted. FIG. 30 shows that, similar to the belt pocket 1406, the cummerbund pocket 706 can have hook and loop fasteners lining for attaching the rigid support 1416.

Referring now to FIGS. 31-33, the alignment of the rigid support vest portion 1420 to be inserted into the cummerbund pocket 706 is shown. These figures also show that the rigid support vest portion 1420 can comprise hook and loop fasteners for attaching to the hook and loop fasteners lining of the cummerbund pocket 706 such that, when the rigid support vest portion 1420 is inserted into the cummerbund pocket 706, the rigid support vest portion 1420 can remain substantially stationary within the cummerbund pocket 706.

Securement straps 1600 are provided with the plate carrier 1300 of the present invention. The characteristics and operation of the securment straps 1600 relative to the plate carrier 1300 will be discussed in further detail later in the Description. Referring now to FIG. 18 the plate carrier 1300 is shown with the front flap 1102 in an opened position, which is also shown in FIG. 22.

Referring now to FIGS. 34-38, and 40, the operation of a strap mechanism is shown. FIG. 34 shows the rear portion 1200 of the plate carrier 1300 on a wearer 1001. The rear flap 1103 and rear flap hold-down 1105 are opened to expose the rear portion of the cummerbund 700. As is shown, the cummerbund 700 can comprise cummerbund adjustable straps 716 for adjusting the length of the cummerbund, and thereby loosening or tightening the cummerbund's fit around the stomach of the wearer 1001. The cummerbund can be sized such that the hook and loop fasteners are not visible when closed beneath the front flap 1102. The adjustable straps 716 can extend from the rear portion of the cummerbund 700 to a fixed position near the center of the rear portion 1200 of the plate carrier 1300. In this embodiment, the adjustable straps 716 extend to fixed loops 714. Further, each adjustable strap 716 can extend through a slide 712 to allow adjustment of the length of the adjustable strap 716, and thereby allow adjustment of the length of the cummerbund 700. The slides 712 can be any device capable of allowing adjustment of the length of the adjustable strap 716. In this embodiment, the slides are tri-bar slides.

Referring again to FIG. 34, the rear portion of the securment straps 1600 is also shown. The securment straps 1600 can be fixed near the shoulder portions 1202, 1204 of the wearer 1001 and extend vertically downward the rear portion 1200 of the plate carrier 1300. The rear portions of the securment straps 1600 can then extend through a tri-loop 710 or other appropriate device, and then horizontally within the cummerbund 700 towards the front portion 1100 of the plate carrier 1300. FIG. 19 shows the front portion of the securment straps 1600 emerging from the cummerbund and its hook and loop fasteners portion and attaching to the hook and loop fasteners of the side panels 702, 704. A wearer 1001 can increase the distance by which the securment straps 1600 extend from the cummerbund 700, and thereby tighten the fit of the plate carrier 1300, by pulling on the securment straps 1600 before attaching the hook and loop fasteners portion of the securment straps 1600 to the hook and loop fasteners of the side panels 702, 704. By adjusting the securment straps 1600, a user can tighten the armor around the chest and torso of the wearer 1001 for a snug fit, which can reduce strain on the shoulders of the wearer 1001 and reduce carrier bouncing when running.

Referring now to FIG. 34A, shown is a cutaway view of an embodiment of the rear portion of the securment straps 1600. Cutaway line A shows the path of the securment strap 1600 within the cummerbund 700. In this embodiment,
each securement strap 160 comprises a rear securement strap 1601 and a front securement strap 1603, where the straps 1601, 1603 are connected by a securement strap loop 1605. Each rear securement strap 1601 can begin near a shoulder portion 1202, 1204 of the vest, extend through the tri-loop 710, and end at a securement strap loop 1605. Each front securement strap 1603, on the other hand, can begin at a fixed point within the cummerbund 700, extend toward the center of the back of the wearer, loop through the securement strap loop 1605, and then extend in the opposite direction towards the front of the wearer 1001. When a wearer 1001 pulls on the front securement strap to tighten the vest, the securement strap loop 1605 can move toward the front of the wearer, thereby pulling the rear securement strap 1601 downward and toward the front of the wearer to tighten the fit of the vest 1300.

[0119] Referring now to FIG. 35, another view of the rear portion of the securement straps 1600 is shown. In this figure, the loose ends of the cummerbund adjustable straps 716 are not tucked within the cummerbund 700, thus showing how a user can adjust the cummerbund adjustable straps 716. FIG. 36 shows the hook and loop fasteners portion of the rear flap hold down 1105.

[0120] Referring now to FIG. 37, the securement strap 1600 extending from the tri-loop 700, through the cummerbund 700, and out to the second side panel 702 is shown.

[0121] Referring now to FIG. 38, a rear view of the plate carrier 1300 on a wearer 1001 is shown. This view also shows the securement strap 1600, and the securement strap shoulder slide 1607 that allows a user to adjust the length of the securement strap 1600 if the front portion of the securement strap 1600 is not extending sufficiently across the side panels 702, 704, or is extending too far across the side panels 702, 704. FIG. 40 shows a closer view of the securement strap shoulder slide 1607.

[0122] Referring to FIGS. 38-41, the functioning of the shoulder strap 1205 of the second shoulder portion 1204 is shown. FIG. 38 shows the shoulder front slide 1201 and shoulder rear slide 1203, which can allow the wearer to adjust the length of a shoulder strap 1205. Decreasing the length of the shoulder straps 1205 can allow armor plates to sit higher on the body and decrease the size of the head opening for the wearer 1001.

[0123] Referring now to FIG. 39, a closer view of the second shoulder portion 1204 where the shoulder strap 1205 is separated for adjustment is shown. This view shows that the shoulder strap 1205 can use hook and loop fasteners to secure the adjusted shoulder strap 1205. FIGS. 40 and 41 show a similar view of the second shoulder portion 1204 where the shoulder strap 1205 is in the secured (FIG. 40) and unsecured (FIG. 41) positions.

[0124] Referring now to FIG. 42, backpack strap retainers are shown. The vest 300 can include small plastic and metal clips that can be used when carrying additional backpacks. These clips can keep the straps from sliding off the shoulders during use, but still allow the backpack to be removed quickly. The clips are optional and can be positioned per the requirements of the wearer 1001.

[0125] Referring now to FIG. 43, it is shown that hook and loop fasteners loops can be provided to allow cables to be run over the shoulders. Additionally, there can be openings in the top corners of the front plate pocket to allow cables to be run inside the vest.

[0126] Referring now to FIG. 44, side plate pockets are shown. These pockets can be positioned as required or removed entirely. The hip belt can be designed so that a side plate can be worn at the base of the spine for improved coverage.

[0127] Referring now to FIG. 45, shoulder and hip belt armor is shown. Soft armor inserts can be provided for additional coverage on the shoulders and around the waist. The belt 1400 can still function as a load bearing element with the armor removed. The shoulders can be oversized for improved coverage. Alternatively, the vest 300 can use traditional thin profile shoulders with no soft armor.

[0128] Referring now to FIG. 46, it is shown that the armor system can be worn in a number of configurations depending on the desired level of coverage and weight management.

[0129] Hook and loop fasteners are described throughout description and shown throughout the figures as a means to secure parts of armor vest 300, 1300 together. Alternative forms of removable attachments may be used, including but not limited to, buttons, snaps, or other suitable forms of attachment.

[0130] Clasps may comprise plastic or other suitable forms of material for attachment. Any form of clasps, buckles, and other suitable forms of connectors may be used.

[0131] D-rings, rings, loops, slides, and strap connectors may comprise plastic, metal, or other suitable forms of material for creating static and dynamic connections with the strap support 500.

[0132] Belt 400, 1400 may comprise multilayered materials including padding and foam configured for a comfort fit.

[0133] The present invention may be used in connection with back packs, alternative types of armor vests and plate carriers, and other applications requiring use of a support system to redistribute weight away from the shoulders of a wearer of a system implementing the present invention. As shown throughout the figures, armor vest 300, 1300 may have additional straps attached along various aspects of its surface for holding packs, grenades, carabiners, and other devices and materials.

[0134] While preferred embodiments of the present invention have been shown and described, it will be apparent to those skilled in the art that many changes and modifications may be made without departing from the invention in its broader aspects. The appended claims are intended to cover, therefore, all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A load distribution device for a vest comprising a front portion, a rear portion, and a shoulder portion, the load distribution device comprising:
   a belt;
   a coupling configured to the belt to the rear portion of the vest; and
   one or more securement straps configured to extend from the shoulder portion of the vest to the rear portion of the vest, and from the rear portion of the vest to the front portion of the vest.

2. The load distribution device of claim 1, wherein the coupling comprises a rigid support.

3. The load distribution device of claim 2, wherein the rigid support comprises a belt portion and a vest portion connected by a rivet such that the belt portion and the vest portion can rotate about the rivet.
4. The load distribution device of claim 1, wherein the armor vest comprises a flexible back brace.

5. The load distribution device of claim 1, wherein the one or more securement straps extend toward the front portion of the vest by passing through a ring in the rear portion of the vest.

6. The load distribution device of claim 1, wherein the shoulder portion comprises a clip configured to prevent a backpack strap from sliding off a wearer's shoulder.

7. A load distribution device for a vest comprising a front portion, a rear portion, and a shoulder portion, the load distribution device comprising:

   a cummerbund;
   a coupling configured to attach the cummerbund to the rear portion of the vest; and
   one or more securement straps, each securement strap comprising a rear securement strap and a front securement strap,
   wherein each rear securement strap extends from a shoulder portion to a securement strap loop, and
   wherein each front securement strap is fixed at one end to the cummerbund, extends toward the center of the back of a wearer, loops through the securement strap loop, and extends in an opposite direction towards the front of the wearer.

   * * * * *