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(54) **PROTECTIVE GARMENT SYSTEM WITH WEIGHT TRANSFER ELEMENTS**

(76) Inventors: **Edward R. Dovner**, Spindale, NC (US); **Gary Lesley**, Burnsville, MN (US)

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**Related U.S. Application Data**

(63) Continuation-in-part of application No. 11/507,635, filed on Aug. 21, 2006, now Pat. No. 7,814,567.

(60) Provisional application No. 60/812,656, filed on Jun. 9, 2006.

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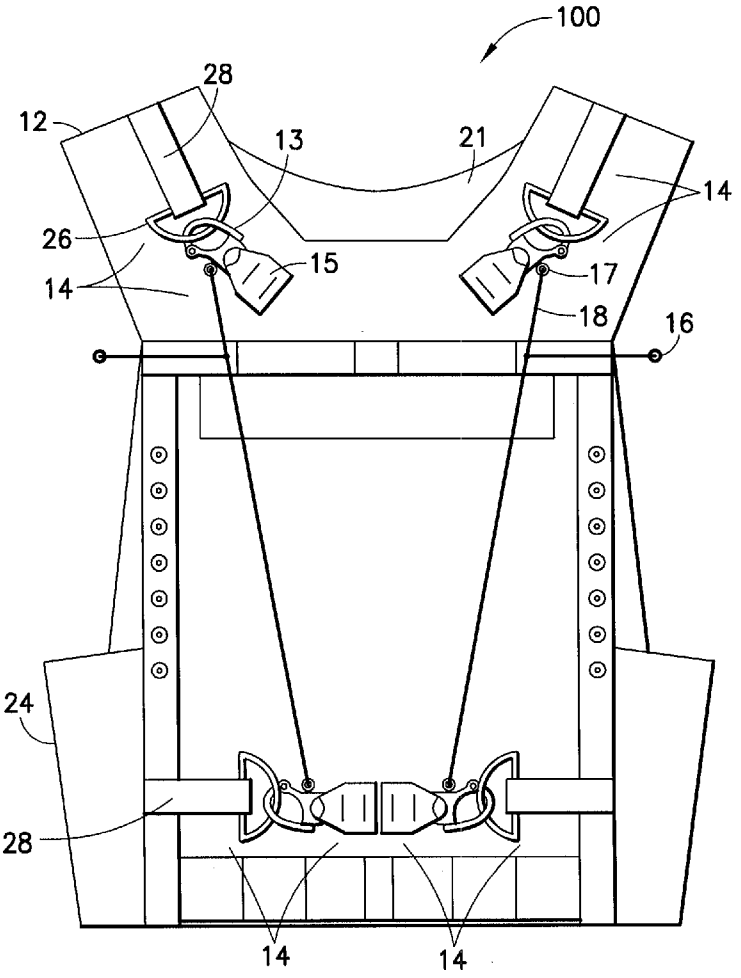
*A41D 1/04* (2006.01)

(52) **U.S. Cl.** ..... **2/2.5**

(57) **ABSTRACT**

One embodiment of the present invention provides a ballistic vest, comprising: a front portion configured to protect a front of a torso of a wearer; a rear portion configured to protect a rear of the torso of the wearer; and a cummerbund; wherein the cummerbund is a separate element from the front portion and the rear portion and the cummerbund is configured to form a loop around the wearer; and wherein at least one of the front portion and the rear portion interface with the cummerbund to transfer weight to the cummerbund. Another embodiment of the present invention provides a ballistic vest, comprising: a front portion configured to protect a front of a torso of a wearer; a rear portion configured to protect a rear of the torso of the wearer; and a shoulder pad; wherein at least one of the front portion and the rear portion interface with the shoulder pad to disperse weight applied by at least one of the front portion and the rear portion over a larger area than would be applied in the absence of the shoulder pad.



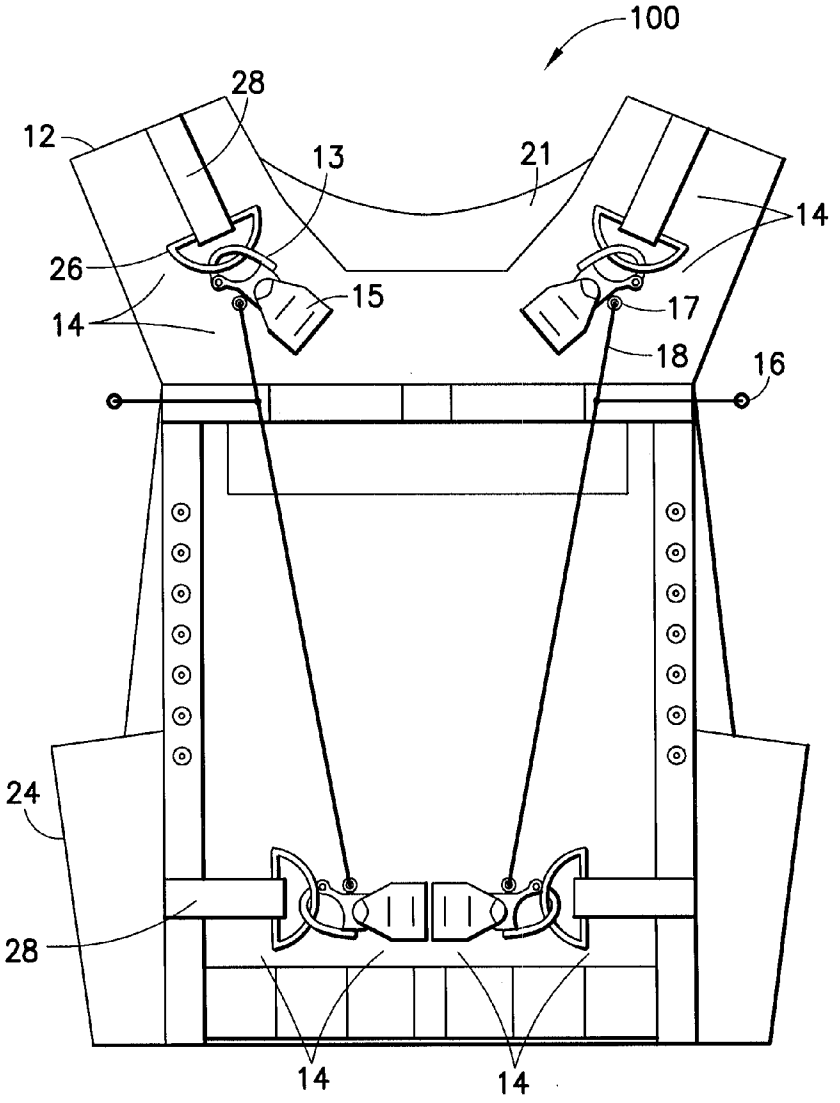



FIG. 1A

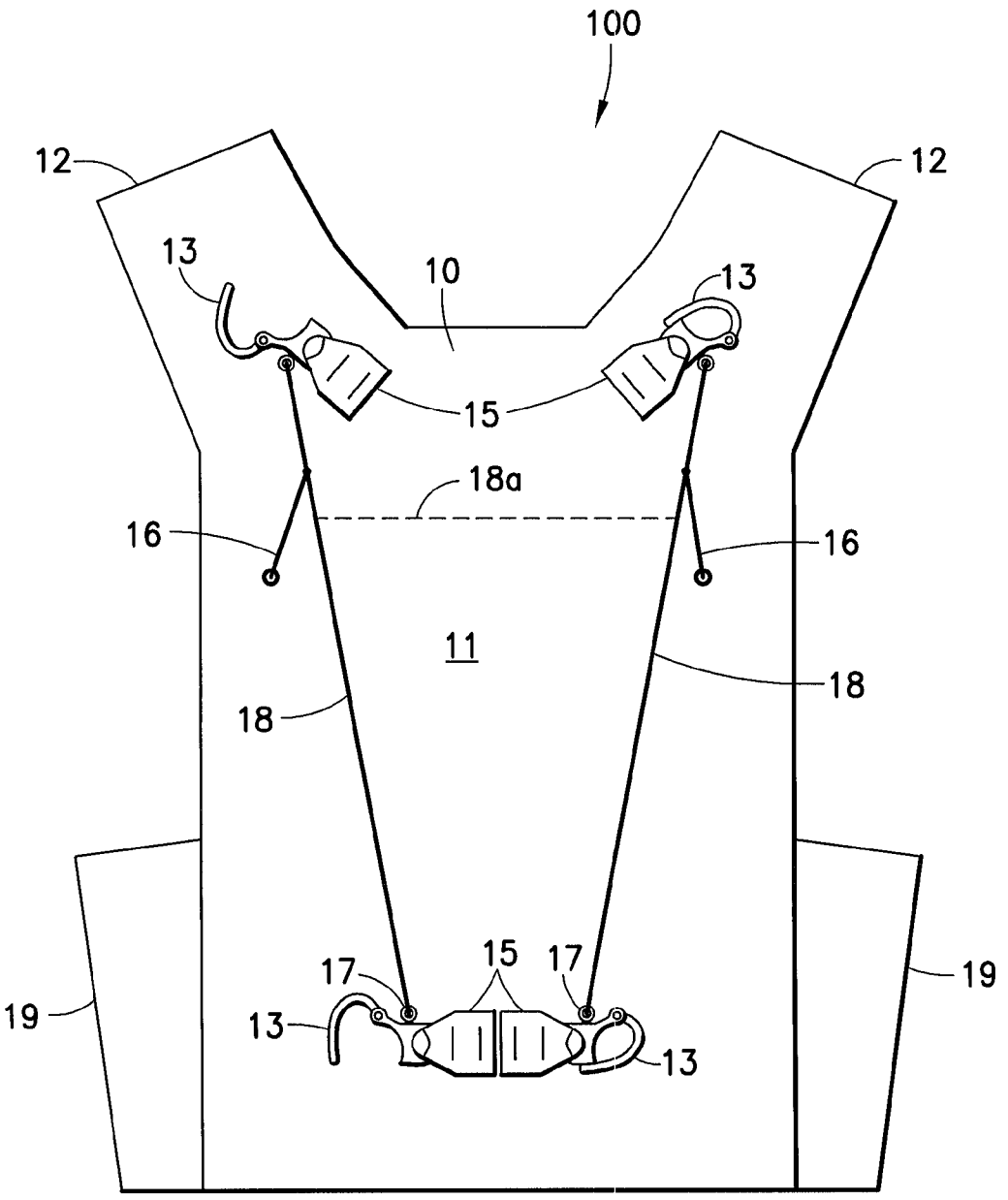



FIG. 1B

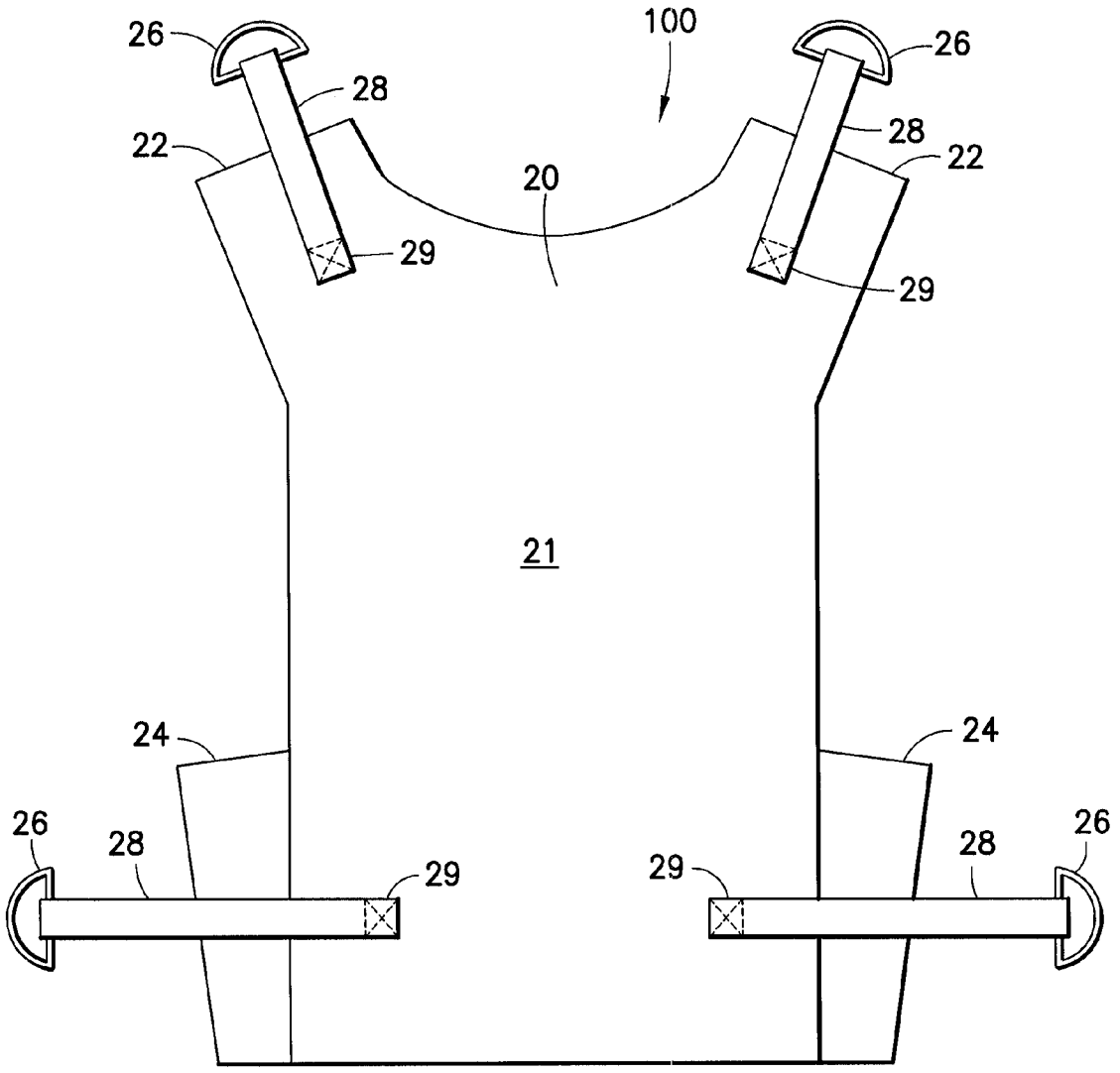



FIG. 1C

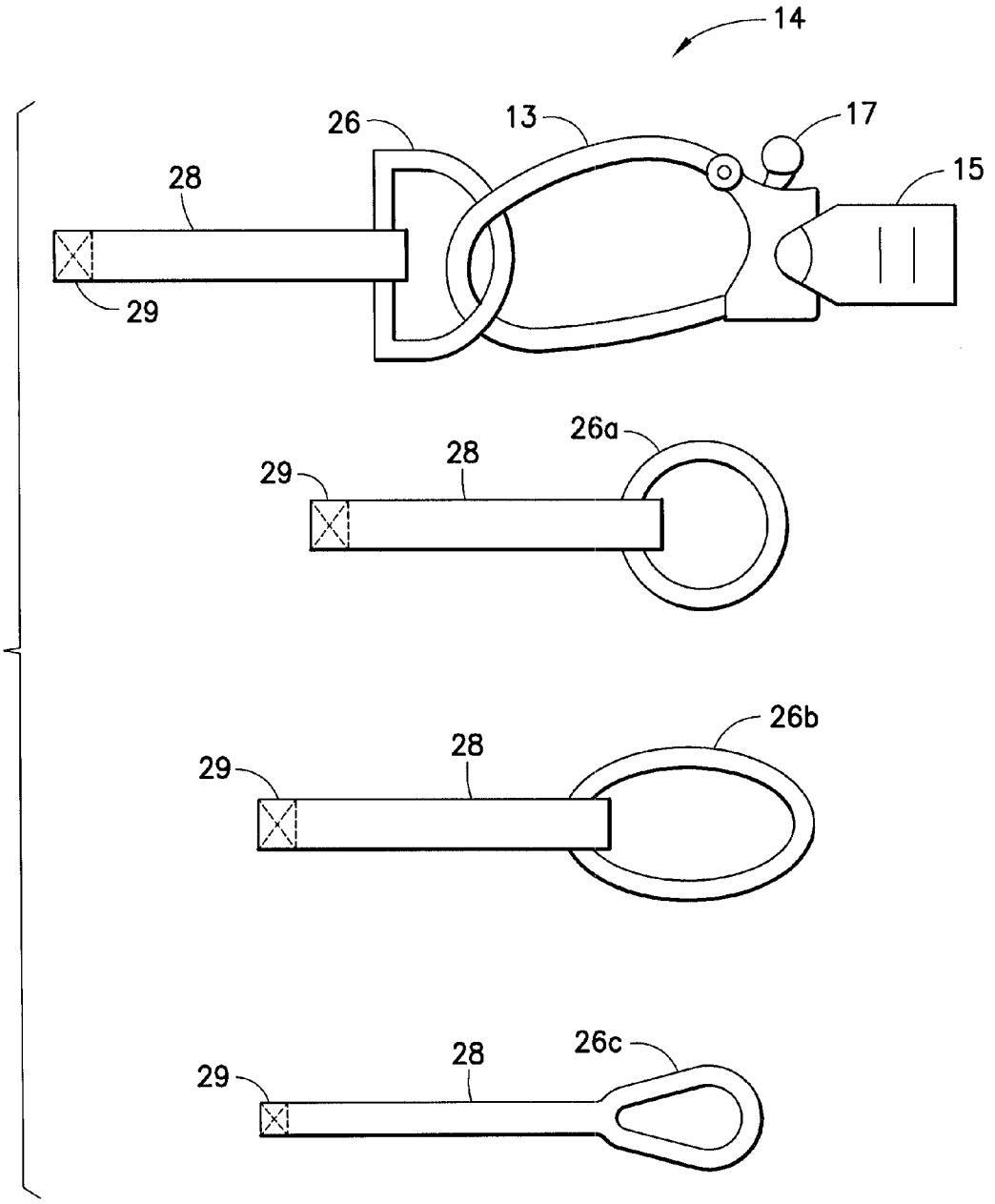



FIG.2

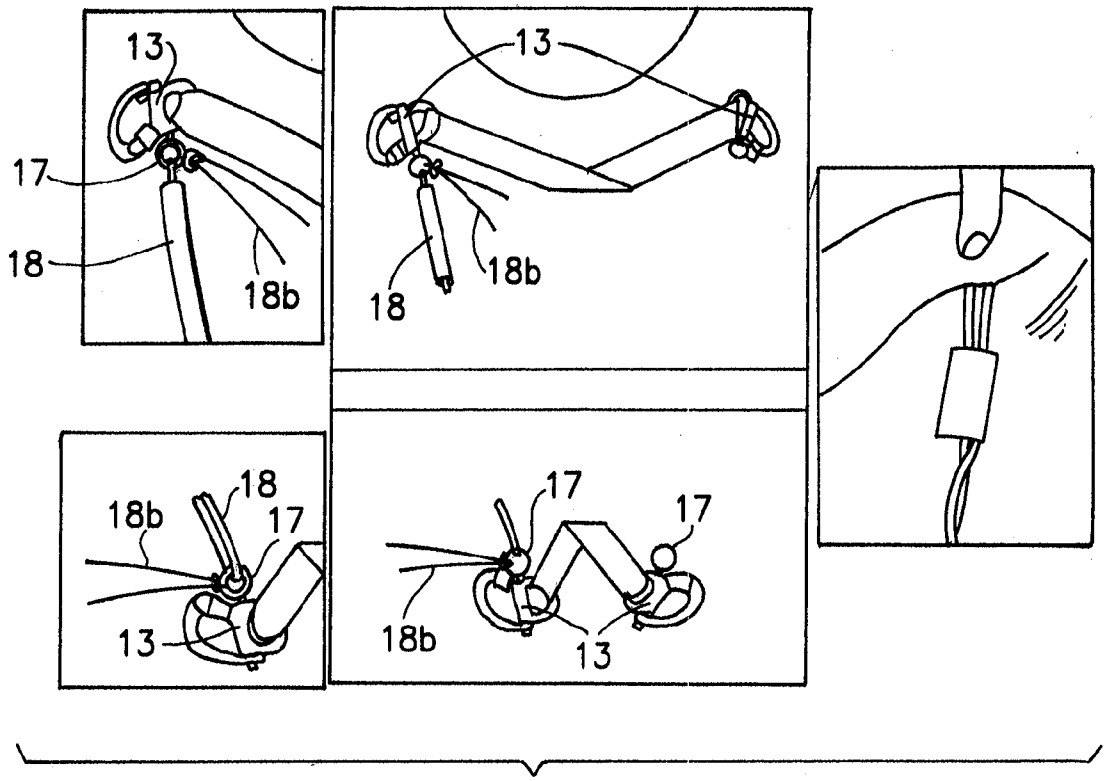



FIG.3

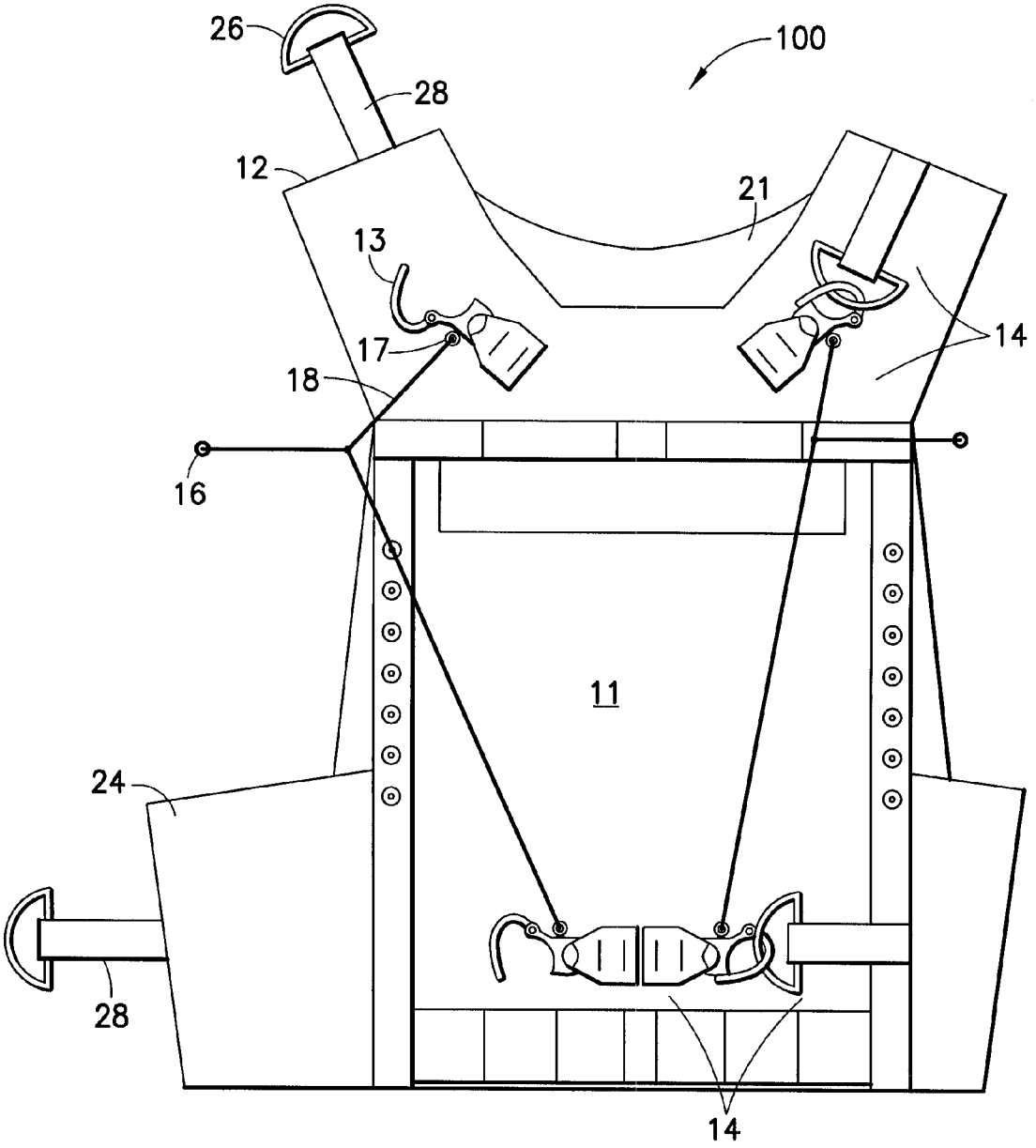



FIG.4

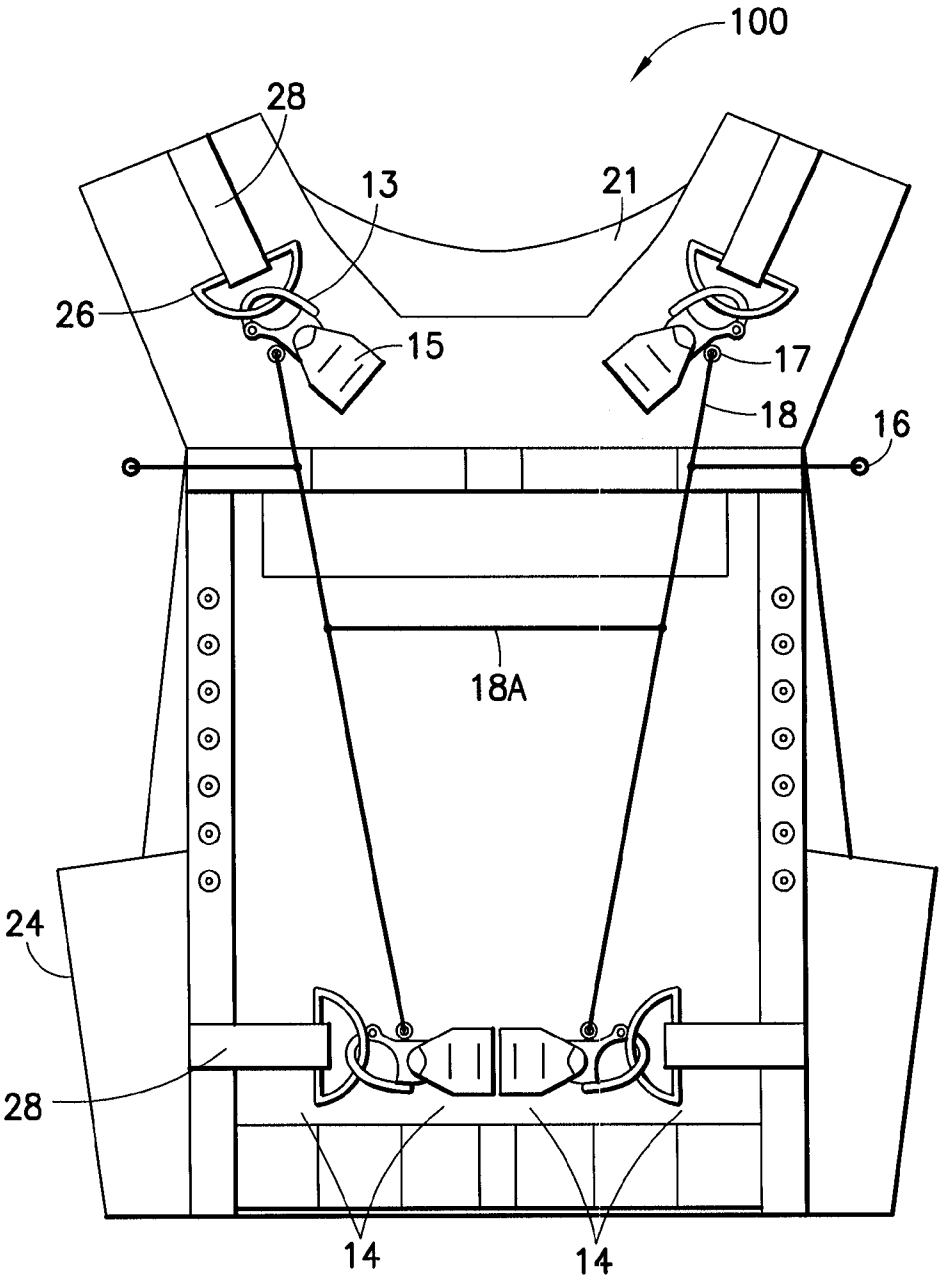



FIG.5

FIG.6A

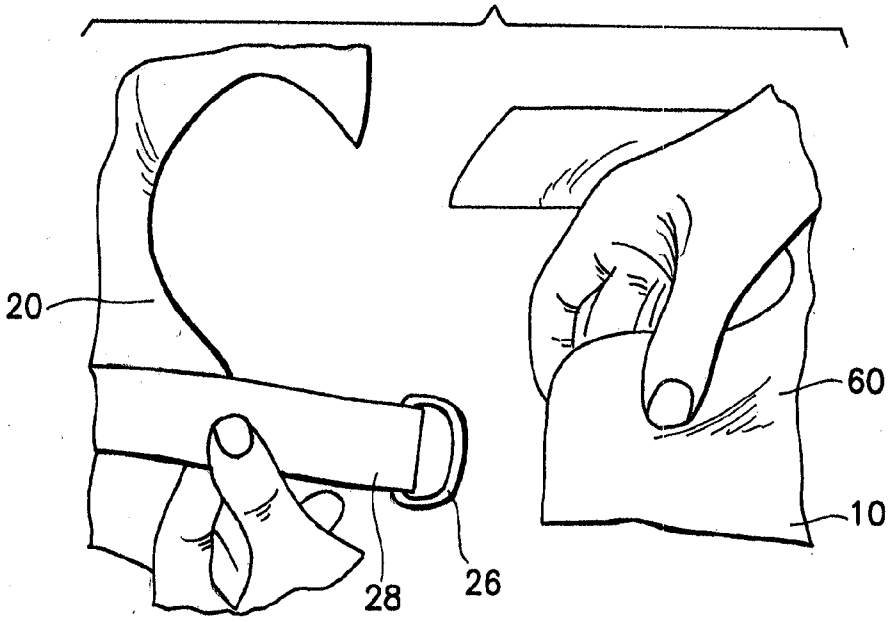
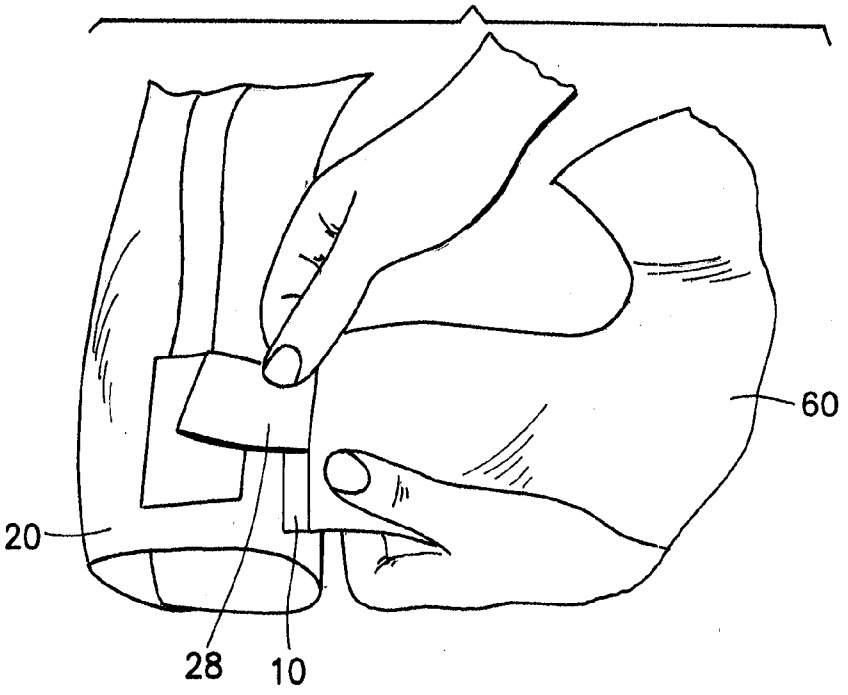



FIG.6B



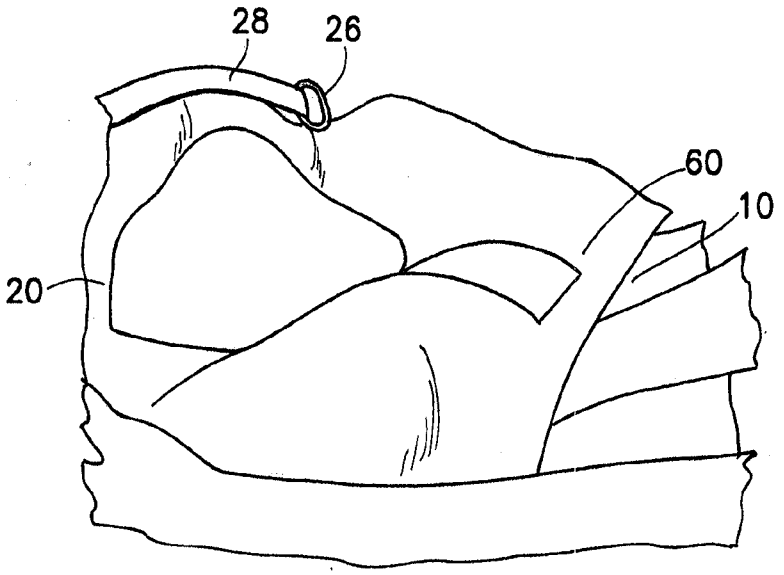



FIG.6C

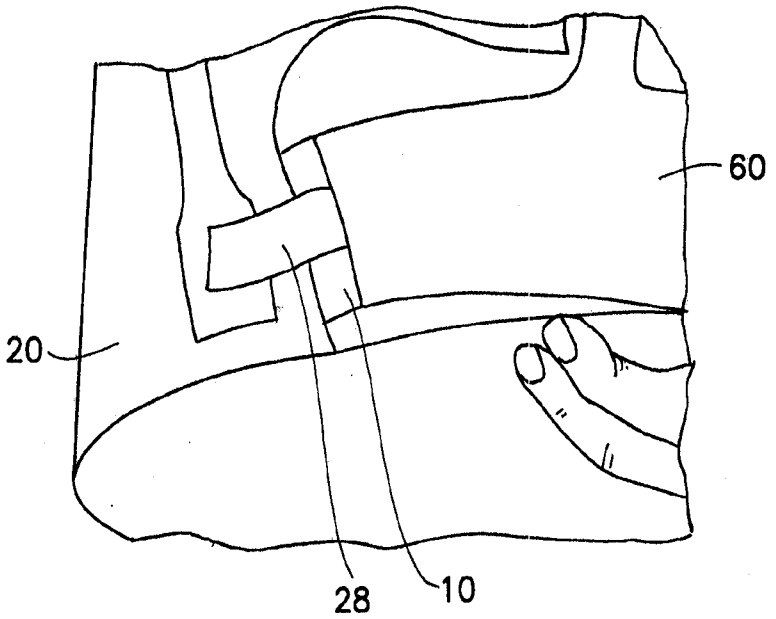



FIG.6D

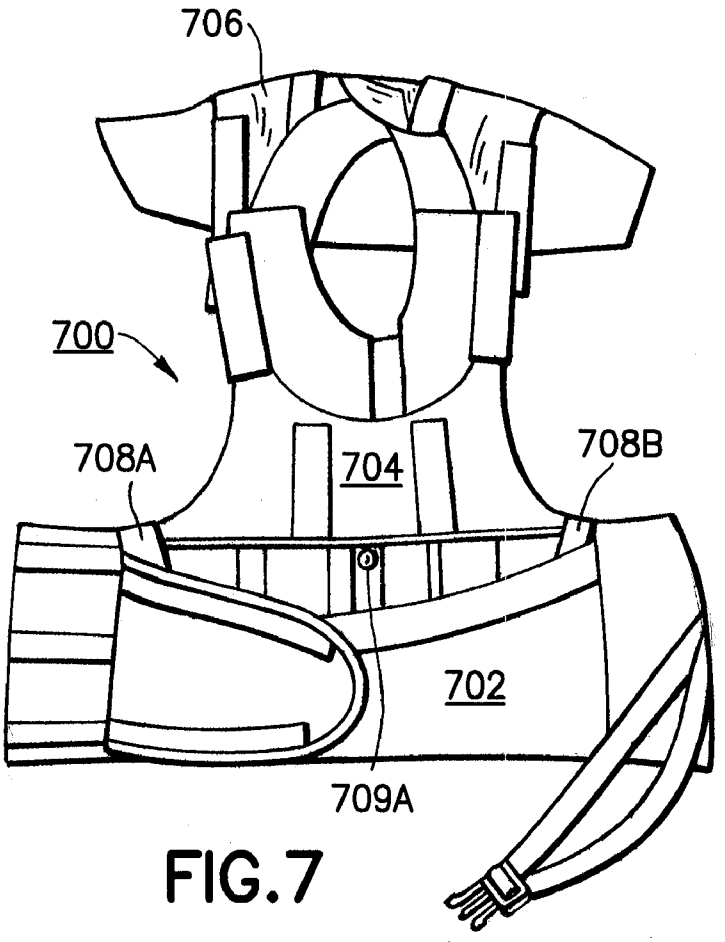



FIG.7

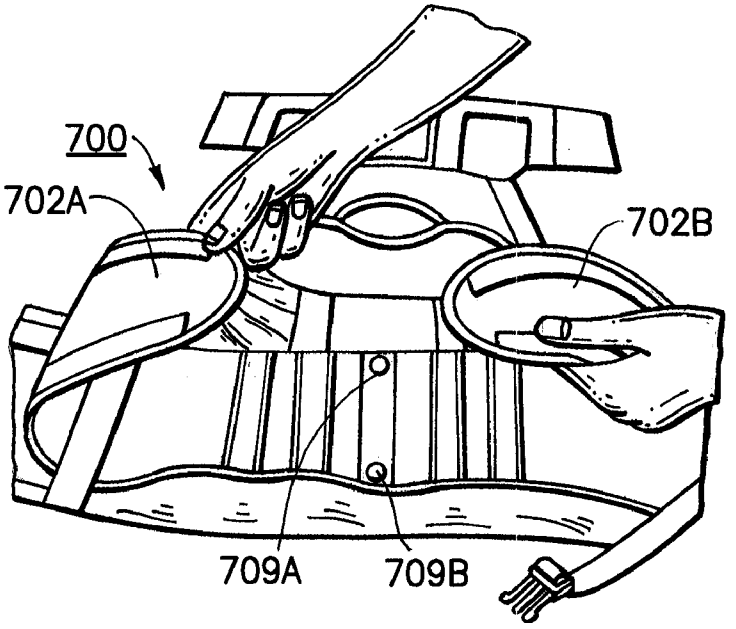



FIG.8

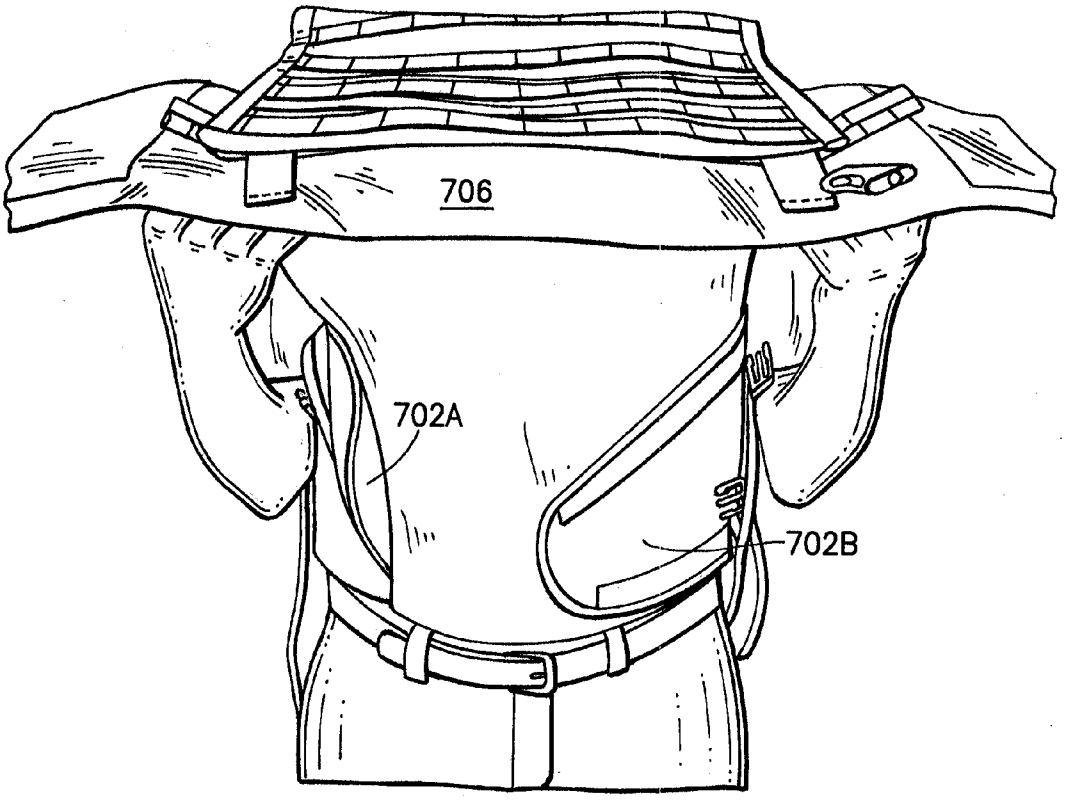



FIG.9

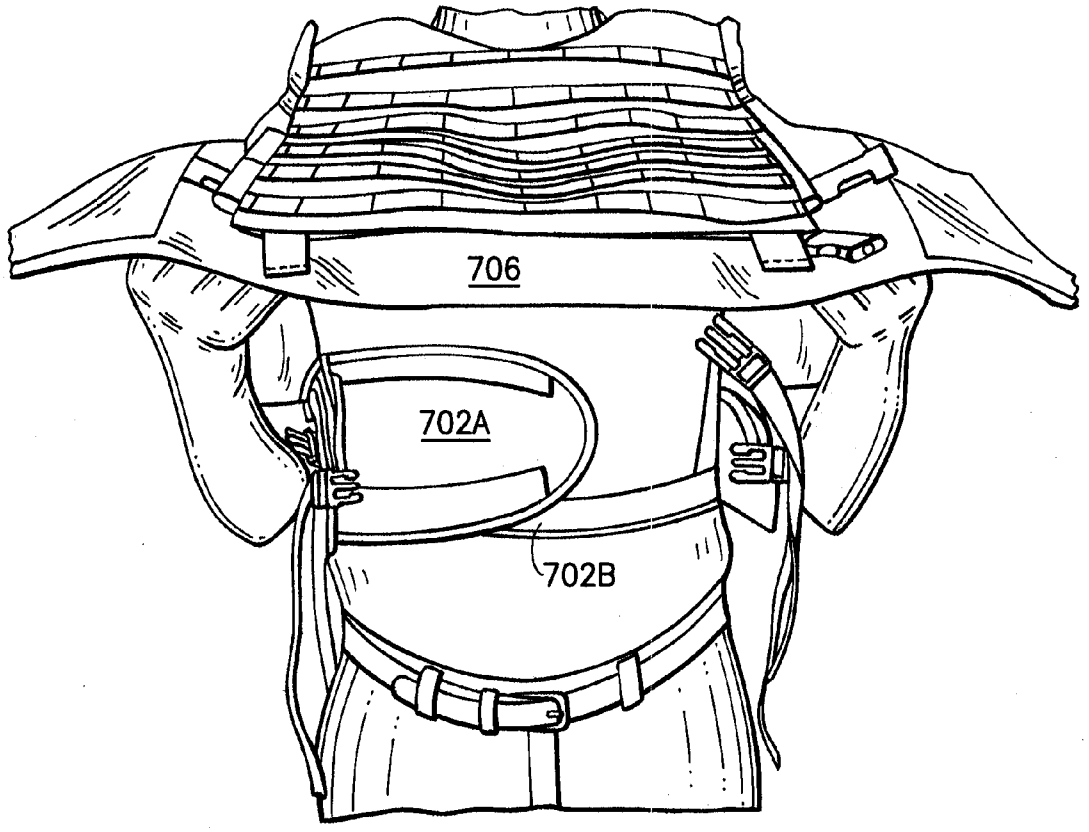



FIG. 10

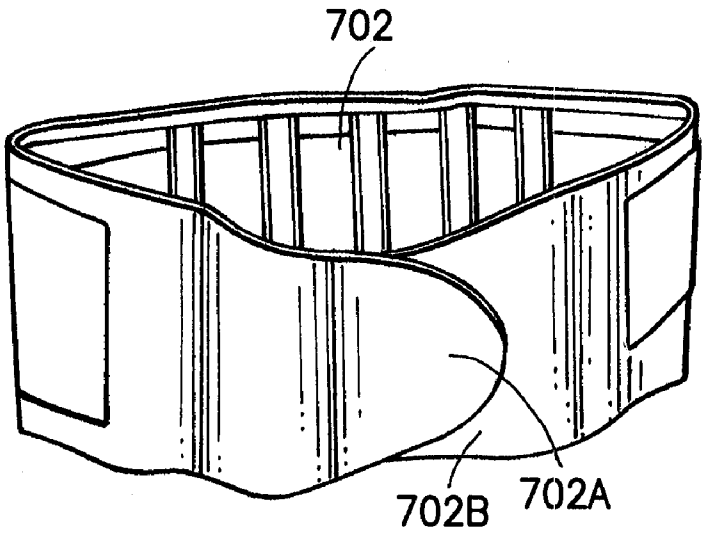



FIG. 11

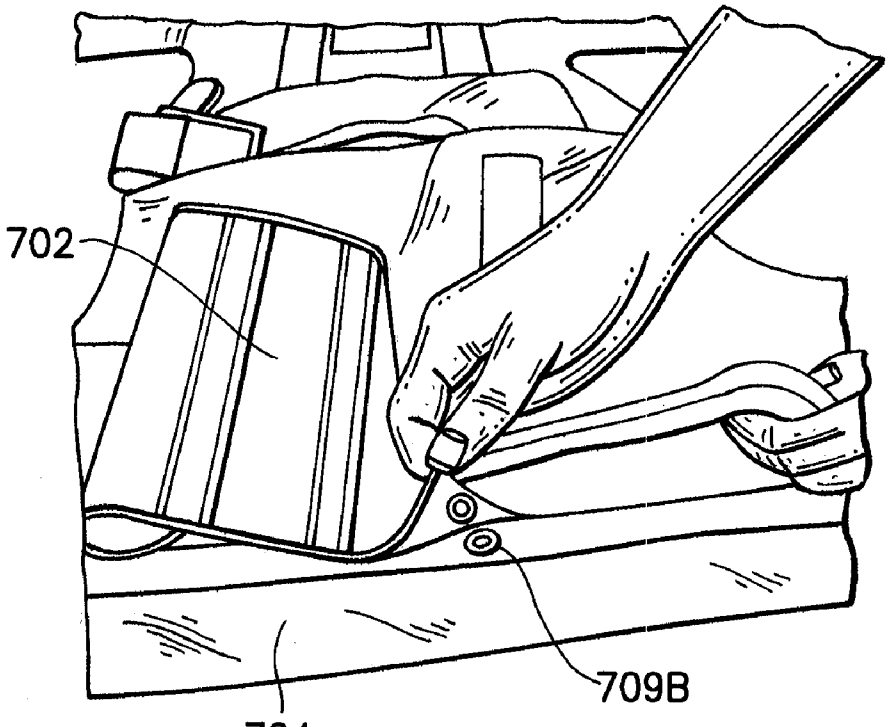



FIG. 12

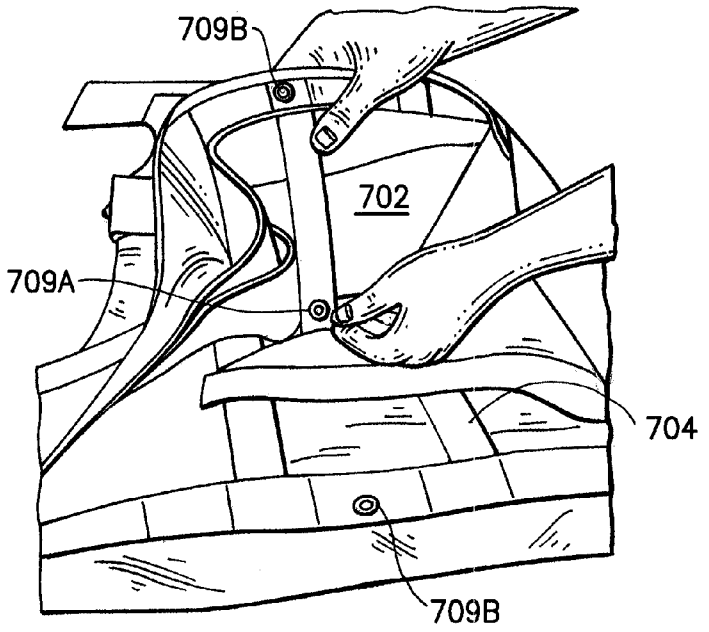



FIG. 13

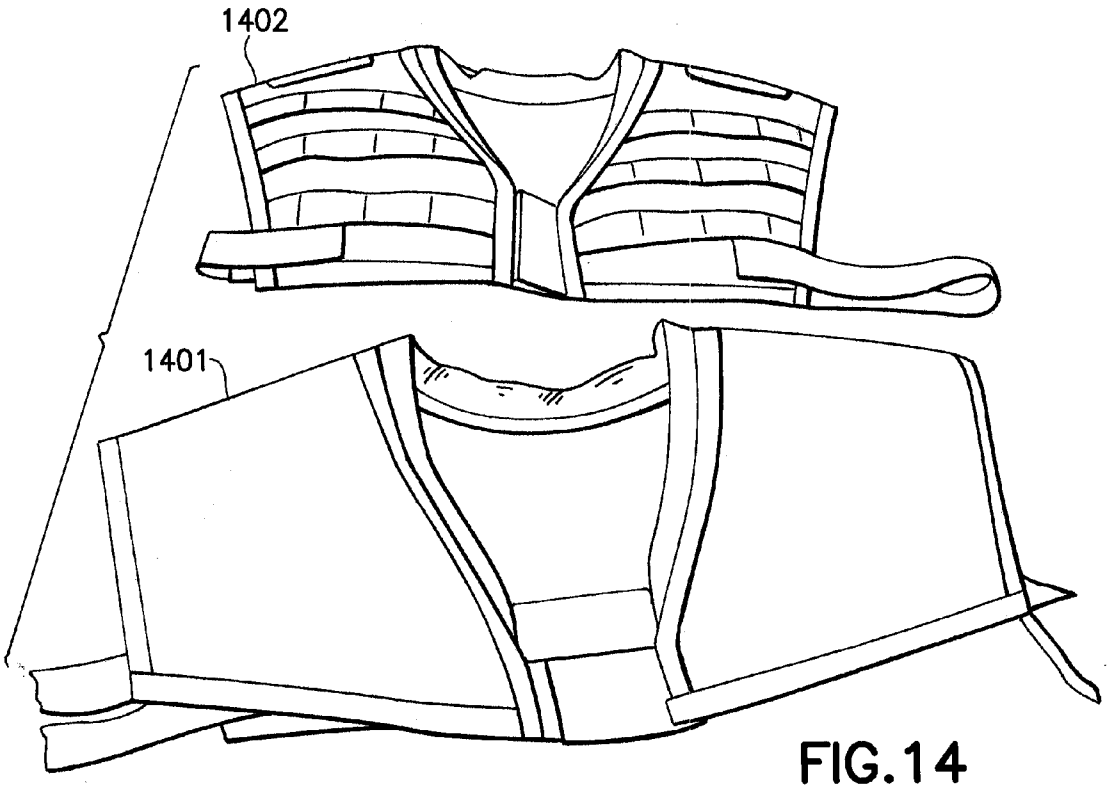



FIG. 14

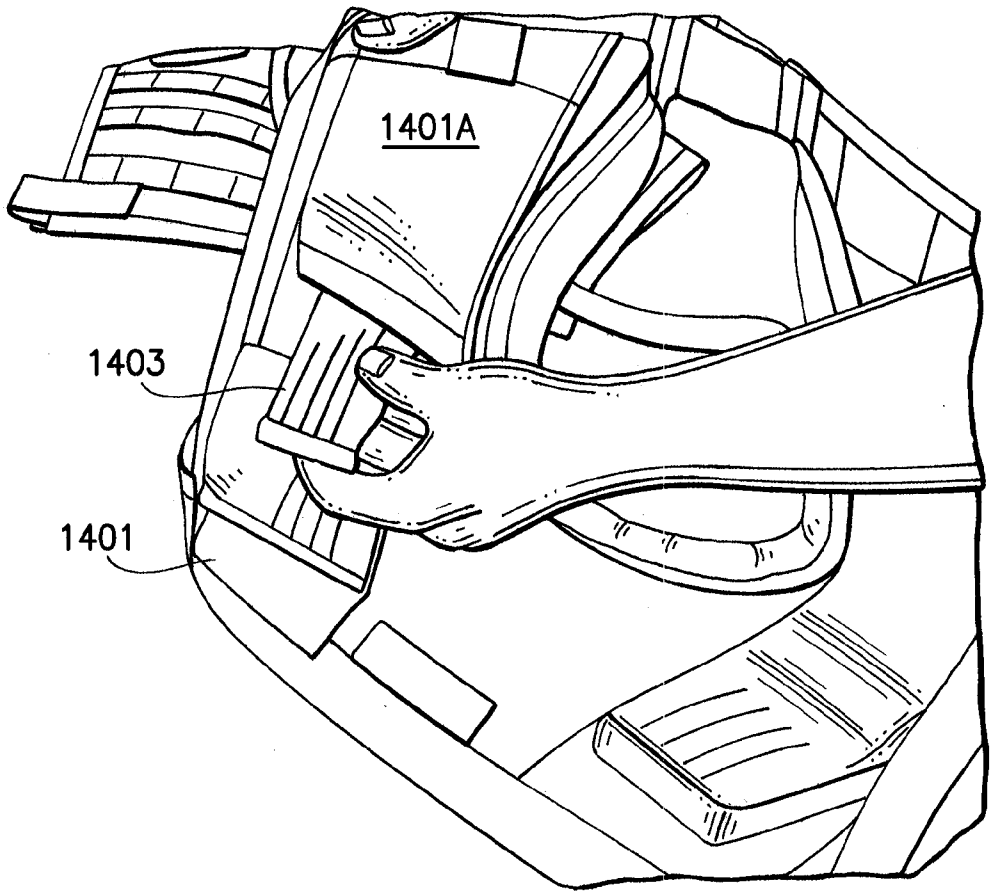



FIG. 15

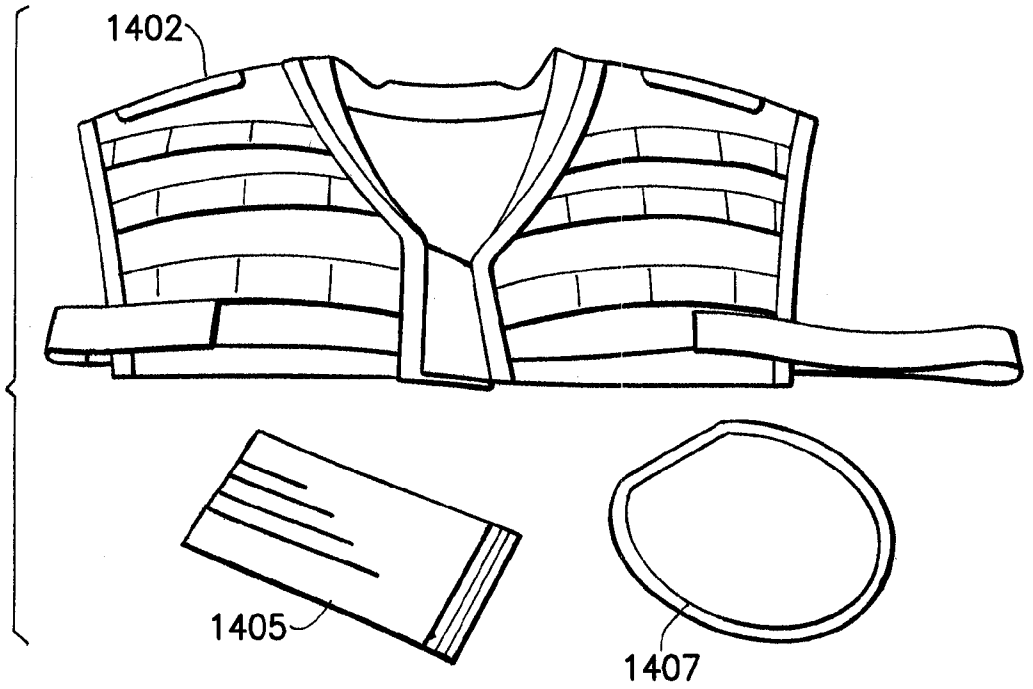



FIG. 16

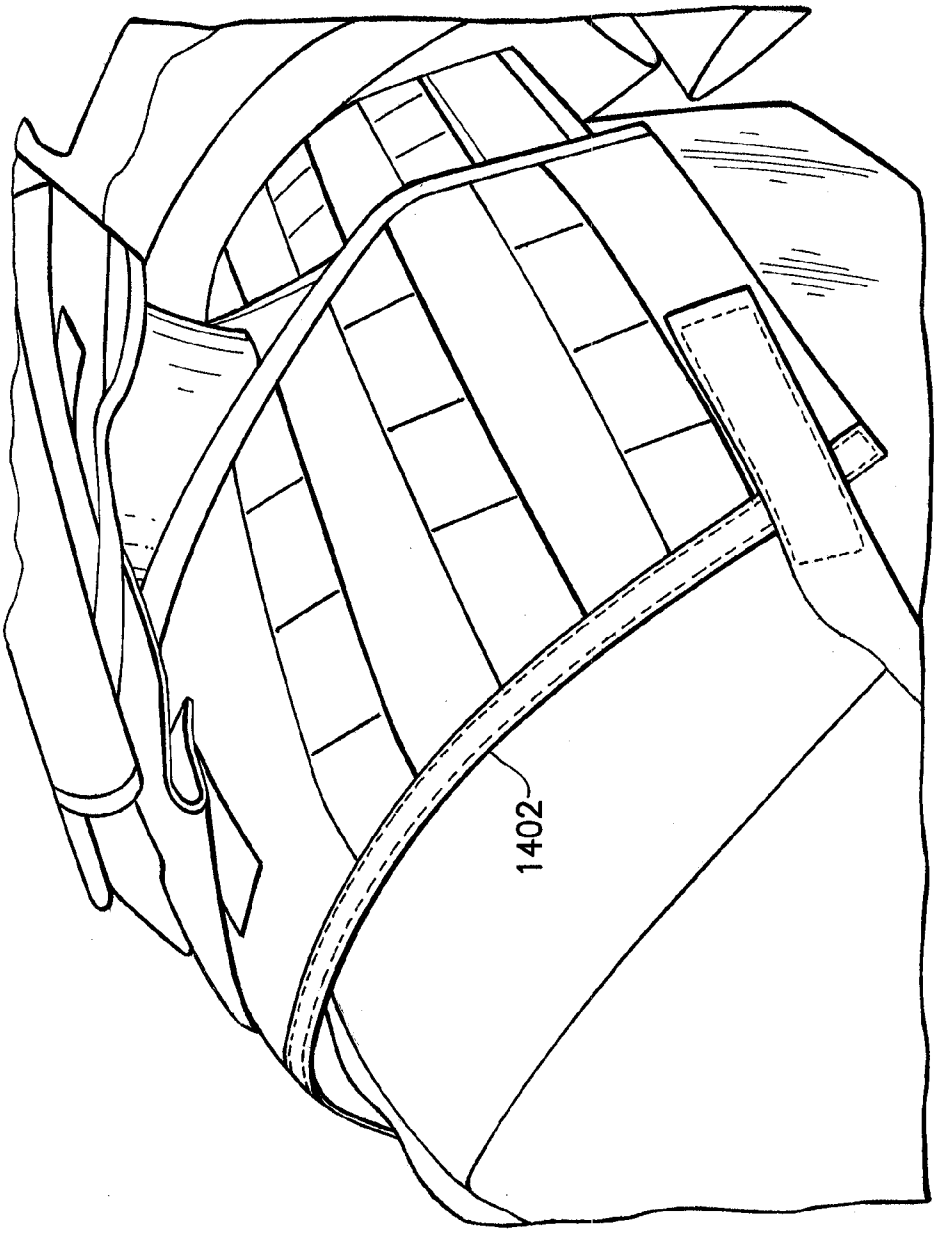



FIG.17

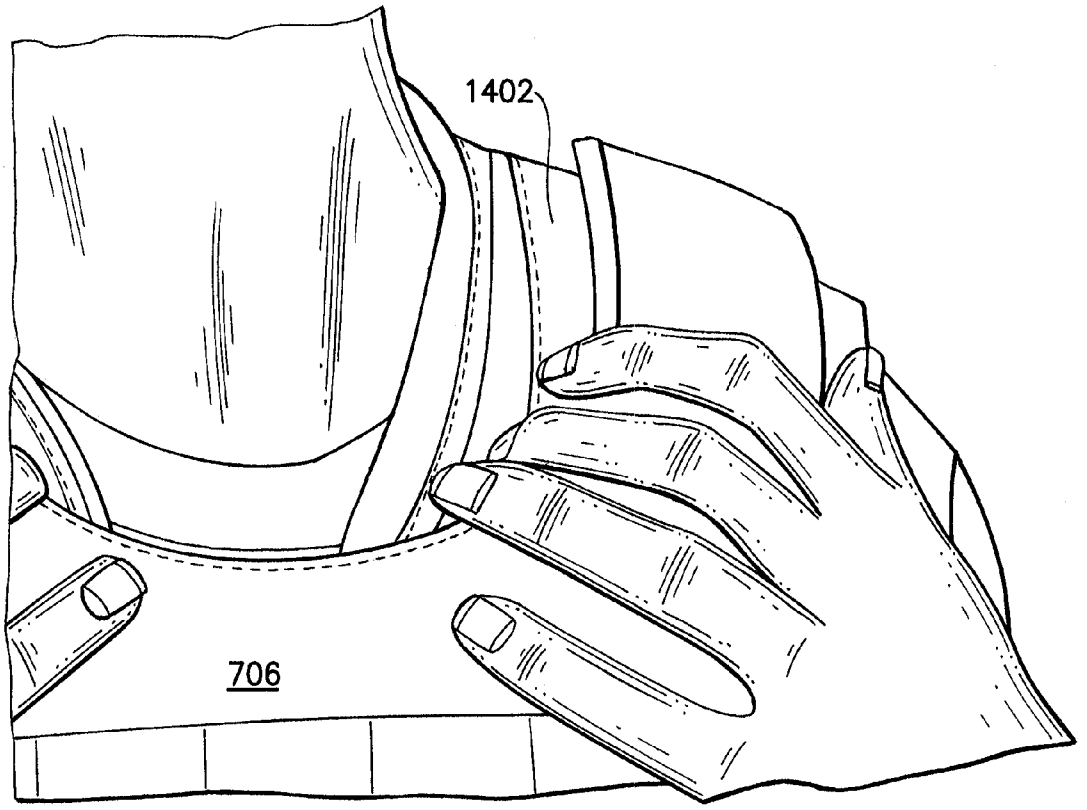



FIG. 18

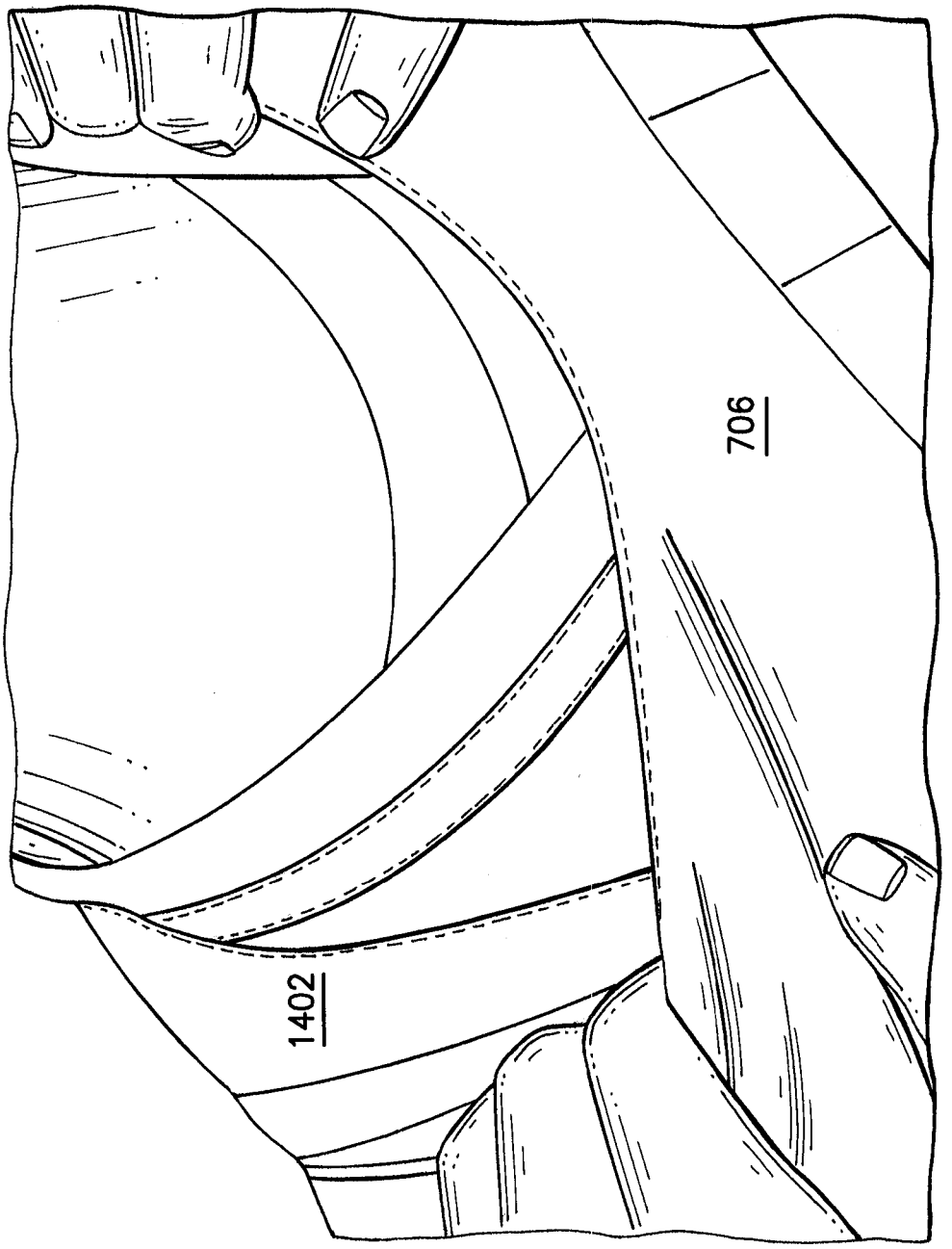



FIG. 19

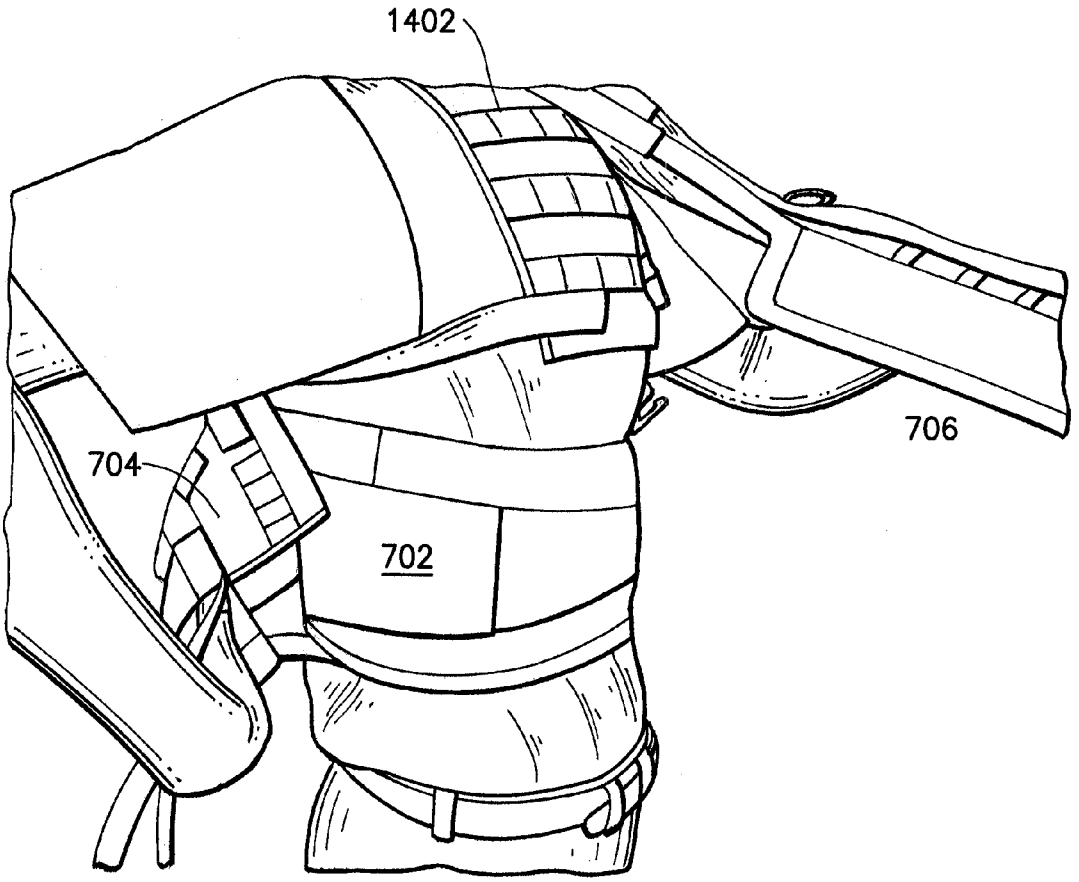



FIG.20

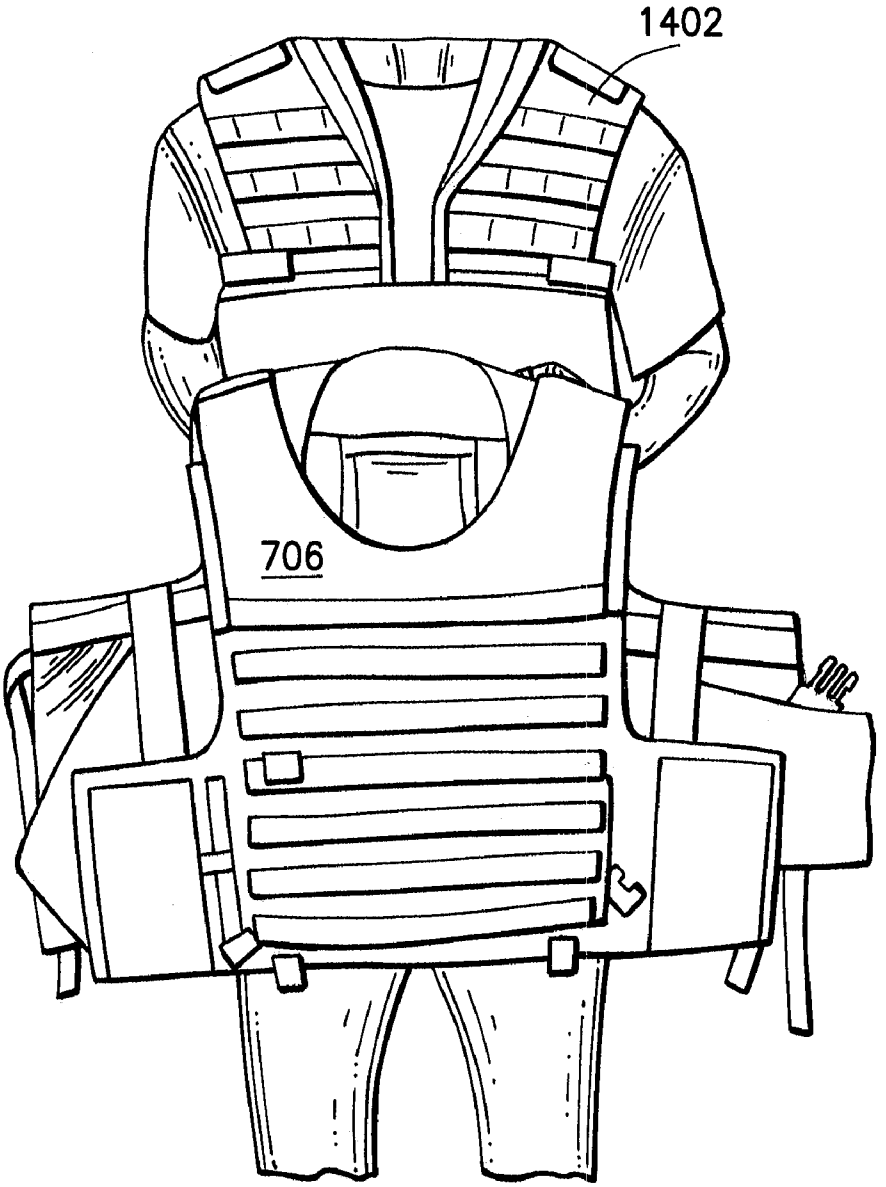



FIG.21

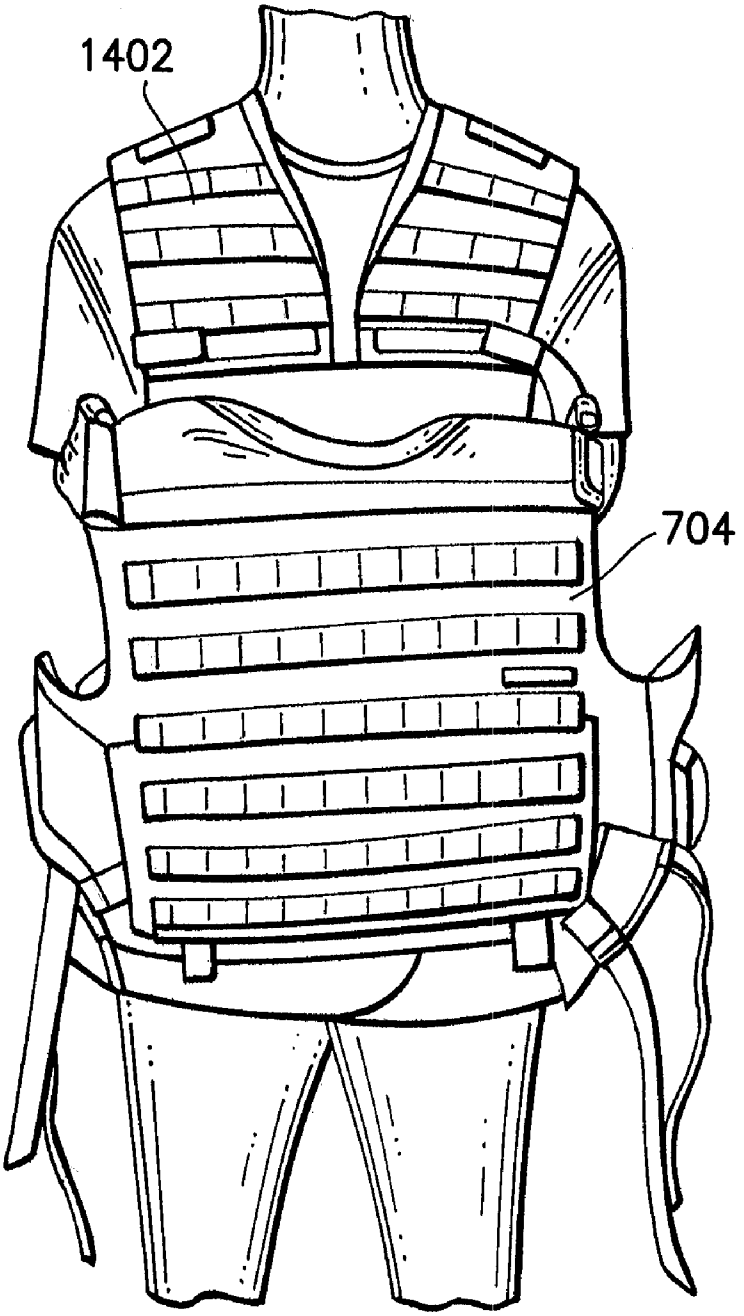



FIG.22

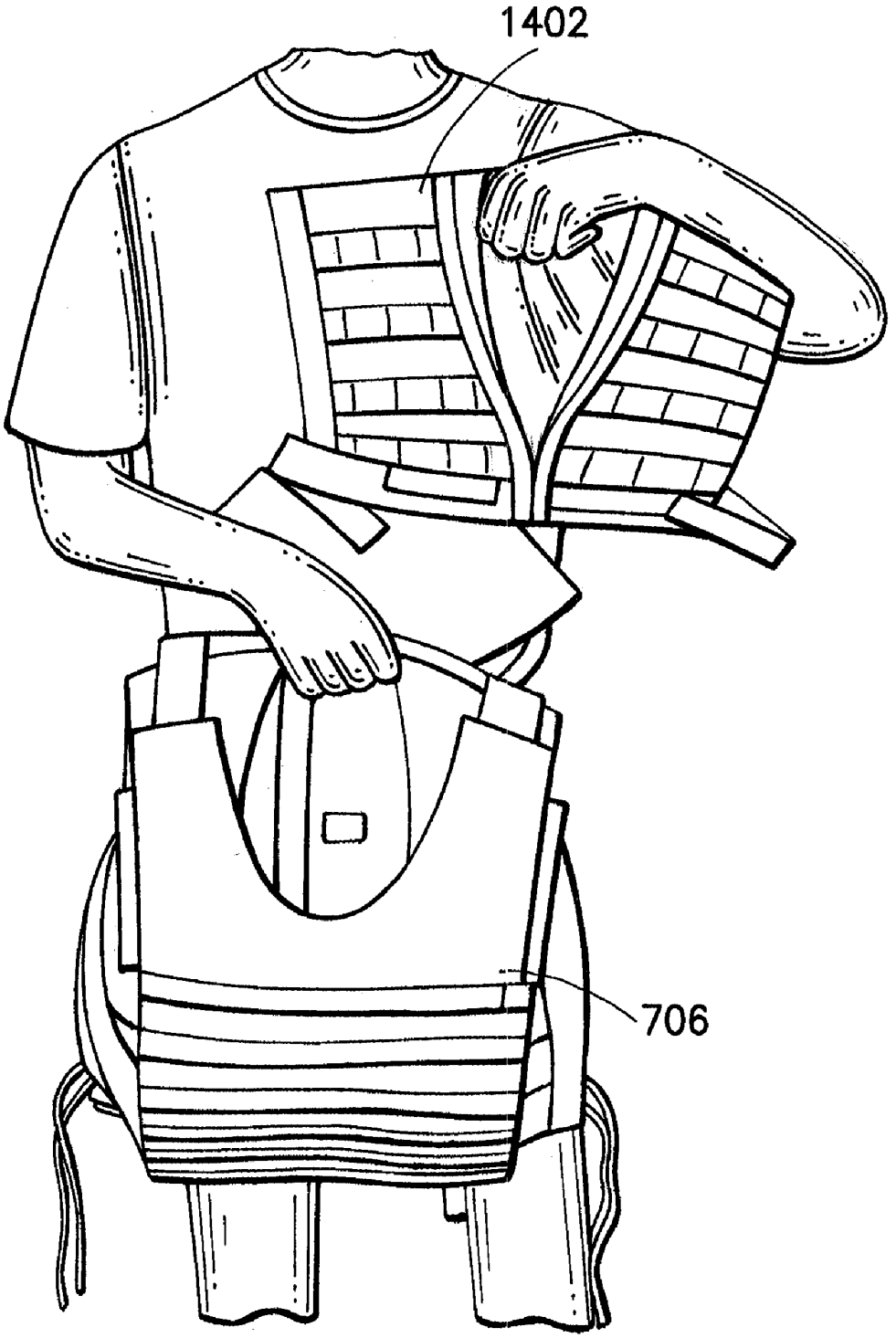



FIG.23

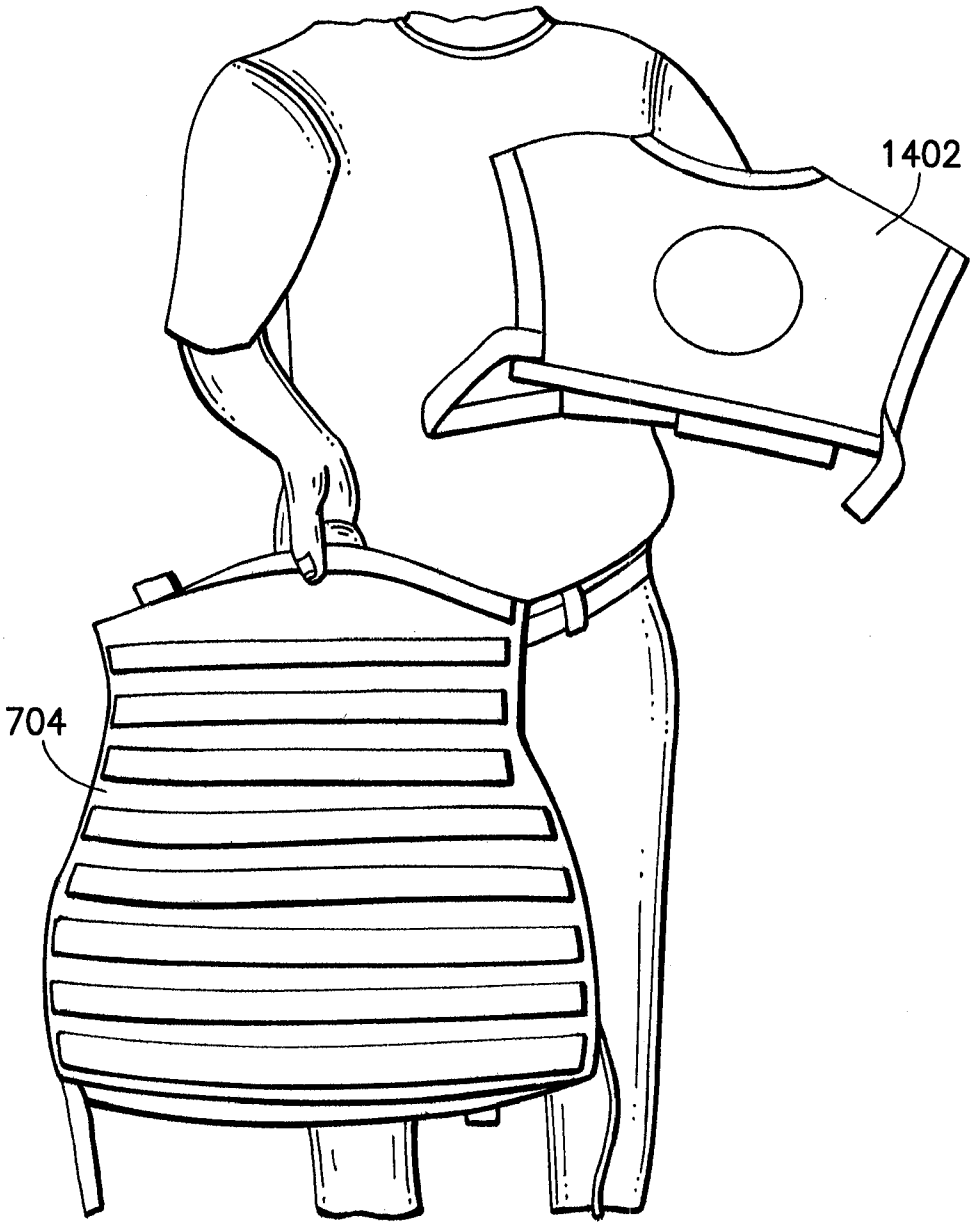



FIG.24

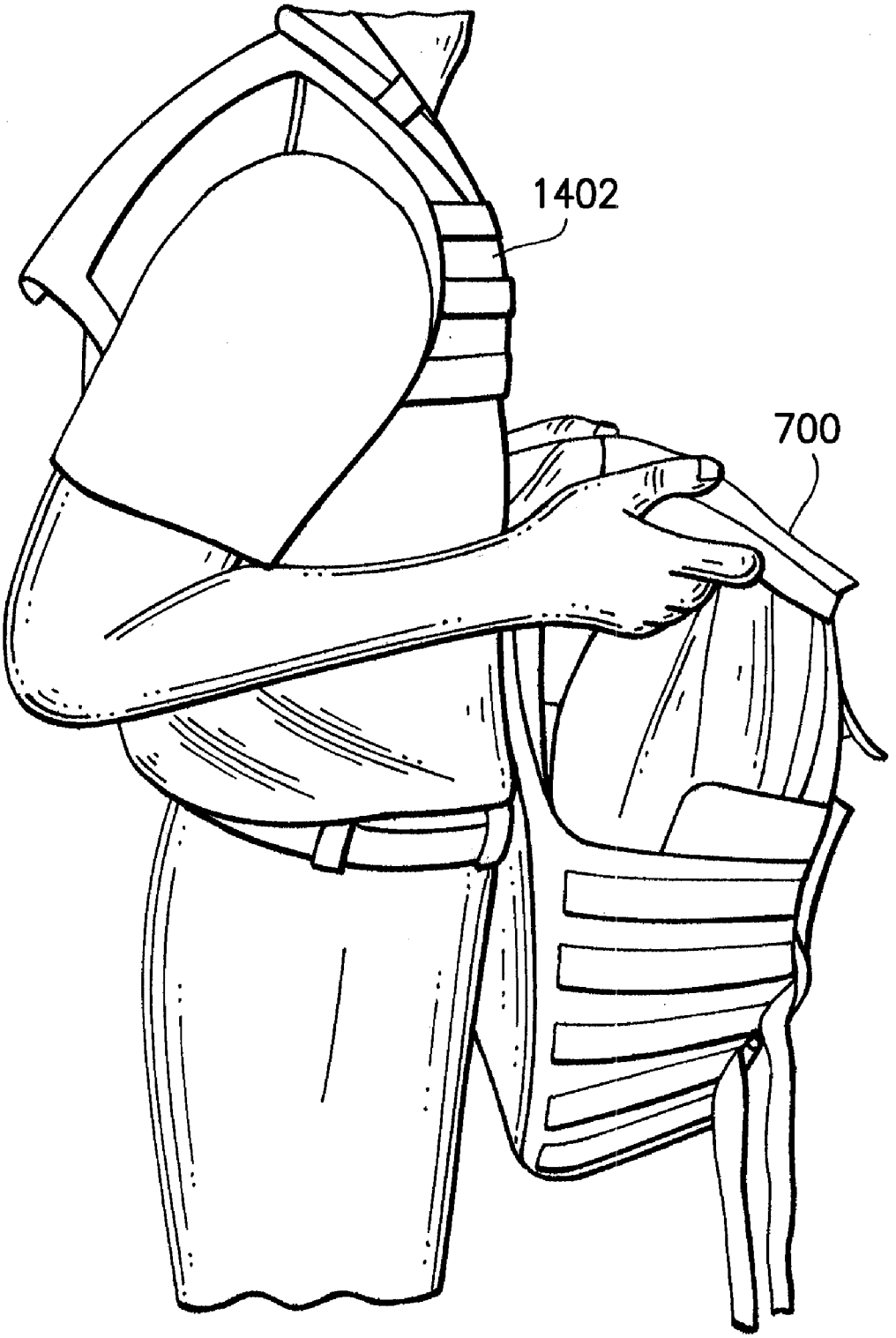



FIG.25

# PROTECTIVE GARMENT SYSTEM WITH WEIGHT TRANSFER ELEMENTS

## 32CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** This application is a continuation-in-part of (and claims priority to and the benefit of) U.S. application Ser. No. 11/507,635, filed Aug. 21, 2006, entitled "PROTECTIVE GARMENT HAVING A QUICK RELEASE SYSTEM", which claims priority to and the benefit of U.S. Provisional Application Ser. No. 60/812,656, filed Jun. 9, 2006, entitled "SYSTEMS FOR USE WITH PROTECTIVE GARMENTS". Each of the aforementioned applications is incorporated herein by reference in its entirety.

## FIELD OF THE INVENTION

**[0002]** The present invention relates to protective garment systems with weight transfer elements.

**[0003]** For the purposes of the present application the term "ballistic garment" is intended to refer to a garment designed to minimize the chances of a fatality or serious injury in the event of a bullet strike, shrapnel strike, or the like (but not necessarily to be impenetrable to all types of strikes under all conditions).

**[0004]** Further, for the purposes of the present application the term "soft body armor" is intended to refer to a garment formed of a relatively flexible material (e.g., woven KEVLAR fibers) which acts to provide the principal ballistic characteristics of the garment.

**[0005]** Further still, for the purposes of the present application the term "hard body armor" is intended to refer to a garment including relatively inflexible material (e.g., one or more ceramic plates) carried in one or more pockets in the garment. In this type of body armor the relatively inflexible material acts to provide the principal ballistic characteristics of the garment.

## BACKGROUND OF THE INVENTION

**[0006]** Oftentimes, such as in emergency situations, protective garments (e.g., soft body armor vests, hard body armor vests, safety vests, and other protective outer garments) need to be removed quickly. For example, when a soldier or law enforcement officer is wearing a protective vest and is injured or incapacitated, in order to provide immediate medical attention, the protective vest typically needs to be removed as quickly as possible. Similarly, a soldier in danger of drowning from being weighed down by protective outer garments along with the equipment and ammunition thereon, may save himself by quickly removing his protective outer garments. A protective garment may also need to be removed quickly, simply so the wearer may quickly change gear and put on other protective outer garments.

**[0007]** Protective outer garments such as ballistic vests are typically detachable at the shoulders and/or at the sides of the vest. The attachment mechanism typically includes VELCRO fasteners, snap fasteners, buckles or other fastening hardware. To put on or remove the protective outer garment, a wearer must generally manipulate several fasteners, typically one at a time. This may be a time consuming process, or may not be possible.

**[0008]** Some conventional outer garments are equipped with systems that allow a user to quickly detach, and remove these protective outer garments. Specifically, "cutaway" vests are described in U.S. Pat. No. 6,948,188, U.S. Pat. No. 6,769,137, U.S. Patent Application Publication No. 2004/0221361, and U.S. Patent Application Publication No. 2002/0120973. The systems used in connection with these vests are generally based on parachute technology, where the emphasis is on complete deployment and not on reassembly of the protective vest subsequent to removal. Similarly, these systems typically emphasize an all or nothing approach, which results in total removal and separation of the protective garment.

**[0009]** Cutaway vests typically have three main components, a front portion, a rear portion, and a cummerbund. Generally, the front and rear portions of the vest and the cummerbund may be releasably attached together by cables. The cables may be routed through a series of rings and loops that are attached to the fabric of the vest, thereby releasably interlocking the vest components together. In operation, a wearer pulls a handle that is attached to the cables and withdraws the cables from the vest, thereby releasing the vest components, which may then be disengaged from the wearer. To reassemble the cutaway vest, the cables need to be rerouted through the entire series of rings and loops throughout the vest, thereby interlocking the vest components together. This may be a time consuming and tedious process.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0010]** FIG. **1**A illustrates a frontal view of a ballistic vest equipped with a quick release system in accordance with an embodiment of the present invention.

**[0011]** FIG. **1**B illustrates a front portion of a ballistic vest for use in connection with an embodiment of the present invention.

**[0012]** FIG. **1**C illustrates a rear portion of a ballistic vest for use in connection with an embodiment of the present invention.

**[0013]** FIG. **2** illustrates components of a connector for use in connection with an embodiment of the present invention.

**[0014]** FIG. **3** illustrates a close-up view of components of connectors and a sample component layout for use in connection with an embodiment of the present invention.

**[0015]** FIG. **4** illustrates partial disengagement of the quick release system in accordance with an embodiment of the present invention.

**[0016]** FIG. **5** illustrates a pull cord configuration for use in connection with an embodiment of the present invention.

**[0017]** FIGS. **6**A through **6**D illustrate the reassembly of a ballistic vest having a quick release system in accordance with an embodiment of the present invention.

**[0018]** FIGS. **7-13** illustrate a ballistic vest according to another embodiment of the present invention (wherein FIG. **7** illustrates the interior of a ballistic vest with a cummerbund in a closed state; FIG. **8** illustrates the interior of the ballistic vest with the cummerbund in an opened; FIG. **9** illustrates the ballistic vest partially applied to a wearer, with the cummerbund in the opened state; FIG. **10** illustrates the ballistic vest partially applied to a wearer, with the cummerbund in the closed state; FIG. **11** illustrates the cummerbund on its own, in the closed state; and FIGS. **12** and **13** illustrate attachment of the cummerbund to an interior surface of the ballistic vest).

**[0019]** FIGS. **14-19** illustrate other embodiments utilizing an inner yoke (wherein FIG. **14** illustrates two types of inner yokes; FIG. **15** illustrates use of a heat management mechanism; FIG. **16** illustrates various example heat management mechanisms; and FIGS. **17-19** illustrate an inner yoke worn by a wearer.

**[0020]** FIG. **20** illustrates a wearer wearing a cummerbund, inner yoke and ballistic vest (partially worn) according to an embodiment of the present invention.

**[0021]** FIGS. **21** and **22** illustrate, respectively, a front view and a rear view of a ballistic vest according to an embodiment of the present invention (as seen in the Figures, side flaps associated with each of the front and rear portions may be utilized to protect the sides of a wearer).

**[0022]** FIGS. **23** and **24** illustrate, respectively, a front view and a rear view of a ballistic vest according to an embodiment of the present invention (as compared to FIGS. **21** and **22**, the side flaps in these Figures are folded-in).

**[0023]** FIG. **25** illustrates a side view of an inner yoke according to an embodiment of the present invention being work by a user (along with a side view of a ballistic vest according to an embodiment of the present invention).

**[0024]** Among those benefits and improvements that have been disclosed, other objects and advantages of this invention will become apparent from the following description taken in conjunction with the accompanying figures. The figures constitute a part of this specification and include illustrative embodiments of the present invention and illustrate various objects and features thereof.

## DETAILED DESCRIPTION OF THE INVENTION

**[0025]** Detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely illustrative of the invention that may be embodied in various forms. In addition, each of the examples given in connection with the various embodiments of the invention are intended to be illustrative, and not restrictive. Further, the figures are not necessarily to scale, some features may be exaggerated to show details of particular components. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a representative basis for teaching one skilled in the art to variously employ the present invention.

**[0026]** Generally, various embodiments of the present invention provide a protective garment, such as a soft body armor vest or a hard body armor vest, having a quick release system for separating the protective garment into a number of components, for example, a front portion and rear portion. In one example, the front and rear portions of the vest may separate at the shoulders, and at the sides of the waist. These two portions may be held together, for example, by four connectors, one for each shoulder and one for each side of the waist.

**[0027]** With reference now to FIGS. **1**A-**1**C, it is seen that FIG. **1**A illustrates a frontal view of a ballistic vest **100** equipped with a quick release system in accordance with an embodiment of the present invention. In one example, the ballistic vest **100** may be a solid front, side-entry style vest with adjustable shoulders and adjustable side closures. The ballistic vest **100** may contain, for example, IIIA soft armor and front, rear, and side torso hard armor (e.g., rifle plate protection) that may be inserted or removed at will. The size of the plates may vary, but in one example may include (but not be limited to): 6×8, 7×8, 8×10, 10×12, and other Small Arms Protective Insert (SAPI) sizes. The ballistic vest may also accept Department of Defense (DoD) Outer Tactical Vest (OTV) ballistic panels and enhanced protection components.

**[0028]** The ballistic vest **100** may also accept, in an example, standard military OTV additional ballistic options including (but not limited to): groin guard, neck and throat armor, shoulder and/or bicep protection. Full shoulder and chest friction material may also be provided for improved weapon welds and firing positions. The ballistic vest **100** may provide substantial load-bearing for Modular Lightweight Load-carrying Equipment (MOLLE), Pocket Attachment Ladder System (PALS), and Advanced Tactical (AT) style pouches and gear options. Additional features that may be provided, in an example, include (but not be limited to): communication wire-routing channels, camelback hydration compatibility, and/or rear drag strap. The ballistic vest **100** may also be integrated with military pack assemblies, and may be treated to be flame-resistant.

**[0029]** Ballistic vest **100** may have a front portion **10**, a rear portion **20**, a plurality of connectors **14** for releasably attaching the front portion **10** to the rear portion **20**, and at least one pull cord **16** associated with connectors **14**. The pull cord **16** may be attached to, and capable of disengaging at least two connectors substantially simultaneously. In particular, pulling on the pull cord **16** may disengage at least two of the connectors **14**, and may allow detachment (e.g., fully or partially) of the front portion **10** from the rear portion **20**.

**[0030]** As illustrated in FIGS. **1**B-**1**C, the front portion **10** and rear portion **20** may respectively include, in an example, torso portions **11**, **21** shoulder portions **12**, **22**, and side portions **19**, **24**. Both the front portion **10** and rear portion **20** may be made of natural or synthetic material, e.g., leather, nylon, kevlar, etc. Both portions **10**, **20** may also include internal pockets for holding the plates discussed above. The pockets may be located in the torso portions **11**, **21** and/or the side portions **19**, **24**. These pockets may be accessed from external openings and/or from inside the ballistic vest **100**.

**[0031]** In accordance with one embodiment of the present invention, each of connectors **14** may include a releasable hook **13**, and an anchor strap **15** located on front portion **10**. Each releasable hook **13** may be fastened to one end of a corresponding anchor strap **15**, with the other end of the anchor strap **15** being affixed to the front portion **10** by, for example, stitching, gluing, and/or fastening. It should be appreciated that other types of clasps, clamps, fasteners, and/or snap shackles may be substituted for the releasable hooks **13**.

**[0032]** Each of connectors **14** may also include a ring **26**, and a strap **28**, located on rear portion **20**. Each ring **26** may be affixed to an end of the strap **28**, and each strap **28** may be affixed to the rear portion **20** at its opposite end **29**, for example, by stitching, gluing, and/or fastening. Alternatively, in another embodiment, the releasable hooks **13** may be affixed on the rear portion **20**, and the rings **26** may be affixed to the front portion **10**. In one example, the strap **28** and anchor strap **15** may be made of natural or synthetic material.

**[0033]** The releasable hook **13** and ring **26** of each connector **14** when releasably fastened together may join the front portion **10** and the rear portion **20** together, to form the ballistic vest **100**.

**[0034]** With reference now to FIG. **2**, as noted above, each connector **14** includes a ring **26**, and a releasable hook **13**, wherein the ring **26** may be releasably clasped by the releasable hook **13**. Each ring **26** and releasable hook **13**, in an embodiment, may be made of a variety of material including (but not limited to) metal and plastic. Although ring **26** is depicted as a D-ring, rings having other shapes may also (or instead) be used, such as, for example, O-ring **26***a*, oval-ring **26***b*, or loops **26***c*. Similarly, although releasable hook **13**, may be depicted as a snap shackle, other designs including

clasps or fasteners may readily be used and not deviate from the teachings of the present invention.

**[0035]** In one embodiment, the releasable hook **13** may include a release knob **17**, for moving the hook into an open position. The release knob **17** may be spring loaded to permit actuation of the releasable hook into an open position upon pulling of the knob **17**. The release knobs **17** of two or more releasable hooks **13** may be connected together with a tether or cord **18** (see, e.g., FIGS. **1**A and **1**B). The pull cord **16** may then be attached to the cord **18**, such that pulling on the pull cord **16** initiates the release knobs **17** that are interconnected by cord **18**. This causes the corresponding releasable hooks **13** to open, thereby releasing the rings **26** from the releasable hooks **13** and disengaging the connectors **14**. The front portion **10** and rear portion **20** may then simply fall away from a wearer.

**[0036]** In another embodiment, as illustrated in FIGS. **1**B and **5**, an additional cord **18***a* may be utilized to configure cord **18** to connect to all of the release knobs **17** on all the releasable hooks **13**. This configuration results in all of the releasable hooks **13** disengaging essentially simultaneously, and complete detachment of the front portion **10** from the rear portion **20** when the pull cord **16** is pulled. Alternatively, as depicted in FIG. **4**, at least two release knobs **17** on two corresponding releasable hooks **13** may be connected by cord **18**, such that pulling the pull cord **16** detaches the front portion **10** from the rear portion **20** only on one side of the ballistic vest **100**.

**[0037]** In another embodiment illustrated in FIG. **3**, the cord **18** may be parachute cord and may be encased in a plastic sheath or tubing to minimize fraying. In addition, the release knobs **17** may include a small ring attachment to facilitate attaching cord **18** to the release knobs **17**. As a preventive measure in the event cord **18** were to break, each releasable hook **13** may include a back-up cord **18***b* that may be utilized to open the releasable hook **13**.

**[0038]** In operation, when the ballistic vest **100** is worn, the shoulder portions **22** of the rear portion **20** engage the shoulder portions **12** of the front portion **10**. The rings **26** may then be inserted into the releasable hooks **13** on the front portion **10**, thereby locking the front and rear portions together at the shoulders. Similarly, the side portions **24** of the rear portion **20** overlap with the side portions **19** of the front portion **10**. Once again, the rings **26** may then be inserted into the releasable hooks **13** on the front portion **10** at the waist, thereby locking the front and rear portions together at the sides of the waist as well.

**[0039]** To release the front portion **10** from the rear portion **20** of ballistic vest **100**, pull cord **16** may be pulled to disengage at least two connectors **14**. In the configuration illustrated in FIG. **4**, pulling only one of the two pull cords **16** results in two of the connectors **14** disengaging on the same side at the shoulder and at the waist.

**[0040]** Specifically, pulling the pull cord **16** causes the release knob **17** to open each corresponding releasable hook **13**, thereby releasing the entrapped rings **26**. The front portion **10** and rear portion **20** then separate, and the ballistic vest **100** detaches on one side. Alternatively, utilizing the cord configuration depicted in FIG. **5**, when pull cord **16** is pulled, this results in all of the releasable hooks **13** disengaging simultaneously, and complete detachment of the front portion **10** from the rear portion **20**.

**[0041]** In another embodiment, it is possible to simultaneously or independently, one after the other, release both upper or lower release points. This may be of value, for example, for quick access to the upper or lower torso areas of the wearer either by himself or other personnel, while keeping the ballistic vest/carrier otherwise attached to the wearer. In other words, various embodiments may allow for a left side-right side release option and/or a top half-bottom half release option and/or release of all points (e.g., four points) simultaneously or independently.

**[0042]** FIGS. **6**A through **6**D illustrate the reassembly of a ballistic vest having a quick release system in accordance with an embodiment of the present invention. As shown in FIG. **6**A, each ring **26** of the rear portion **20** may engage a corresponding hook **13** of front portion **10**. In an embodiment of the present invention, a covering **60**, made of a ballistic protective material, such as Kevlar, may be provided to protect the connectors **14** (e.g., from secondary fragmentation that may occur if a bullet were to strike a releasable hook **13** or ring **26**).

**[0043]** In FIG. **6**B, the ring **26** and strap **28** may be passed under the covering **60** on the front portion **10**. In FIG. **6**C, the releasable hook **13** may be clasped around the ring **26**, thereby locking the rear portion **20** and front portion **10** at that shoulder, as shown in FIG. **6**D. This process may be repeated for the remaining connectors at the opposite shoulder and at both sides of the waist.

**[0044]** Although described primarily as being essentially simultaneously releasable, the connectors may be individually released as well. For example, all four connectors may be essentially simultaneously released resulting in the complete detachment of the front and rear portions, and rapid removal of the entire vest. Alternatively, a shoulder and a side connector may be detached on the same side of the body, so that a wearer may partially remove the vest, but still be partially protected by the vest. In addition, various embodiments of the present invention may, due to fewer operating parts and the configuration of the connectors (as compared to certain conventional systems), offer up to 95% faster reassembly of a detached garment.

**[0045]** The present invention provides, in an embodiment, a protective garment having a front portion, a rear portion, and a quick release system having a plurality of connectors for releasably attaching the front portion to the rear portion, and a pull cord. The pull cord may be attached to, and capable of disengaging at least two connectors, to allow detachment of the front portion from the rear portion.

**[0046]** In one example, each connector may include a ring designed to be releasably clasped by a releasable hook. The ring may be affixed via a strap to the rear portion, and the releasable hook may be affixed to the front portion of the garment. The pull cord may be attached to a release knob located on the releasable hook, so that pulling on the pull cord may cause the release knob to move and open the releasable hook. In the open position the releasable hook may release the ring and disengage the connector, and permit the front and rear portions to simply fall away from a wearer.

**[0047]** In another embodiment, the present invention provides a protective garment having a front portion, a rear portion, a plurality of rings and a plurality of releasable hooks for releasably attaching the front portion to the rear portion, and a pull cord. The pull cord may be attached to, and capable of disengaging at least two releasable hooks of the plurality of releasable hooks, to allow detachment of the front portion from the rear portion.

**[0048]** In another embodiment, the present invention provides a method for quickly removing a garment. The method may include wearing a protective garment that has a front portion, a rear portion, a plurality of connectors for releasably attaching the front portion to the rear portion, and a pull cord that may be attached to, and capable of disengaging at least two of the plurality of connectors to allow detachment of the front portion from the rear portion. The method may further include the step of pulling the pull cord on the protective garment to disconnect the front portion from the rear portion.

**[0049]** In another embodiment, the present invention provides a method for quickly removing a garment. The method may include wearing a protective garment that has a front portion, a rear portion, a plurality of rings and a plurality of releasable hooks for releasably attaching the front portion to the rear portion, and a pull cord that may be attached to, and capable of disengaging at least two releasable hooks of the plurality of releasable hooks to allow detachment of the front portion from the rear portion. The method may further include the step of pulling the pull cord on the protective garment to detach the front portion from the rear portion.

**[0050]** In another embodiment, the present invention provides a method for quickly removing a garment. The method may include wearing a protective garment having a front portion and a rear portion, both of which include respective torso portions, shoulder portions, and side portions. The method may further include the step of disconnecting the shoulder portions of the front portion from the shoulder portions of the rear portion, and the side portions of the rear portion from the side portions of the front portion.

**[0051]** In another embodiment of the present invention a protective garment is provided comprising: a front portion; a rear portion; a plurality of connectors for releasably attaching the front portion to the rear portion; and a pull cord coupled to, and capable of disengaging at least two of the connectors to allow detachment of the front portion from the rear portion.

**[0052]** In one example, each connector may include a ring and a releasable hook, the ring being releasably clasped by the releasable hook.

**[0053]** In another example, the ring may include one of D-rings, O-rings, and loops.

**[0054]** In another example, the pull cord may be coupled to the releasable hooks to permit detachment of the front portion from the rear portion at the shoulders and waist of the protective garment.

**[0055]** In another example, the protective garment may comprise a ballistic vest, tactical load-bearing vest, and/or other protective vests.

**[0056]** In another embodiment of the present invention a protective garment is provided comprising: a front portion; a rear portion; a plurality of rings and releasable hooks designed to engage one another for releasably attaching the front portion to the rear portion; and a pull cord coupled to at least two of the releasable hooks, the pull cord capable of disengaging the at least two of the releasable hooks to allow detachment of the front portion from the rear portion.

**[0057]** In one example, each ring may be releasably clasped by a corresponding releasable hook.

**[0058]** In another example, the plurality of rings may include one of D-rings, O-rings, and loops.

**[0059]** In another example, the releasable hooks may be located on the front portion of the protective garment.

**[0060]** In another example, the releasable hooks may be located on the rear portion of the protective garment.

**[0061]** In another example, the pull cord may be coupled to the releasable hooks to permit detachment of the front portion from the rear portion at the shoulders and waist of the protective garment

**[0062]** In another example, the protective garment may comprise a ballistic vest, a load-bearing vest, and/or other protective vests.

**[0063]** In another embodiment of the present invention a method for quickly removing a garment is provided, the method comprising: wearing a garment having a front portion, a rear portion, a plurality of connectors releasably attaching the front portion to the rear portion, and a pull cord attached to at least two of the plurality of connectors; and pulling the pull cord on the garment to disengage the connectors to allow the front portion to detach from the rear portion.

**[0064]** In another embodiment of the present invention a method for quickly removing a garment is provided, the method comprising: wearing a garment having a front portion, a rear portion, a plurality of rings and releasable hooks for releasably attaching the front portion to the rear portion, and a pull cord attached to at least two of the plurality of releasable hooks; and pulling the pull cord on the garment to disengage the releasable hooks from the rings to allow the front portion to detach from the rear portion.

**[0065]** In another embodiment of the present invention a method for assembling a garment is provided, the method comprising: providing a garment having a front portion, a rear portion, a plurality of rings and releasable hooks for releasably attaching the front portion to the rear portion, and a pull cord attached to at least two of the plurality of releasable hooks, and capable of disengaging the at least two of the plurality of releasable hooks to allow detachment of the front portion from the rear portion; and attaching the releasable hooks through the rings to secure the front portion to the rear portion of the garment.

**[0066]** As described herein, various embodiments of the present invention may provide for release in tighter quarters where it may be difficult if not impossible to fully remove the cord or wire which is typically used to release a conventional cutaway-type system.

**[0067]** Further, a separate pull cord to the release ring of each releasable hook under various embodiments of the present invention may serve as a back-up aid in the case the main tether becomes damaged, separated and/or inaccessible.

**[0068]** Further still, under various embodiments of the present invention use does not affect/change the adjusted fit to the wearer (as use of certain conventional cut-away systems may (such cut-away systems typically must be re-rigged in a particular fashion/manner to insure the same fit)).

**[0069]** Referring now to FIGS. **7-13**, ballistic vest **700** utilizing a cummerbund **702** is shown. As seen in these Figures, cummerbund **702** may be used to transfer weight from one area of a wearer to another. In one example, cummerbund **702** takes some of the weight of rear portion **704** of ballistic vest **700** (wherein the weight transferred would otherwise have been borne by the shoulders of the wearer). In another example, cummerbund **702** takes some of the weight of front portion **706** of ballistic vest **700** (wherein the weight transferred would otherwise have been borne by the shoulders of the wearer). In yet another example, cummerbund **702** takes some of the weight of rear portion **704** and front portion **706** of ballistic vest **700** (wherein the weight transferred would otherwise have been borne by the shoulders of the wearer).

**[0070]** In the embodiment shown in FIGS. **7-13**, cummerbund **702** takes some of the weight of rear portion **704** via an interface comprising loops **708**A and **708**B (through which cummerbund **702** is passed). In addition, Snaps **709**A and **709**B may be used to secure rear portion **704** and cummerbund **702** to one another (in another example, hook-and-loop fasteners (e.g., VELCRO) may be used to secure cummerbund **702** to rear portion **704**). Of course cummerbund **702** may also (or alternatively) take some of the weight from front portion **706** via a similar interface.

**[0071]** Of note, cummerbund **702** may be passed through loops **708**A,**708**B by opening cummerbund **702** and passing one or both of ends **702**A,**702**B of cummerbund **702** through loops **708**A,**708**B. Of course, the loops **708**A,**708**B may also (or alternatively) open and close to accept the cummerbund **702**.

**[0072]** Further, ends **702**A,**702**B of cummerbund **702** may be separated from one another to allow a wearer to put on/take off the cummerbund **702** (see FIG. **9** showing cummerbund **702** in an open state) and ends **702**A,**702**B of cummerbund **702** may be attached to one another to hold cummerbund **702** on a wearer (see FIG. **10** showing cummerbund **702** in a closed state). In one example, the ends **702**A,**702**B of cummerbund **702** may have hook-and-loop fasteners (e.g., VELCRO) to allow the ends **702**A,**702**B of cummerbund **702** to be releasably attached to one another. In another examples, the ends **702**A,**702**B of cummerbund **702** may have snap(s), zipper(s) and/or buttons to allow the ends **702**A,**702**B of cummerbund **702** to be releasably attached to one another.

**[0073]** Of note, the cummerbund **702** may be a separate element from the front portion **706** and the rear portion **704** and the cummerbund **702** may be configured to form a loop around the wearer. This may aid in helping to achieve a good fit to the wearer as well as helping to optimize weight transfer to the cummerbund.

**[0074]** Referring now to FIGS. **14-19**, inner yoke **1401** and inner yoke **1402** are shown (in one example, inner yoke **1402** may provide ballistic protection as well as provide for weight transfer, while inner yoke **1401** may only provide for weight transfer—a user may chose to wear whichever type of inner yoke as desired).

**[0075]** Of note, each of inner yokes **1401** and **1402** may be padded (e.g., to provide comfort to the wearer).

**[0076]** Of further note, one or more heat management mechanisms **1403**, **1405**, **1407** may be placed in one or more pockets in inner yokes **1401**, **1402** (see, e.g., pocket **1401**A in FIG. **15**).

**[0077]** Referring now to FIGS. **20-25**, various view of a ballistic vest system (both on and off of a wearer) according to embodiments of the present invention are shown.

**[0078]** As described above, the cummerbund and inner yoke according to embodiments of the present invention may provide a better ergonomic condition (e.g., referring to the general interaction between the user and the task performed while being worn) by mitigating some of the effect of weight carried at the shoulders. For example, the cummerbund may transfer weight to the lower back area (via a secure and snug fit on the wearer with reasonable comfort, breath-ability and essentially without compromise to any quick-donning capabilities provided via the ballistic vest system) and the inner yoke may mitigate the effect of weight born at the shoulders (e.g., mitigate the discomfort generated from heavy weights, by transferring and dispersing the pressure points which may be created by a ballistic vest system).

**[0079]** The cummerbund and the inner yoke may, in one example, work alone or together with simplicity, soldier relevancy, little or no specific knowledge required to enjoy the benefits, minimal weight added, cleaning options, etc.

**[0080]** Further, the cummerbund and the inner yoke of various embodiments may be true to the design fundamentals serving "open architecture" and allowance for "technology insertion". This may minimize premature obsolescence as new and emerging technologies make themselves available.

**[0081]** Further, heat management mechanism(s) may be integrated into the inner yoke and/or the cummerbund to address issues which are desirous to mitigate or relieve. Such heat management mechanism(s) may include (but not be limited to): cooling packs, gels and/or advanced phase-change packs.

**[0082]** Further still, additional pads, etc. may be integrated into the cummerbund (e.g., for lower back support and related benefits) and/or integrated into the inner yoke.

**[0083]** Further still, the inner yoke may be used as a stand-alone component.

**[0084]** Further still, the cummerbund and/or inner yoke may be easily removable for exchange, replacement, up-grade, custom sizing for better ergonomics, etc.

**[0085]** Further still, under various embodiments absence/loss/failure of the cummerbund and/or inner or yoke will not sacrifice ballistic protection of the wearer.

**[0086]** In another embodiment, a modified D-ring design may be utilized. Such a modified D-ring design may have a bend applied to it to better allow the D-ring to releasable hook assemble to lay flat.

**[0087]** The embodiments of the present invention discussed in this application are primarily focused on ballistic vests and other protective vests. Of course, the present invention may alternatively be utilized in connection with other garments including (but not limited to): load-bearing vests, safety vests, life preservers, harnesses, military packs, backpacks and other garments.

**[0088]** While a number of embodiments of the present invention have been described, it is understood that these embodiments are illustrative only, and not restrictive, and that many modifications may become apparent to those of ordinary skill in the art. For example, while the ballistic garments of the present invention have been described principally as bullet or shrapnel resistant, the garments may also (or instead) be designed to be resistant to sharp and/or blunt weapons (e.g., knives, clubs, etc.). Further, a garment according to the present invention may be designed such that certain components are reusable. Further still, while the garments of the present invention have been described principally as taking the form of a vest, any other desired form may be taken (e.g., in the form of a shirt, in the form of a jacket, in the form of an overcoat). Further still, garments of the present invention may comprise any desired materials (e.g., aramid fiber; nylon; rayon; cotton, and/or ceramic). Further still, any steps may be performed in any desired order (and any desired steps may be added and/or any desired steps may be deleted).

What is claimed is:

**1**. A ballistic vest, comprising:

a front portion configured to protect a front of a torso of a wearer;

a rear portion configured to protect a rear of the torso of the wearer; and

a cummerbund;

wherein the cummerbund is a separate element from the front portion and the rear portion and the cummerbund is configured to form a loop around the wearer; and

wherein at least one of the front portion and the rear portion interface with the cummerbund to transfer weight to the cummerbund.

**2**. The vest of claim **1**, wherein the front portion releasably interfaces with the cummerbund.

**3**. The vest of claim **2**, wherein the front portion has at least one loop element on an interior surface of the front portion and the front portion interfaces with the cummerbund via the cummerbund passing through the at least one loop element.

**4**. The vest of claim **2**, wherein the front portion interfaces with the cummerbund via a first part of a hook and loop fastener combination attached to an interior surface of the front portion and a second part of the hook and loop fastener combination attached to the cummerbund.

**5**. The vest of claim **2**, wherein the front portion interfaces with the cummerbund via a plurality of snaps attached to an interior surface of the front portion and to the cummerbund.

**6**. The vest of claim **1**, wherein the rear portion releasably interfaces with the cummerbund.

**7**. The vest of claim **6**, wherein the rear portion has at least one loop element on an interior surface of the rear portion and the rear portion interfaces with the cummerbund via the cummerbund passing through the at least one loop element.

**8**. The vest of claim **6**, wherein the rear portion interfaces with the cummerbund via a first part of a hook and loop fastener combination attached to an interior surface of the rear portion and a second part of the hook and loop fastener combination attached to the cummerbund.

**9**. The vest of claim **6**, wherein the rear portion interfaces with the cummerbund via a plurality of snaps attached to an interior surface of the rear portion and to the cummerbund.

**10**. The vest of claim **1**, wherein the cummerbund is worn at a lower torso area of a wearer.

**11**. The vest of claim **1**, wherein the cummerbund comprises at least one pocket for holding therein a heat management device.

**12**. The vest of claim **11**, wherein the heat management device comprises a cooling pack.

**13**. The vest of claim **1**, wherein the vest is selected from the group consisting of: (a) a soft body armor ballistic vest; and (b) a hard body armor ballistic vest.

**14**. A ballistic vest, comprising:

a front portion configured to protect a front of a torso of a wearer;

a rear portion configured to protect a rear of the torso of the wearer; and

a shoulder pad;

wherein at least one of the front portion and the rear portion interface with the shoulder pad to disperse weight applied by at least one of the front portion and the rear portion over a larger area than would be applied in the absence of the shoulder pad.

**15**. The vest of claim **14**, wherein the front portion releasably interfaces with the shoulder pad.

**16**. The vest of claim **15**, wherein the front portion interfaces with the shoulder pad via a first part of a hook and loop fastener combination attached to an interior surface of the front portion and a second part of the hook and loop fastener combination attached to the shoulder pad.

**17**. The vest of claim **15**, wherein the front portion interfaces with the shoulder pad via a plurality of snaps attached to an interior surface of the front portion and to the shoulder pad.

**18**. The vest of claim **14**, wherein the rear portion releasably interfaces with the shoulder pad.

**19**. The vest of claim **18**, wherein the rear portion interfaces with the shoulder pad via a first part of a hook and loop fastener combination attached to an interior surface of the rear portion and a second part of the hook and loop fastener combination attached to the shoulder pad.

**20**. The vest of claim **18**, wherein the rear portion interfaces with the shoulder pad via a plurality of snaps attached to an interior surface of the rear portion and to the shoulder pad.

**21**. The vest of claim **14**, wherein the shoulder pad is held in place on a wearer by a belt configured to: (a) pass around a chest of the wearer; and (b) pass under the arms of the wearer.

**22**. The vest of claim **14**, wherein the shoulder pad comprises at least one pocket for holding therein a heat management device.

**23**. The vest of claim **22**, wherein the heat management device comprises a cooling pack.

**24**. The vest of claim **14**, wherein the vest is selected from the group consisting of: (a) a soft body armor ballistic vest; and (b) a hard body armor ballistic vest.

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