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**Silverberg**(10) **Pub. No.: US 2015/0000004 A1**(43) **Pub. Date: Jan. 1, 2015**(54) **TEMPERATURE REGULATING GARMENT****Publication Classification**(71) Applicant: **Mark Silverberg**, Chapel Hill, NC (US)(72) Inventor: **Mark Silverberg**, Chapel Hill, NC (US)(21) Appl. No.: **14/490,106**(22) Filed: **Sep. 18, 2014**(51) **Int. Cl.****A41D 13/12** (2006.01)**A41D 1/02** (2006.01)**A41D 27/20** (2006.01)(52) **U.S. Cl.**CPC ..... **A41D 13/12** (2013.01); **A41D 27/20**  
(2013.01); **A41D 1/02** (2013.01)USPC ..... **2/69****Related U.S. Application Data**

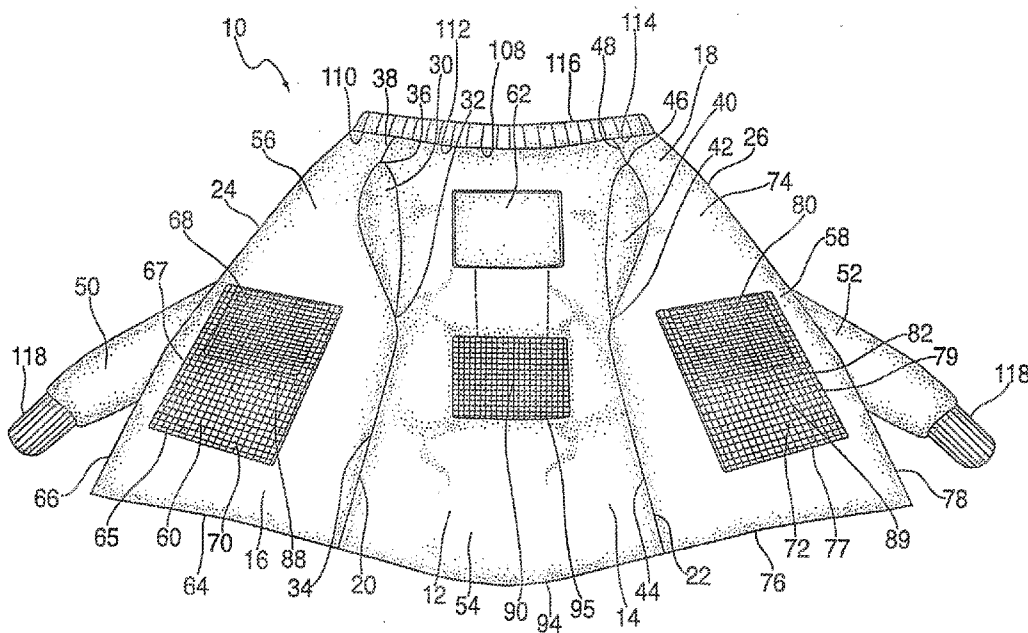
(63) Continuation-in-part of application No. 14/324,707, filed on Jul. 7, 2014, which is a continuation-in-part of application No. 14/167,083, filed on Jan. 29, 2014, which is a continuation of application No. 13/024,635, filed on Feb. 10, 2011, now Pat. No. 8,671,464.

(60) Provisional application No. 61/353,442, filed on Jun. 10, 2010.

(57)

**ABSTRACT**

A garment for regulating temperature is provided, with a body including a back panel and at least one front panel and at least partially joined along at least one common edge, an inner liner panel fastened to an inner surface of at least one of the back panel and to the at least one front panel with a first surface, and a second surface opposite to the first surface of the inner liner panel, and at least one pocket with top, bottom and side edges, being fastened to at least one of the first and second surfaces of the inner removable liner panel. The at least one pocket has at least one side opening.



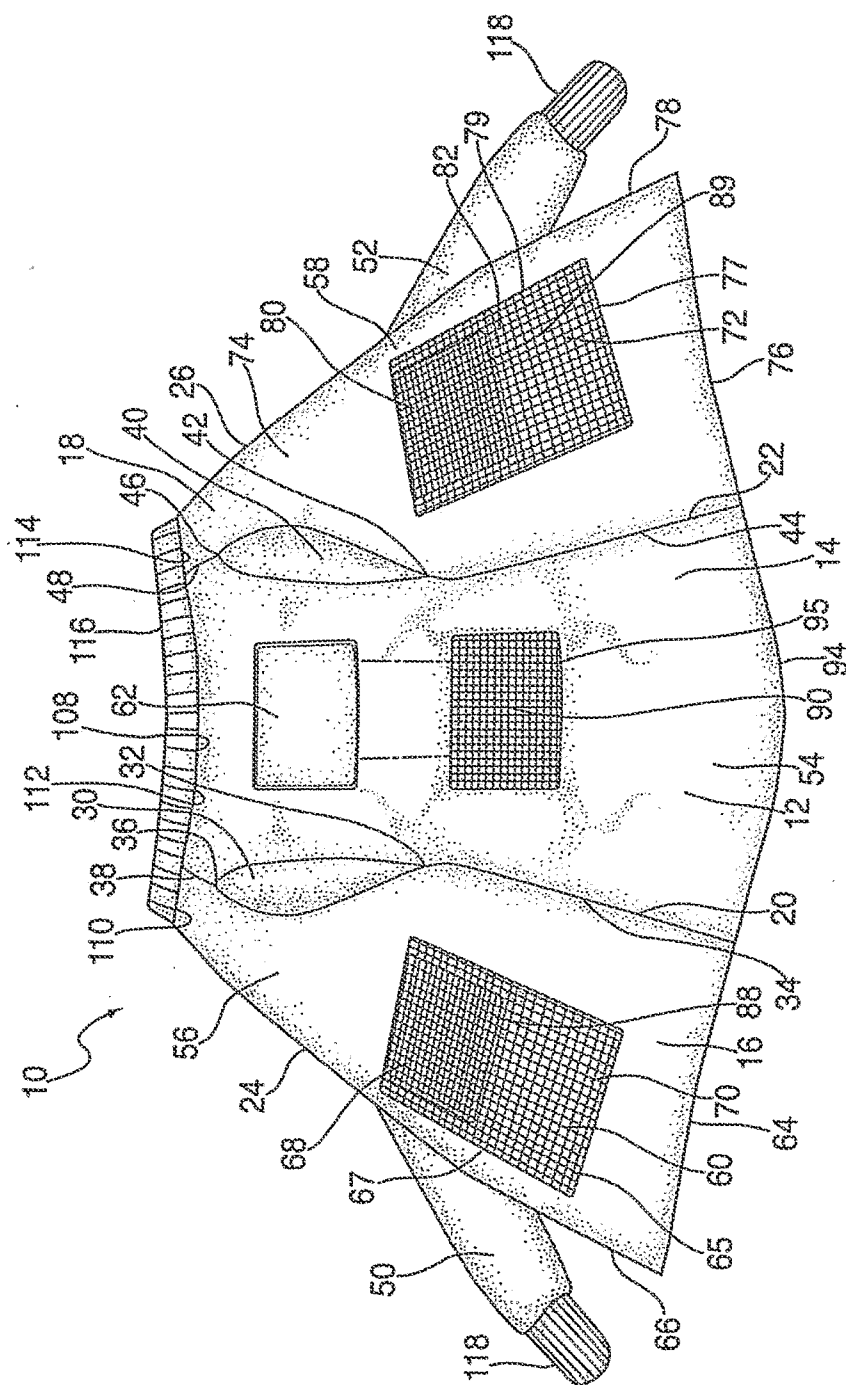


FIG. 1

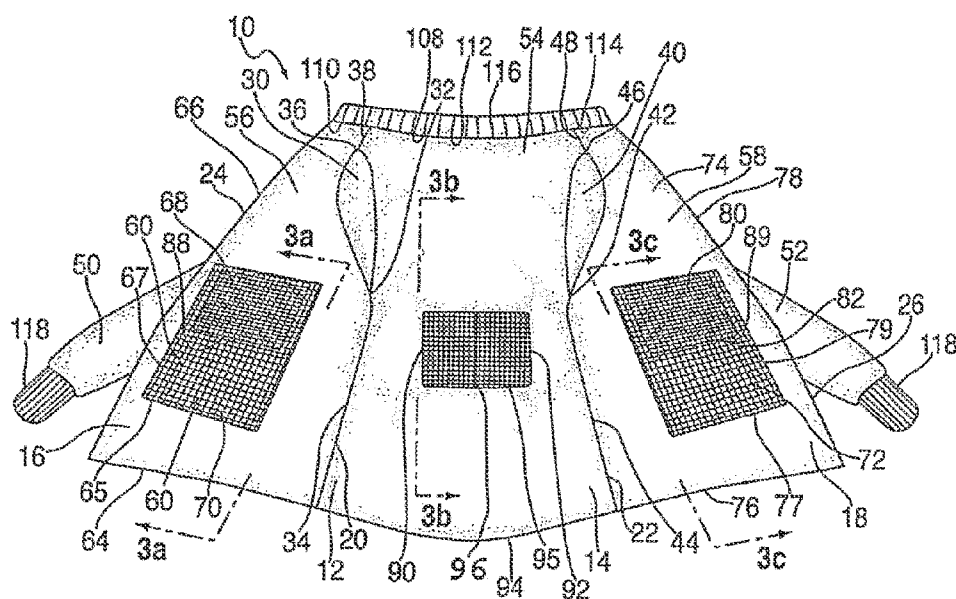


FIG. 2

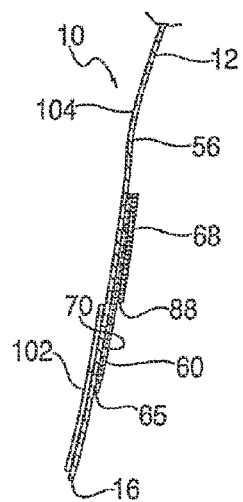


FIG. 3a

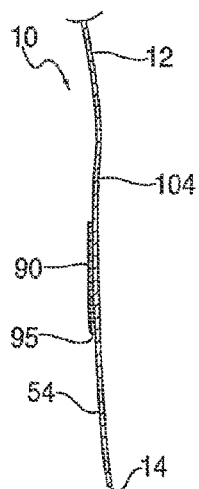


FIG. 3b

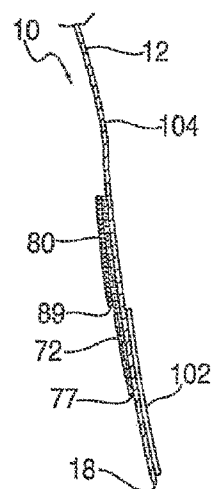


FIG. 3c

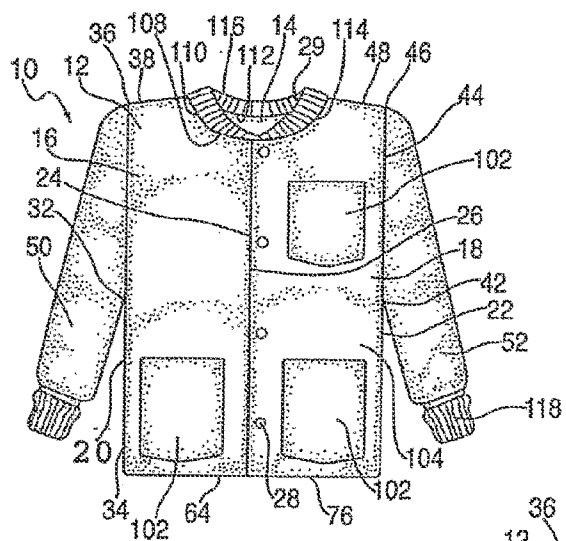


FIG. 4

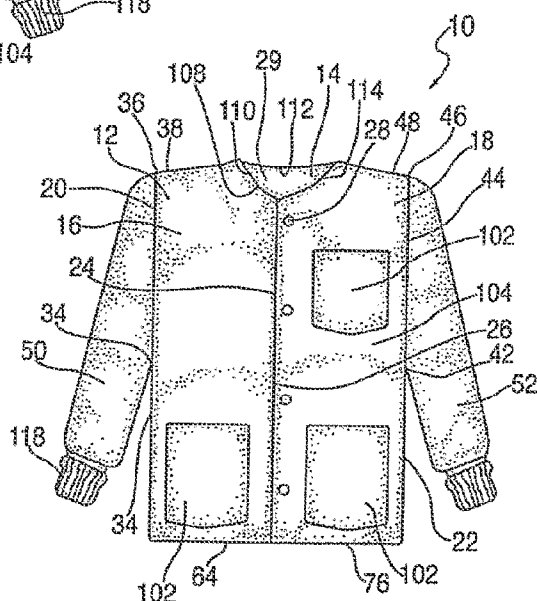


FIG. 5

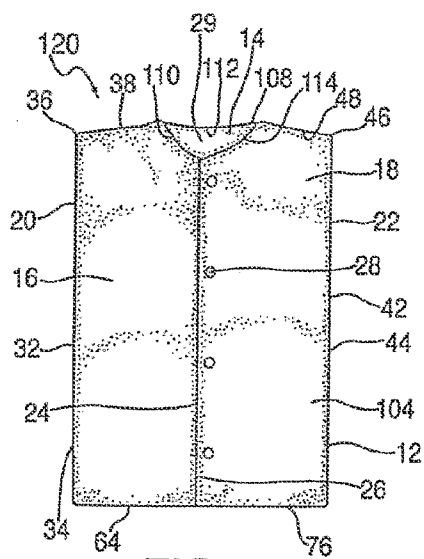


FIG. 6

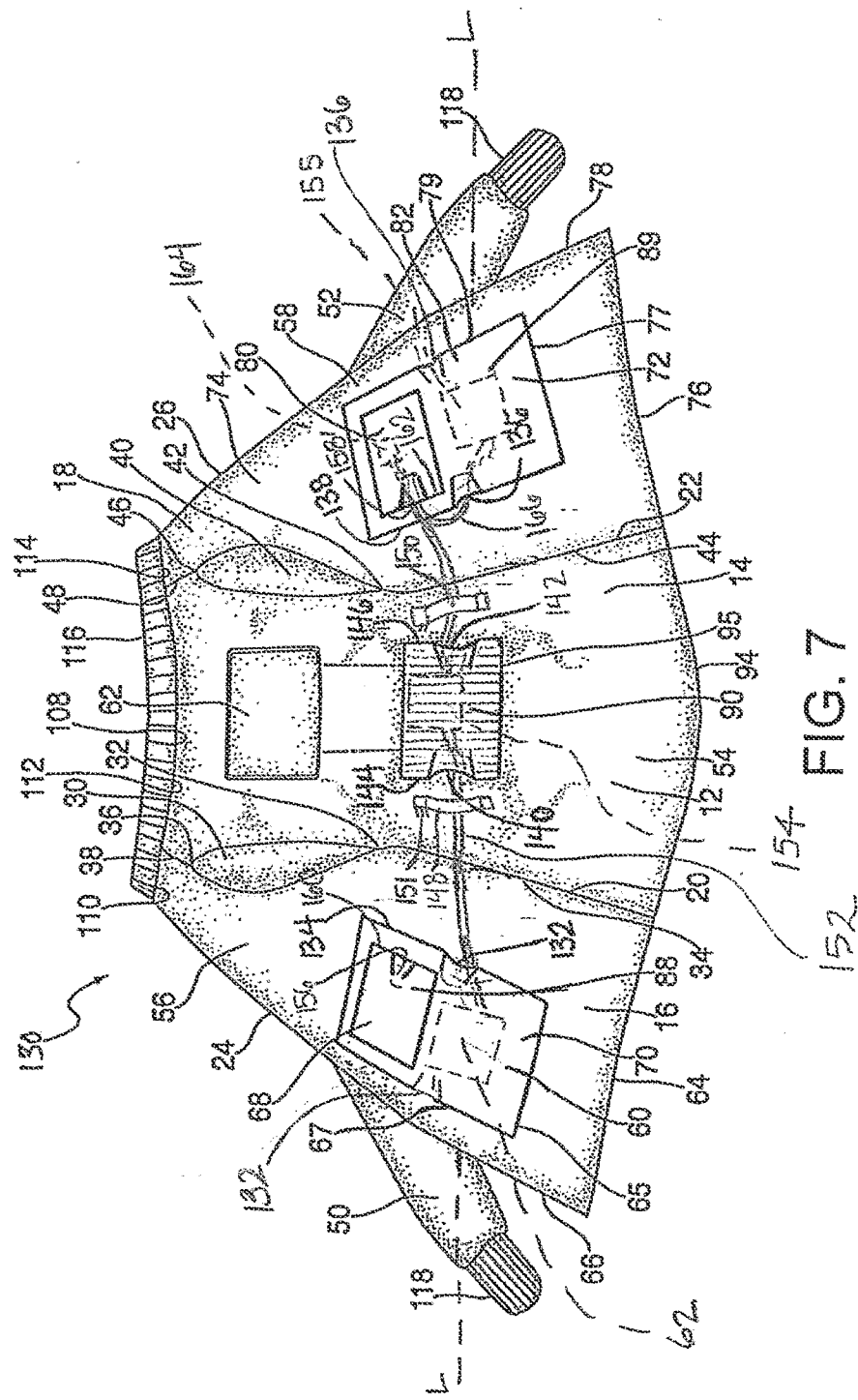
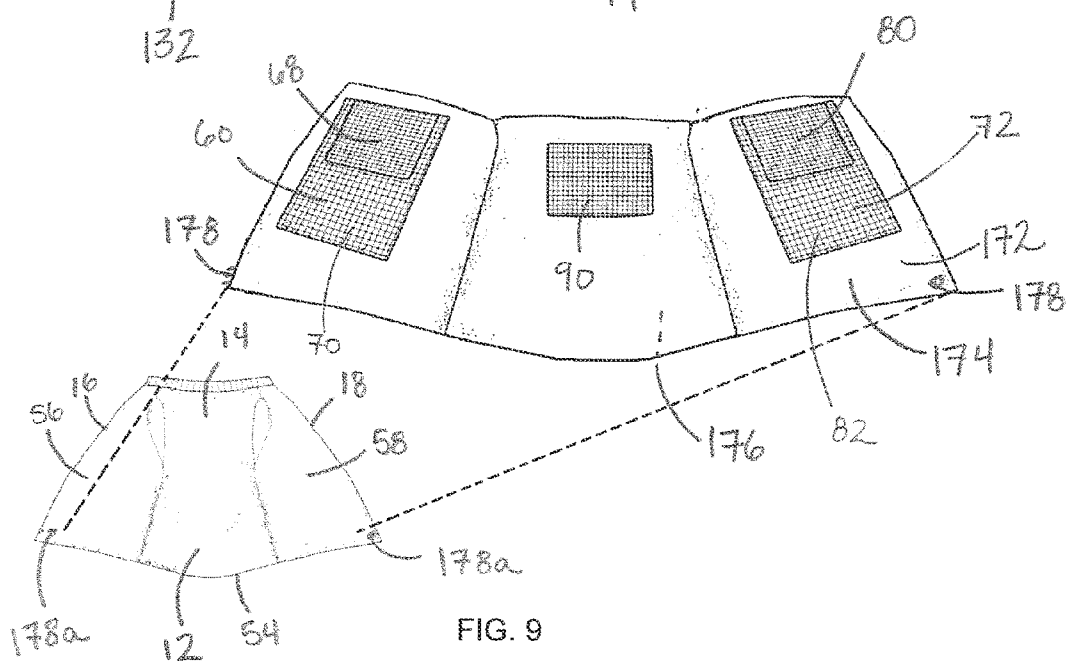
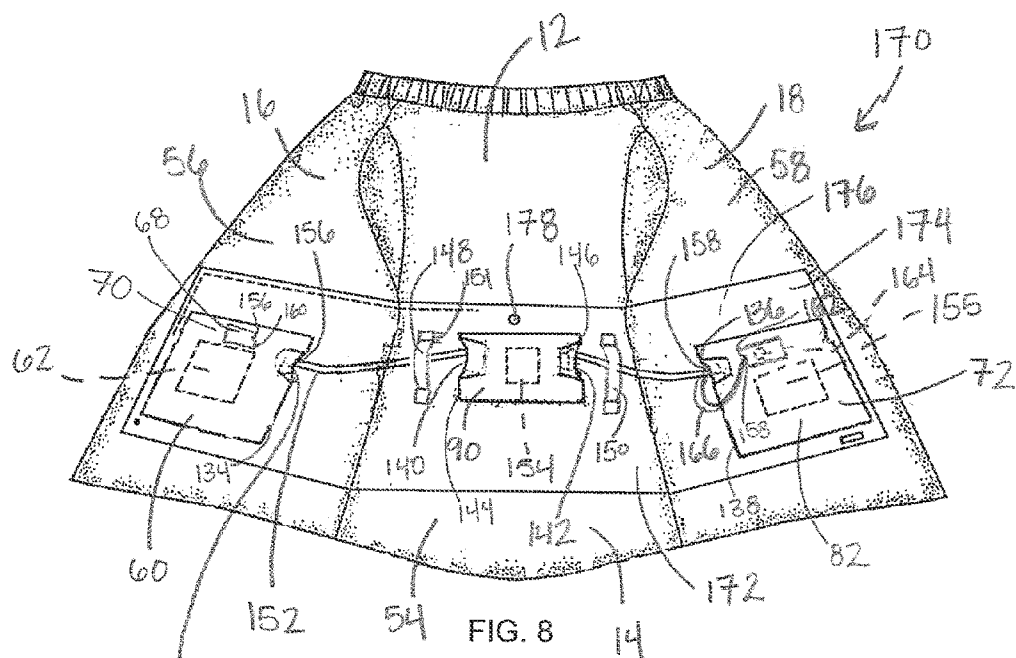


FIG. 7



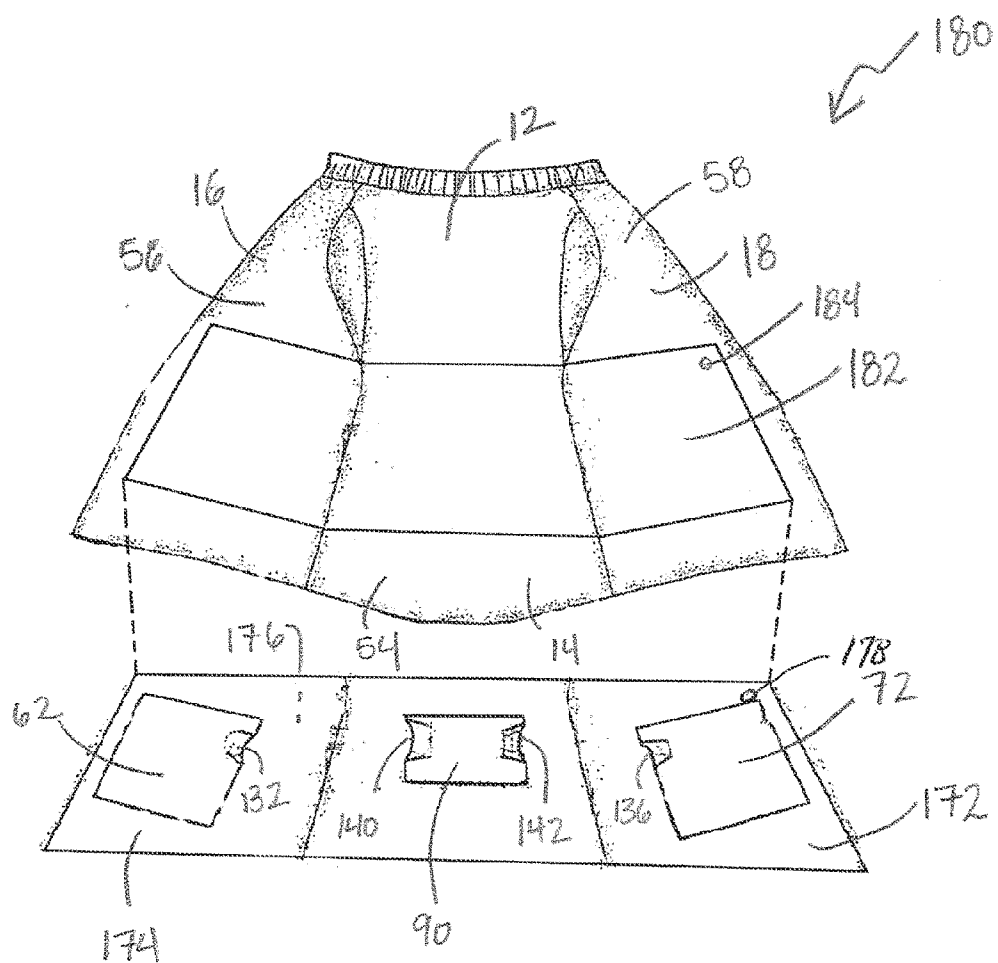
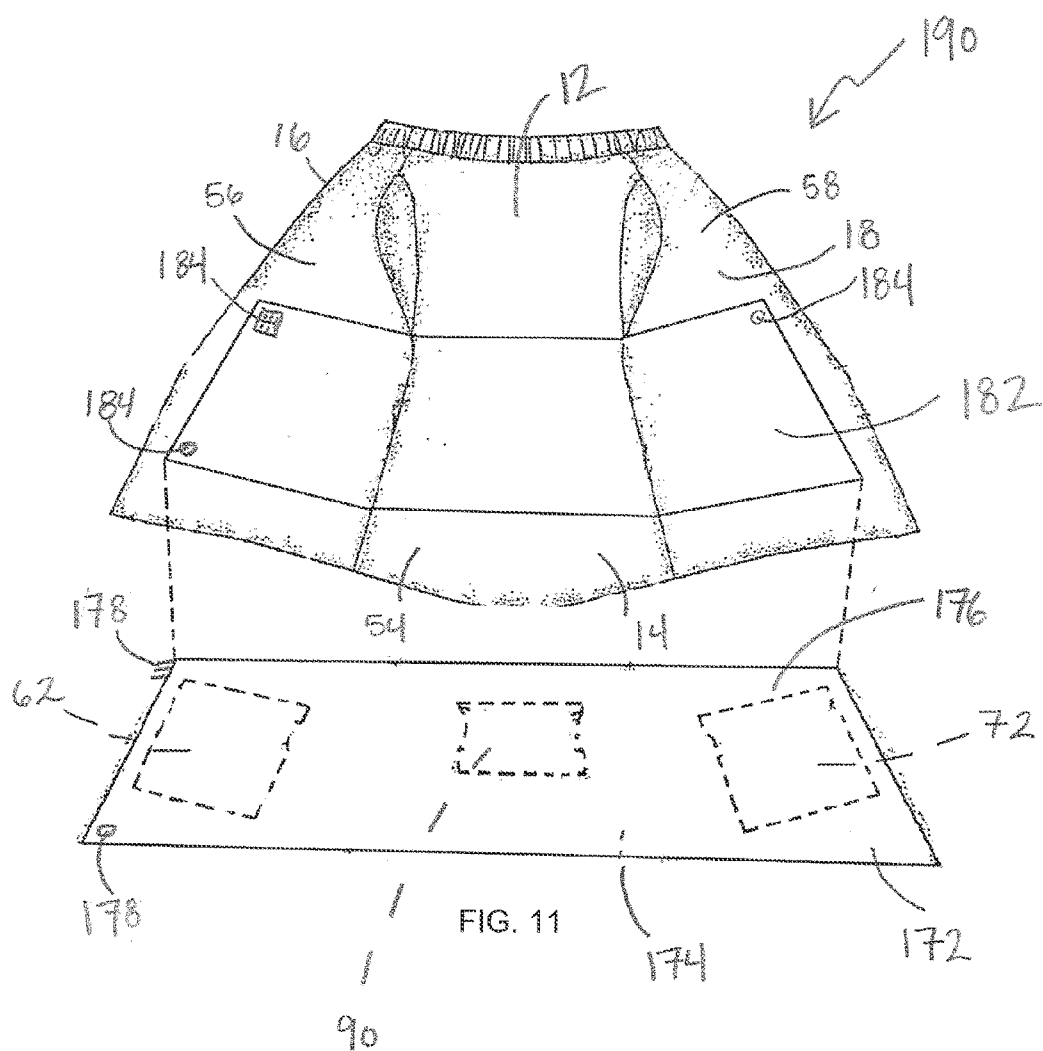


FIG. 10



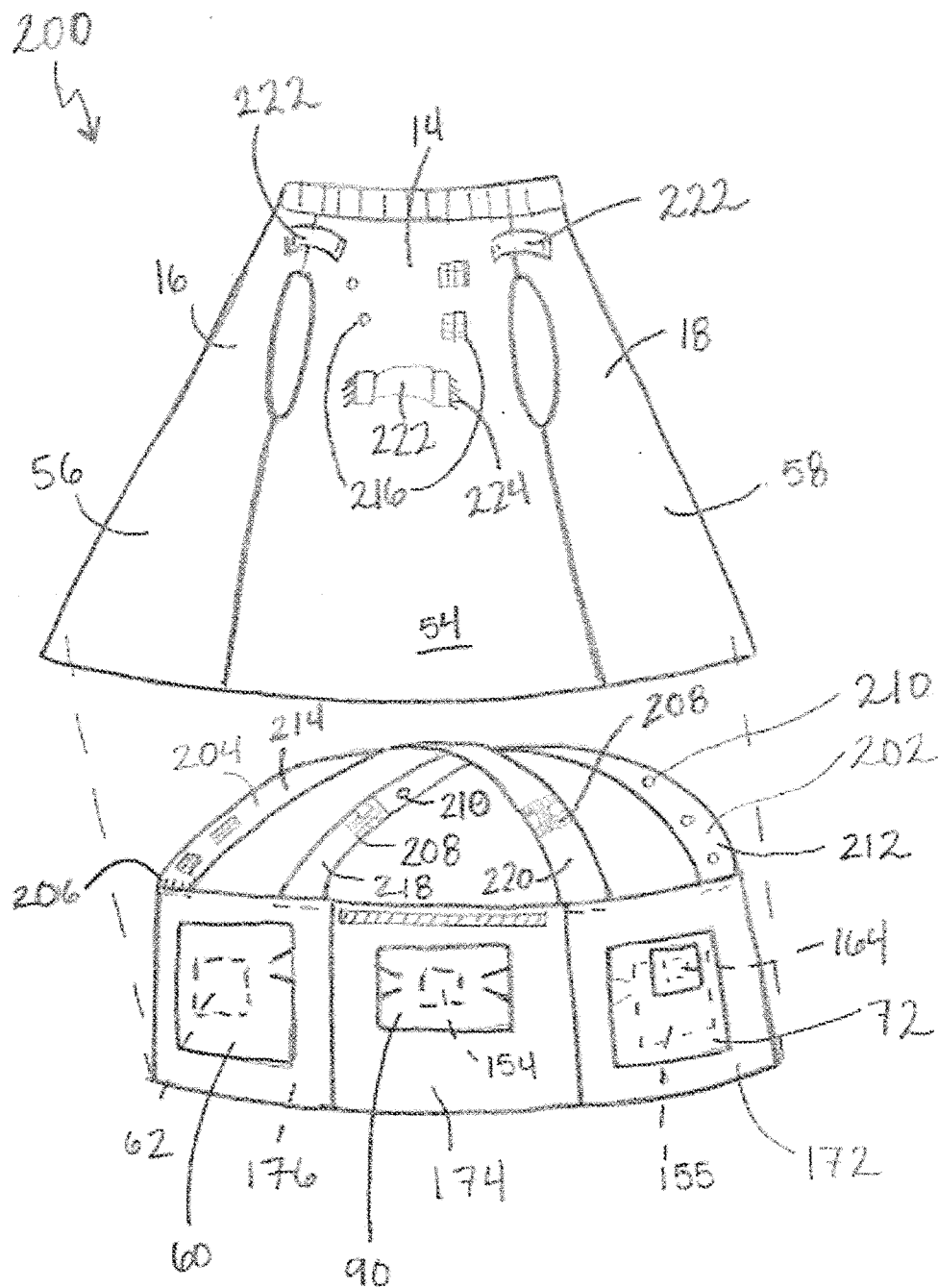


FIG. 12

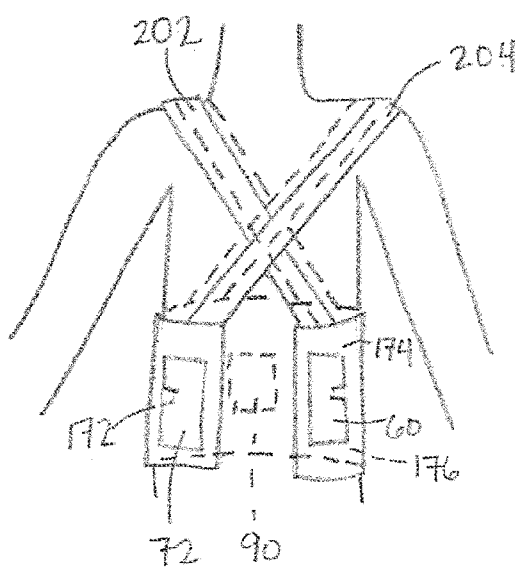


FIG. 13A

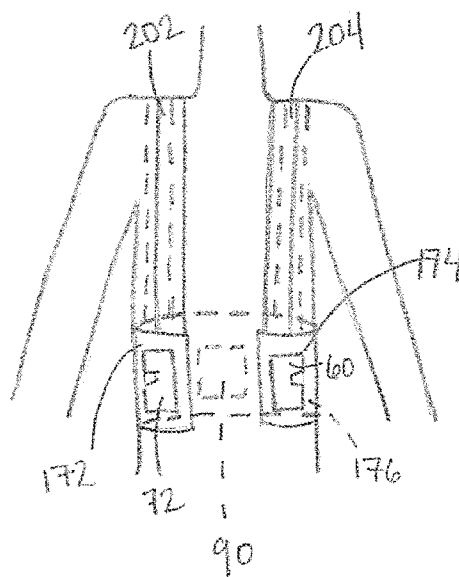


FIG. 13B

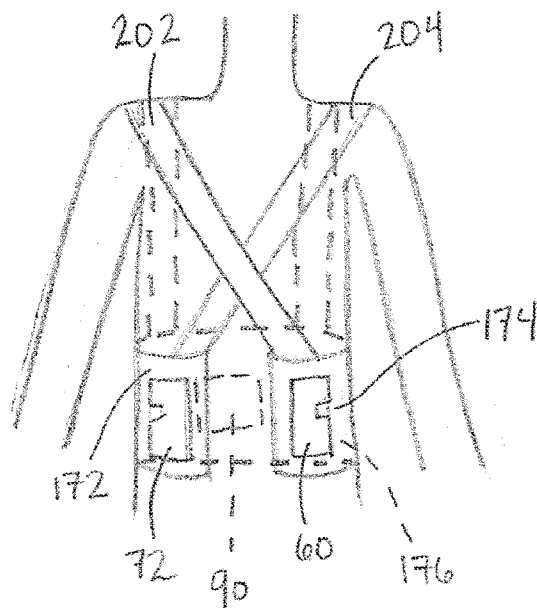


FIG. 13C

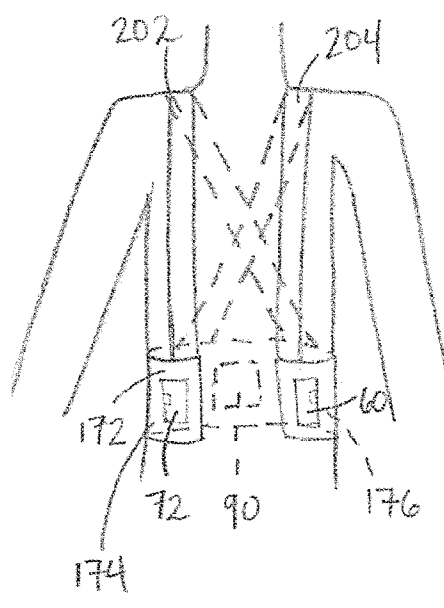


FIG. 13D

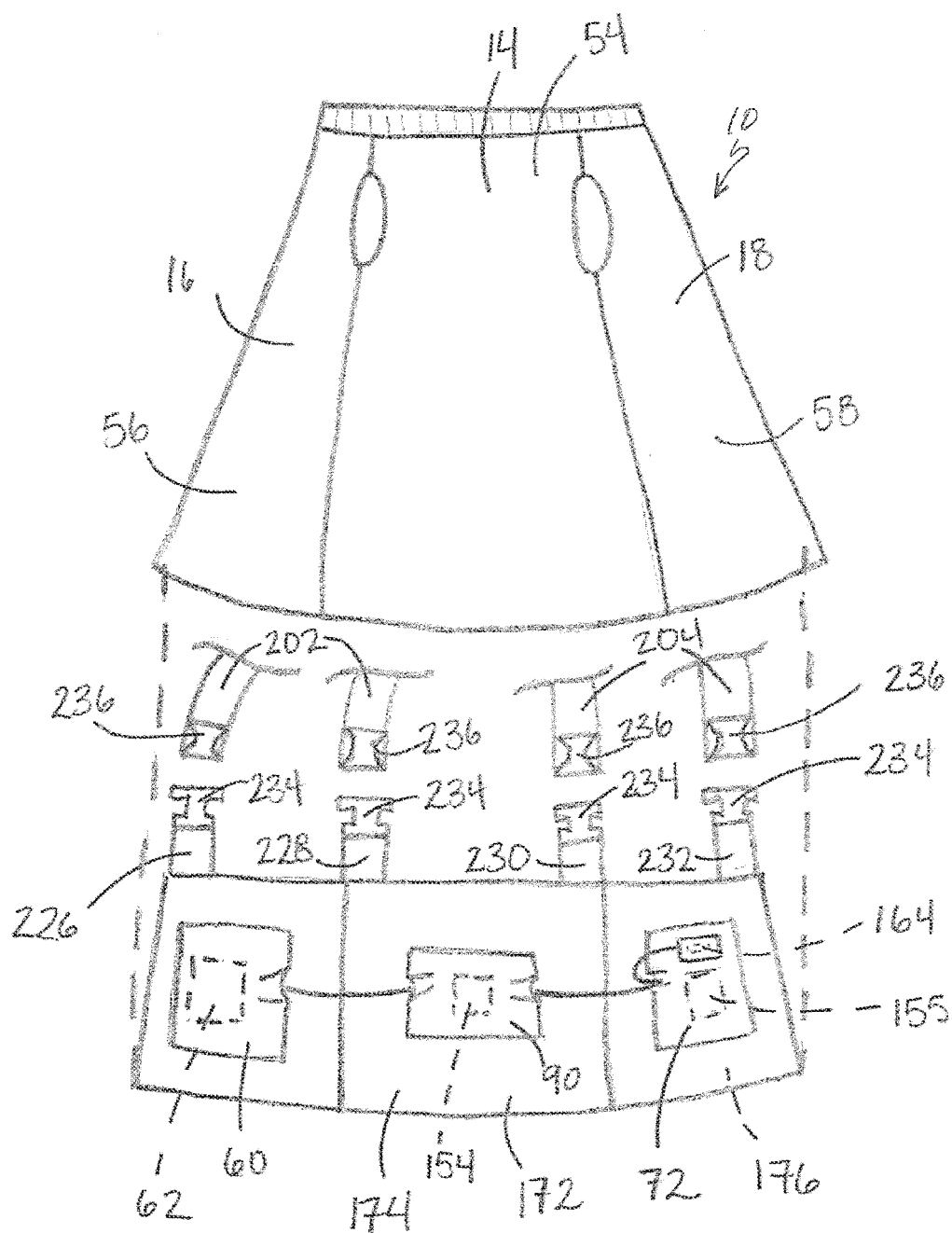


FIG. 14

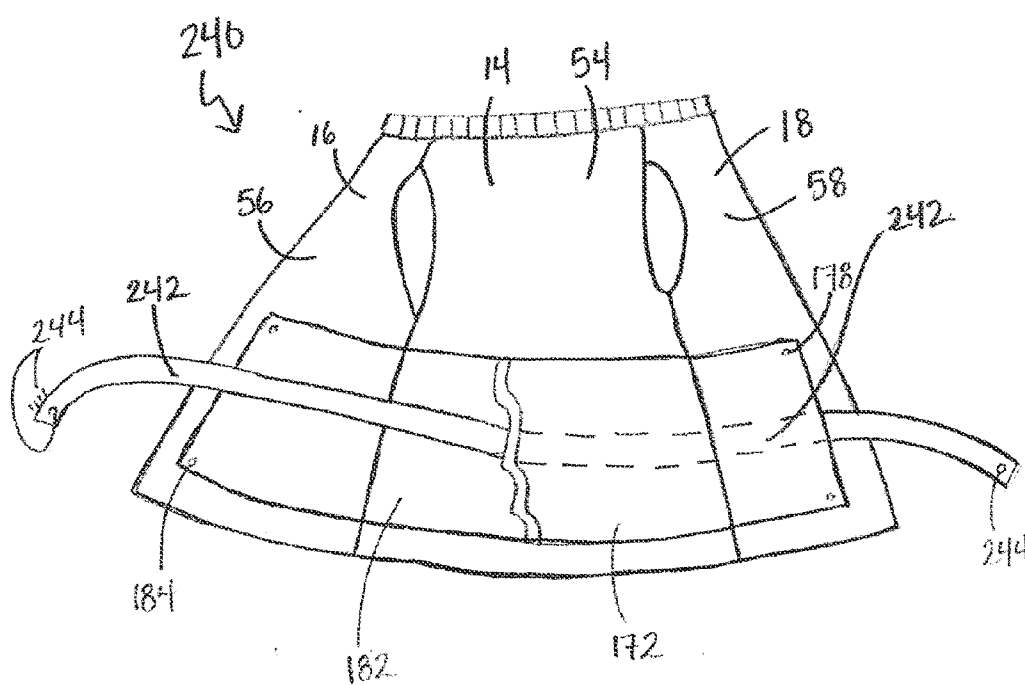


FIG. 15

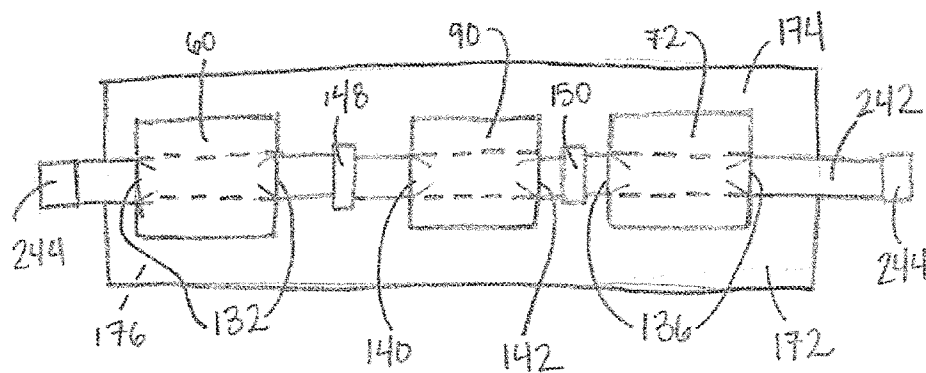


FIG. 16A

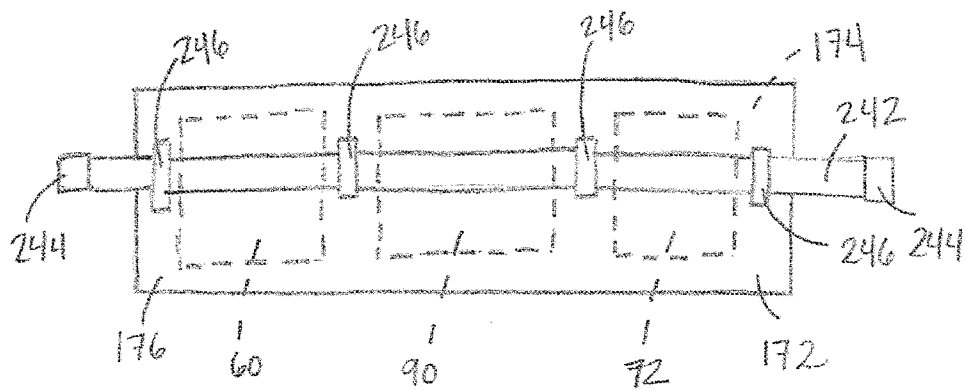


FIG. 16B

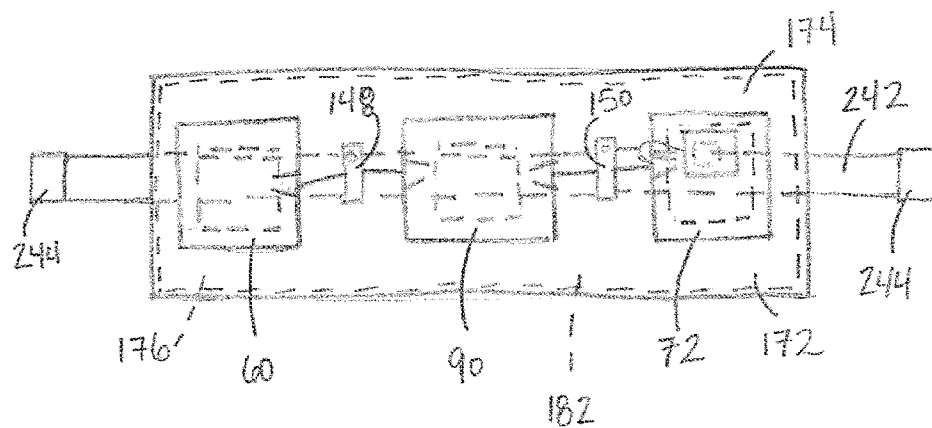


FIG. 16C

## TEMPERATURE REGULATING GARMENT

### RELATED APPLICATIONS

**[0001]** This application is a continuation-in-part and claims priority to U.S. patent application Ser. No. 14/324,707 filed Jul. 7, 2014, which is a continuation-in-part and claims priority to U.S. patent application Ser. No. 14/167,083 filed Jan. 29, 2014, which is a continuation of and claims priority to U.S. patent application Ser. No. 13/024,635 filed Feb. 10, 2011, now U.S. Pat. No. 8,671,464, which claims priority pursuant to 35 U.S.C. §119 from U.S. Provisional Application Ser. No. 61/353,442 filed Jun. 10, 2010.

### BACKGROUND

**[0002]** This invention relates generally to clothing, and more specifically to garments of the type worn by medical personnel in operating rooms, and other applications.

**[0003]** To create a proper working environment, medical operating rooms are usually maintained at a certain temperature which is often relatively cold to offset hot lighting, to keep stressed doctors and nurses comfortable while working, and/or to inhibit the spread of bacteria. In most hospitals, medical personnel are forbidden from bringing street clothing into the operating room. In some cases, anesthesiologists, nurses and any other personnel in the operating room who are not scrubbed in may wear a medical or hospital issue warm up jacket over their scrubs; however, these garments do not keep the wearer at a comfortable temperature. Excessive layers of garments are also counterproductive in the operating room, since they may restrict the mobility or dexterity of the personnel. On the other hand, limbs and fingers tend to get stiff when the body is cold.

**[0004]** Anesthesiologists, nurse anesthetists, perioperative nurses, and others participating in the operating room need their body to be at a comfortable level of temperature and dexterity to perform their functions over many hours. Additionally, medical personnel suffering from hormonal changes often have abnormal body temperature perceptions while participating in surgery. One example is post menopausal women, who suffer from periodic drastic perceived changes in body temperature and often feel much warmer than other individuals in the same room. Also, the surgical treatment of burn patients or pediatric patients usually requires the operating or treating room to be warmer than average for the patient's benefit. These situations have created a need for alternative measures for keeping medical personnel, or other users comfortable.

### SUMMARY

**[0005]** The above-listed needs are met or exceeded by the present temperature regulating garment, usable in many situations when a wearer desires enhanced temperature regulation, and in particular for keeping operating room personnel at a desired temperature. A specially designed warm up jacket or vest is provided to be worn over scrubs. A version of the present garment is a specially designed vest provided to be worn over scrubs and under any sort of warm up jacket or surgical gown. In a preferred embodiment, the garment is made of a thermally insulating material, such as GORE® surgical fabric, preferably level 3 or 4. Furthermore, the present garment features at least one and preferably several pockets which are designed to releasably accommodate a

temperature element such as a reusable heatable gel pack or chemical warming pack, cooling pack or the like.

**[0006]** It is contemplated that the size and locations of the temperature regulating elements are variable to suit the situation. The temperature regulating element can be a heating element, such as a battery-powered heating element, chemical warming pack, reusable heated gel pack or warmed up bag of IV fluid, or a cooling element, such as a phase change cooling element, chemical cooling pack, reusable cooled gel pack, refrigerated bag of IV fluid or ice packs. While preferably made of mesh material, the pockets are designed to allow the heat generated by the regulating elements to be distributed generally uniformly throughout an inside chamber defined by the present garment. The garment also features at least one single layer or double layer pocket, designed to hold a heating or cooling pack over the wearer's lumbar region. When provided as a vest, the present garment can be reversed to provide an additional layer of non-fenestrated material between the wearer and the temperature element. Such an additional layer is helpful when a cooling element is used to prevent the discomfort of localized cold upon the skin.

**[0007]** There also exists a need to easily launder garments with temperature regulating elements. After placing the elements into the pockets, the user has to remove each element before placing the garment into the laundry machine. This need is met by the present temperature regulating garment, which features an inner liner panel which has pockets for the temperature regulating elements. Therefore, it is contemplated that the inner liner panel is preferably removable, and the user removes the liner panel and launders the garment. After laundering, the liner panel is reattached to the garment.

**[0008]** More specifically, a garment for regulating temperature is provided, with a body including a back panel and at least one front panel and at least partially joined along at least one common edge, an inner liner panel fastened to an inner surface of at least one of the back panel and to the at least one front panel with a first surface, and a second surface opposite to the first surface of the inner liner panel, and at least one pocket with top, bottom and side edges, being fastened to at least one of the first and second surfaces of the inner liner panel. The at least one pocket has at least one side opening.

**[0009]** In another embodiment, a strip is provided for use with a garment for regulating temperature having a body including a back panel and at least one front panel and at least partially joined along at least one common edge, the joined panels defining an inside chamber. The strip has a cloth web having a surface, at least one removable attachment disposed on the surface of the cloth web of the strip, and at least one pocket having top, bottom, and side edges, being fastened to the surface of the cloth web of the strip on at least one said side edge of the at least one pocket, the at least one pocket having at least one side opening.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0010]** FIG. 1 is a front view of the present temperature regulating garment shown in an open position with a temperature regulating element exploded out;

**[0011]** FIG. 2 is front view of the garment of FIG. 1 shown without the temperature regulating element;

**[0012]** FIG. 3a is a cross-section taken along the line 3a-3a of FIG. 2 and in the direction generally indicated;

**[0013]** FIG. 3b is a cross-section taken along the line 3b-3b of FIG. 2 and in the direction generally indicated;

[0014] FIG. 3c is a cross-section taken along the line 3c-3c of FIG. 1 and in the direction generally indicated;

[0015] FIG. 4 is a front view of the present garment;

[0016] FIG. 5 is a front view of an alternate embodiment of the garment of FIG. 4;

[0017] FIG. 6 is a front view of another alternate embodiment of the garment of FIG. 4;

[0018] FIG. 7 is a front view of another alternate embodiment shown in an open position with a temperature regulating element exploded out;

[0019] FIG. 8 is a front view of another alternate embodiment shown in an open position;

[0020] FIG. 9 is a front view of the garment of FIG. 8 shown in an open position with an inner liner panel exploded out;

[0021] FIG. 10 is a front view of another alternate embodiment shown in an open position with an inner liner panel exploded out;

[0022] FIG. 11 is a front view of another alternate embodiment of the garment of FIG. 10 shown in an open position with an inner liner panel exploded out;

[0023] FIG. 12 is a front view of another alternate embodiment shown in an open position with an inner liner panel exploded out;

[0024] FIG. 13A-13D are front views of alternate embodiments of the inner liner panel of FIG. 12;

[0025] FIG. 14 is a front view of another alternate embodiment of the garment of FIG. 12 shown in an open position with an inner liner panel exploded out;

[0026] FIG. 15 is a front view of another alternate embodiment shown in an open position; and

[0027] FIG. 16A-16C are front views of alternate embodiments of an inner liner panel of FIG. 15.

#### DETAILED DESCRIPTION

[0028] Referring to FIGS. 1-2 and 4, a garment for regulating temperature is generally designated 10, and in the preferred embodiment is a jacket including a body 12 with a back panel 14, at least one of a first front panel 16 and a second front panel 18. The first front panel 16 is partially joined along at least one first common edge 20 shared with the back panel 14. Likewise, the second front panel 18 is partially joined along at least one second common edge 22 shared with the back panel 14. As is known in the art, the common edges 20, 22 form seams. The first front panel 16 and the second front panel 18 are joinable along respective free edges 24, 26, preferably by fasteners 28, such as snaps, buttons, clips, zip-pers, VELCRO® hook and loop fastener material, and the like. Upon assembly, the joined panels 14, 16 and 18 combine to define an inside chamber 29.

[0029] A first arm hole 30 is defined in part by an end 32 of a seam 34 formed by joining the common edges 20 of the first front panel 16 and the back panel 14, and at an end 36 of the arm hole opposite the end 32 by a shoulder seam 38 formed by a junction of the first front panel 16 and the back panel 14. Likewise, a second arm hole 40 is defined by an end 42 of a second seam 44 formed by joining the common edges 22 of the second front panel 18 and the back panel 14, and at an end 46 of the arm hole 40 opposite the end 42 by a shoulder seam 48 formed by a junction of the second front panel 18 and the back panel 14.

[0030] A first sleeve 50 and a second sleeve 52 are optionally affixed respectively to the first and second arm holes 30, 40. Preferably, the body 12, and if provided, the sleeves, 50, 52 of the garment 10 are made of GORE® surgical fabric,

level 3 or 4, but alternate embodiments are contemplated where the body is made of any thermally insulating, synthetic, non-linting medically acceptable textile, including, but not limited to polyester fabric, cotton polyester fabric, surgical fabric, nylon or the like.

[0031] Referring now to FIG. 1, the garment 10 is depicted in an open position such that an inner surface 54 of the back panel 14, an inner surface 56 of the first front panel 16, and an inner surface 58 of the second front panel 18 are shown. A first pocket 60 dimensioned for accommodating a temperature regulating element 62 is fastened to the inner or interior surface 56 of the first front panel 16 approximately 10-15 centimeters from a bottom edge or hem 64 of the first front panel to a bottom edge 65 of the pocket and approximately 4 centimeters from a side edge 66 of the first front panel 16 to an adjacent pocket edge 67. A third pocket 68, preferably smaller than the first pocket 60, is fastened to an outer or exterior surface 70 of the first pocket 60. As an alternative, the third pocket 68, is directly fastened to the inner surface 56 of the first front panel 16, and therefore lies inside the first pocket 60.

[0032] Likewise, a second pocket 72 dimensioned for accommodating the temperature regulating element 62 is fastened to an inner surface 58 of the second front panel 18 approximately 10-15 centimeters from a bottom edge or hem 76 of the second front panel 18 to a bottom pocket edge 77 and approximately 4 centimeters from a side edge 78 of the second front panel 18 to an adjacent pocket edge 79. A fourth pocket 80, preferably smaller than the second pocket 72, is fastened to an outer or exterior surface 82 of the second pocket 72. As an alternative, a fourth pocket 80, is directly fastened to the inner surface 58 of the second front panel 18, and therefore lies inside the second pocket 72.

[0033] The preferred dimension of the first and the second pockets 60, 72 is 25 cm deep or tall, and 20 cm wide. These pockets 60, 72 are sized to accommodate a larger temperature regulating element 62, including but not limited to IV fluid bags, but may also hold a smaller temperature regulating element such as a chemical warming pack. The preferred dimensions of the third and fourth pockets 68, 80 are 12 cm deep or tall and 16 cm wide. The bottom edge 65 of the first pocket 60 and the bottom edge 77 of the second pocket 72 are preferably located 13 cm from bottom edges 88, 89 of the third and fourth pockets 68, 80, respectively. These pockets 68, 80 are sized to accommodate a smaller temperature regulating element 62, such as a chemical warming pack. For the purposes of this application, the above-identified combinations of the first and third pockets 60 and 68, and the second and fourth pockets 72 and 80 will also be referred to as double pockets.

[0034] Referring now to FIG. 2, a fifth pocket 90 and a sixth pocket 92 for accommodating a temperature regulating element 62 are fastened to the inner surface 54 of the back panel 14 approximately 20-25 cm from a bottom edge 94 of the back panel to a bottom edge 95 of the pockets. Advantageously, the fifth and sixth pockets 90, 92 are placed over a wearer's lumbar region to direct the temperature regulating element 62 over this body region. Accordingly, the preferred dimension of each of the fifth and sixth pockets 90, 92 is 12-25 cm deep or tall and 16-20 cm wide. In the preferred embodiment, as seen in FIG. 2, the pockets 90 and 92 are separated by a seam 96. In FIG. 1, the seam 96 is omitted, leaving only a single pocket 90.

**[0035]** It is contemplated that at least one of the pockets **60, 68, 72, 80, 90** and **92** may have one of the temperature regulating elements **62** disposed inside of them at any given time. The location, dimensions, and design of the pockets **60, 68, 72, 80, 90** and **92** may vary from the above description to suit the application, provided that the pockets are constructed and arranged for allowing the heat or cooling from the temperature regulating element **62** to escape into the interior chamber **29** and this chamber is thus insulated from ambient temperature in the room, usually an operating room. Thus, the user will employ the type of temperature regulating element(s) **62** as needed to achieve a desired temperature within the interior chamber that has a perceived differential from the ambient temperature of the room. It is to be understood that this desired temperature varies with the individual and the circumstances of the application.

**[0036]** The garment **10** is preferably made of a non-linting, temperature insulating textile which can withstand multiple industrial or hospital launderings. Advantageously, the preferred material maintains the temperature within the inside chamber **29**. In the preferred embodiment, the pockets **60, 72, 68, 80, 90**, and **92** of the garment **10** are made of polyester fabric, preferably mesh which allows for enhanced conductivity of the desired temperature in the inside chamber **29**. However, in other embodiments, the pockets **60, 72, 68, 80, 90, 92**, can be made of other textiles. The pockets **60, 72, 68, 80, 90, 92**, are fastened to the garment **10** to withstand the weight of a one liter bag of IV fluid as well as repeated use of the pockets. In the preferred embodiment, the pockets **60, 72, 68, 80, 90, 92**, are sewn to the inner or interior surfaces **56, 58, 54**, respectively, of the front first panel **16**, the second front panel **18**, and the back panel **14**, although alternate ways of fastening the pockets to the front first panel, the second front panel, and the back panel are envisioned.

**[0037]** In the preferred embodiment, the temperature regulating element **62** is a heating element, such as a battery powered heating element, a chemical warming pack, warmed up bag of IV fluid or other elements that are remotely heated and placed into the pockets **60, 72, 68, 80, 90, 92**, while warm. Advantageously, including a heating element allows the user to remain at a comfortable temperature while working in a cold operating room. In other embodiments, similar benefits are obtained when the temperature regulating element **62** is a cooling element, including elements that are remotely cooled, chemical cooling packs, refrigerated bags of IV fluid or ice packs. The placement of, and amounts of the temperature regulating element **62** can be individualized to the needs of the wearer. One skilled in the art will appreciate that the temperature regulating element **62** is not limited to those listed and can be substituted with similar temperature regulating elements.

**[0038]** Referring now to FIGS. **3a, 3c** and **4**, at least one supplemental pocket **102** is fastened to an outer or exterior surface **104** of either or both of the first and second front panels **16, 18**. As is known in the art, such supplemental pockets **102** can be used to hold a pen, pencil or other instrument needed by the wearer.

**[0039]** Referring now to FIGS. **1, 2**, and **4** the garment **10** preferably has a neck **108**, formed by a top edge **110** of the first front panel **16**, a top edge **112** of the back panel **14**, and a top edge **114** of the second front panel **18**. In the preferred embodiment, a collar **116**, which will keep the wearer's neck warm, is affixed to the neck **108** of the garment **10**. The garment **10** also preferably includes a cuff **118** affixed to each

of the sleeves **50, 52**. Note that the collar **116** is optional (FIG. **5**). Advantageously, the cuffs **118** will keep the wrists of the wearer warm, and will serve to prevent heat from escaping into the room. The collar **116** and the cuffs **118** are preferably made of rib knit polyester, however other materials are contemplated.

**[0040]** Referring now to FIG. **6**, an alternate embodiment of the garment is shown, generally designated **120**. Components shared with the garment **10** are designated with identical reference numbers. The main distinction of the garment **120** is it does not have the first and second sleeves **50, 52**. This embodiment is advantageous in that it helps keep the wearer's core warm or cool while being worn under a conventional warm up jacket or surgical gown. The garment **120** shown in FIG. **6** is preferably reversible such that the respective inner surfaces **56, 58**, of the first **16** and second **18** front panels become an outer or exterior surface of the first **16** and second **18** front panels, respectively, and the inner surface **54** of the back panel **14** becomes an outer or exterior surface of the back panel **14**. Reversing the garment **120** will place a non-fenestrated layer of material, that being the material of the body **12**, between the wearer's skin and the temperature regulating element **62**, particularly important if **62** is a cooling element. A temperature regulating element **62** for maintaining temperature range within the chamber between the vest and a conventional warm up jacket or between the vest and a surgical gown can be disposed into one or more pockets **60, 72, 68, 80, 90**, and **92**.

**[0041]** Furthermore, the garments **10** and **120** are designed to meet guidelines for garments worn in hospital operating rooms as set forth by the American Association of PeriOperative Registered Nurses (AORN).

**[0042]** Referring now to FIG. **7**, an alternate embodiment of the garment is shown, generally designated **130**. Components shared with the garment **10** are designated with identical reference numbers. The main distinction of the garment **130**, compared to the garments described above, is that the attachments of at least one of the pockets **60, 72, 90** to the back, first front, and second front panels **14, 16, 18**, or the attachments of at least one of the pockets **68** and **80** to the pockets **60** and **72** have openings to facilitate the placement of at least one temperature regulating element connected by at least one wire and for the attached wires to have a neat appearance and to reduce tangling of the wires. Ultimately, the wires are connected to a battery pack for generating the desired heating or cooling.

**[0043]** In a preferred embodiment, openings **132** are preferably centered on edges **134** and **67** of the first pocket **60** facing the fifth pocket **90**. In the preferred embodiment, each opening **132** is between 2-2.5 inches long. Similar openings **136** are preferably provided on edges **138** and **79** of the second pocket **72** facing the fifth pocket **90**. The fifth pocket **90** has openings **140** and **142** preferably centered on edges **144** and **146**. The openings **140** and **142** are also preferably 2-2.5 inches long. Preferably, the size of the openings **132, 136, 140**, and **142** are smaller than a shortest size of the temperature regulating element **62** to prevent the temperature regulating element from falling through the openings regardless of its direction in the pockets. It is contemplated that the size and location of the openings **132, 136, 140**, and **142** may vary to suit the application.

**[0044]** Preferably, there additionally are strap-like attachments **148, 150** with at least one end removably attached to the inner surfaces **54, 56, 58**. In the preferred embodiment, the

attachments **148, 150** are attached to the inner surface **54** of the back panel **14**. These removable attachments keep a connecting wire **152** connecting the respective heating elements **62** from hanging freely. The removable attachments **148, 150** are fastened to the inner surface **54** of the back panel **14** with fasteners **151** located at at least one of the top and bottom of each of the removable attachments **148, 150**. In the preferred embodiment, the removable attachments **148, 150** are detachable with a fastener **151** at one end, and permanently attached on the end opposite to the end with the fastener **151**. These fasteners include, but are not limited to, VELCRO® hook-and-loop fasteners, snaps, or buttons.

[0045] The removable attachments **148, 150**, when fastened to the inner surface **54** of the back panel **14**, define a passage for receiving the wires **152** from the temperature regulating elements **62, 154, 155** when the wires are threaded or passed from pockets **60 to 90 to 72** or alternatively **72 to 90 to 60**. The removable attachments **148, 150** are removably attached to the inner surface **54** of the back panel **14**, respectively between the first pocket **60** and the fifth pocket **90** and between the second pocket **72** and the fifth pocket **90**. However, other attachment technologies and arrangements of the removable attachments are contemplated.

[0046] The openings **132, 136, 140, 142** are dimensioned to accommodate a folded temperature regulating element **62**, or the like, which is connected via the wire or cord **152**, to a second temperature regulating element **154** (shown hidden) located in one of the other pockets. Once inserted through the openings **132, 136, 140, 142**, the temperature regulating element **62** is unfolded by the user so that it remains in the pocket. At the same time, the wire **152** maintains connection to the second temperature regulating element **154**. Preferably, pockets **60, 72, and 90** are conventional, open-topped pockets, and can be either single or double pockets as discussed above.

[0047] Thus, a user can thread or pass the connected first temperature regulating element **62**, second temperature regulating element **154**, and third temperature regulating element **155** and wires **152** into the designated pockets without needing to disconnect any of the elements for separate placement in pockets. For example, the user first passes a third temperature regulating element **155** (shown hidden) sequentially through openings **140 and 142** of the fifth pocket **90** and then through opening **136** in the pocket **72**. The second temperature regulating element **154**, connected by wire **152**, is passed through the opening **140** of the fifth pocket **90**, and the temperature regulating element **62** is inserted into the first pocket **60** through the opening **132**. Preferably, the removable attachments **148, 150** are unattached during the passing process, and fastened with fasteners **151** after elements **62, 154, and 155** are disposed in pockets **60, 90, and 72**. Alternatively, the removable attachments **148, 150** are attached during the passing process, and each element **62, 154, 155** can be passed through the passage defined by the removable attachments.

[0048] In a preferred embodiment, in general, the pockets **60, 90 and 72**, and more specifically, the openings **132, 136, 140, and 142** are generally aligned, and are disposed along a common latitudinal axis **L**. In the preferred embodiment, the removable attachments **148, 150** are also generally in alignment with openings **140, and 142**, and in some cases also openings **132, 136**. The removable attachments **148, 150** are preferably disposed along a common latitudinal axis 'L' such that the attachments are fastened with fasteners **151** disposed on either side of the axis **L**. Therefore, when elements **62, 154,**

and **155** are disposed in pockets **60, 90, and 72**, the wire **152** preferably is level and parallel to axis **L**.

[0049] The third pocket **68** and fourth pocket **80** preferably have openings **156 and 158** on edges **160 and 162**, each facing the fifth pocket **90**. In a preferred embodiment, openings **156 and 158** are two inches in length and centered on edges **160 and 162**. Preferably, pockets **68 and 80** are conventional, open-topped pockets. As is the case with the openings **132, 136, 140, 142**, the length and position of the openings **156, 158** may vary to suit the application.

[0050] In a preferred embodiment, temperature regulating elements **62, 154, and 155** are connected to an associated battery pack **164** (shown hidden). The battery pack **164** is contemplated as being of any one of a commercially available style, including rechargeable removable batteries, rechargeable fixed batteries, being disposable as a unit, or the like. Preferably, while the temperature regulating elements **62, 154, 155** are passed through pockets **60, 90, and 72**, the battery pack **164** is disconnected from the temperature regulating elements. Preferably, the battery pack **164** is placed in the pockets **68 or 80** conventionally through open tops of the pockets **68 or 80**. Alternatively, it is contemplated that the battery pack **164** is placed in the pockets **68 or 80** through openings **156 or 158**. It is also contemplated that the battery pack **164** is located in one of the other pockets that also houses a temperature regulating element. Once the temperature regulating elements **62, 154, 155** are disposed in the pockets **60, 90, and 72**, the battery pack **164** is connected to the temperature regulating elements via a wire **166** and a suitable plug-in coupler (not shown). The battery pack **164** is also optionally provided with a power adjustment to enable user adjustment of the power distributed to the various temperature regulating elements **62, 154, 155**.

[0051] Referring now to FIGS. **8 and 9**, an alternate embodiment of the garment is shown, generally designated **170**. Components shared with the garment **10** are designated with identical reference numbers. The main distinction of the garment **170**, compared to the garments described above, is that garment **170** has an inner, preferably removable, liner panel **172** preferably fastened to the inner surfaces **56 and 58** of the front panels **16 and 18** and the inner surface **54** of the back panel **14**. In a preferred embodiment, the inner liner panel **172** is attached to the inner surfaces **56 and 58** of the front panels **16 and 18** and the inner surface **54** of the back panel **14** with at least one fastener **178** and preferably several such fasteners. These fasteners are contemplated to include, but are not limited to, VELCRO® hook-and-loop fasteners, snaps, or buttons. Preferably, the fasteners **178** are disposed along the perimeter of the inner liner panel **172**.

[0052] Preferably, the inner liner panel **172** has a first surface **174** and an opposite second surface **176**. In this preferred embodiment, first, second, and fifth pockets **60, 72, and 90** are attached to the first surface **174** of the inner liner panel **172** and face away from the inner surfaces **56 and 58** of the front panels **16 and 18** and the inner surface **54** of the back panel **14**. However, the pockets can readily be attached to the second surface **176**, and face the inner surfaces **56 and 58** of the front panels **16 and 18** and the inner surface **54** of the back panel **14**.

[0053] In the preferred embodiment, the first, second, and fifth pockets **60, 72, and 90** are attached to the first surface **174** in registry. It is contemplated that the inner liner panel **172** is sized to closely accommodate the preferred dimensions of the first and second pockets **60 and 72**, preferably **12 cm** tall.

Preferably, the inner liner panel 172 is attached to the body 12 so that the fifth pocket 90 is positioned over the wearer's lumbar region.

[0054] It is contemplated that the first and second pockets 60 and 72 additionally have third pocket and fourth pockets 68 and 80. Preferably, the third pocket 68 is fastened to an outer or exterior surface 70 of the first pocket 60. However, the third pocket 68 can readily be attached to an inner or interior surface of the first pocket 60. As an alternative, the third pocket 68, is directly fastened to the first surface 174 of the inner liner panel 172, and therefore lies inside the first pocket 60. Similarly, the fourth pocket 80 is fastened to an outer or exterior surface 82 of the second pocket 72, and also can readily be attached to an inner or interior surface of the second pocket 72. As an alternative, the fourth pocket 80, is directly fastened to the first surface 174 of the inner liner panel 172, and therefore lies inside the second pocket 72.

[0055] It is contemplated that the inner liner panel 172 is made of any thermally insulating, synthetic, non-linting medically acceptable textile, including, but not limited to polyester fabric, cotton polyester fabric, surgical fabric, nylon or the like. It is also contemplated that the inner liner panel 172 is made of a non-thermally insulating textile since the inner liner panel 172 is attached to the garment 170 which is made of a thermally insulating textile. In an embodiment, the inner liner panel 172 is made of MYLAR® biaxially-oriented polyethylene terephthalate film. Besides the material, the length, width, thickness and any other dimension of the liner panel 172 may vary to suit the application.

[0056] Preferably, the first, second, and fifth pockets 60, 72, and 90 attached to the first surface 174 of the inner liner panel 172 have openings 132, 136, 140, and 142. As described with respect to FIG. 7, a user threads or passes the connected first temperature regulating element 62, second temperature regulating element 154, and third temperature regulating element 155 and wires 152 into the designated pockets without needing to disconnect any of the elements for separate placement in pockets by threading the connected elements through the openings. Preferably, the associated battery pack 164 is placed in the pockets 68 or 80 conventionally through open tops of the pockets 68 or 80. Alternatively, it is contemplated that the battery pack 164 is placed in the pockets 68 or 80 through openings 156 or 158. It is also contemplated that the battery pack 164 is located in one of the other pockets that also houses a temperature regulating element. Once the temperature regulating elements 62, 154, 155 are disposed in the pockets 60, 90, and 72, the battery pack 164 is connected to the temperature regulating elements via a wire 166 and a suitable plug-in coupler (not shown).

[0057] Preferably, there additionally are strap-like attachments 148, 150 with at least one end removably attached to the first surface 174 of the inner liner panel 172. In the preferred embodiment, the removable attachments 148, 150 are detachable with a fastener 151 at one end, and permanently attached on the end opposite to the end with the fastener 151. These fasteners 178 include, but are not limited to, VELCRO® hook-and-loop fasteners, snaps, or buttons.

[0058] The removable attachments 148, 150, when fastened to the first surface 174 of the inner liner panel 172, define a passage for receiving the wires 152 from the temperature regulating elements 62, 154, 155 when the wires are threaded or passed from pockets 60 to 90 to 72 or alternatively 72 to 90 to 60. The removable attachments 148, 150 are removably attached to the first surface 174 of the inner liner

panel 172, respectively between the first pocket 60 and the fifth pocket 90 and between the second pocket 72 and the fifth pocket 90. However, other attachment technologies and arrangements of the removable attachments 148, 150 are contemplated.

[0059] FIG. 9 shows the garment 170 of FIG. 8 with the inner liner panel 172 exploded out. In a preferred embodiment, the inner liner panel is attached to the inner surfaces 56 and 58 of the front panels 16 and 18 and the inner surface 54 of the back panel 14 with at least one fastener 178. These fasteners 178 are contemplated to include, but are not limited to, VELCRO® hook-and-loop fasteners, snaps, or buttons. Preferably, the fasteners 178 are disposed along the perimeter of the inner liner panel 172 and engage complementary fastener portions 178a located on the body 12.

[0060] After the jacket, vest, or garment 170 is worn by the user, the user optionally removes the entire inner liner panel 172 from the inner surfaces 56 and 58 of the front panels 16 and 18 and the inner surface 54 of the back panel 14 so that the garment 170 can be conveniently laundered. Therefore, once the temperature regulating elements 62, 154, and 155, battery pack 164, and associated wires 152 and 166 are disposed within the pockets attached to the inner liner panel 172 as described above, the user does not have to extricate the elements each time he or she would like to wash the garment 170, and then put the elements back into the pockets once the garment is washed. The temperature regulating elements 62, 154, and 155, battery pack 164, and associated wires 152 and 166 can remain in the inner liner panel 172. However, it is also contemplated that the inner liner panel 172 is optionally sewn onto the inner surfaces 56 and 58 of the front panels 16 and 18, and the inner surface face 54 of the back panel 14.

[0061] Additionally, it is contemplated that because the inner liner panel 172 is a separate component from the body 12 of the garment 170, an already existing garment can be "retrofitted" with the inner liner panel 172. It is contemplated that the inner liner panel is dimensioned to retrofit into already existing garments 170 with bodies 12 of various sizes. In the preferred embodiment, the body 12 is provided with fasteners 178 that are configured for engaging the inner liner panel 172. Alternatively, the body 12 is retrofitted by stitching the inner liner panel 172 in place.

[0062] Referring now to FIG. 10, an alternate embodiment of the garment is shown, generally designated 180. Components shared with the garment 10 are designated with identical reference numbers. A main feature of the garment 180 is at least one backing strip 182 permanently attached to the inner surfaces 56 and 58 of the front panels 16 and 18 and the inner surface 54 of the back panel 14. Preferably, the backing strip 182 is permanently attached to the inner surfaces 56 and 58 of the front panels 16 and 18 and the inner surface 54 of the back panel 14 by stitching the backing strip in place. Other methods of attaching textiles are contemplated, including but not limited to fabric glue and iron-on adhesives. In this embodiment, the inner liner panel 172 is fastened to the backing strip 182 with at least one fastener 184. These fasteners 184 on the backing strip 182, like the fasteners 178a on the body 12 in FIG. 9, are complementary with the associated fasteners 178 on the inner liner panel 172. The contemplated suitable fasteners 184 include, but are not limited to, VELCRO® hook-and-loop fasteners, snaps, or buttons.

[0063] In the preferred embodiment, the backing strip 182 has the same dimensions as, and corresponds in size to the inner liner panel 172. However, it is also contemplated that

the backing strip **182** is variable in size from the inner liner panel **172**, so long as the backing strip **182** is attachable to the garment **180** and has fasteners **184** that engage the fasteners **178** on the inner liner panel **172**. Preferably, the backing strip **182** is rectangular, but a multitude of shapes is contemplated, such as an X-shape. Alternatively, it is also contemplated that two or more backing strips, both with fasteners to engage the inner liner panel **172** are suitable. In a preferred embodiment, the two or more backing strips are attached to inner surfaces **56** and **58** of the front panels **16** and **18** and the inner surface **54** of the back panel **14** in a parallel formation with fasteners to engage either the top and bottom edges of the inner liner panel **172** or the side edges of the inner liner panel **172**.

[0064] Referring now to FIG. 11, an alternate embodiment of the garment is shown, generally designated **190**. Features shared with the other embodiments are designated with identical reference numbers. The main feature of the garment **190** is a backing strip **182** that engages the inner liner panel **172** (shown exploded out). The first, second, and fifth pockets **60**, **72**, and **90** (indicated by broken lines in FIG. 11) are attached to the second surface **176** of the inner liner panel **172**.

[0065] In a preferred embodiment, both of the first and second surfaces **174** and **176** have the fasteners **178** attached in registry with each other on both surfaces such that the inner liner panel **172** is reversible. In other words, the user chooses whether the surface of the inner liner panel **172** with the first, second, and fifth pockets **60**, **72**, and **90** attached faces the inner surfaces **56** and **58** of the front panels **16** and **18** and the inner surface **54** of the back panel **14**, or whether the surface with the pockets attached faces the user's skin.

[0066] Referring now to FIGS. 12-14, an alternate embodiment of the garment is shown, generally designated **200**. Components shared with the garment **10** are designated with identical reference numbers. A main feature of the garment **200** is that the inner liner panel **172** has first and second straps **202** and **204** attached to the second surface **176** of the inner liner panel **172**.

[0067] FIG. 12 shows the garment **200** with the inner liner panel **172**, with attached straps **202** and **204**, exploded out. In the preferred embodiment, the straps **202** and **204** are made of a soft, durable, comfortable textile, and are sufficiently wide enough to distribute the weight of the liner panel **172**, the temperature regulating elements **62**, **154**, and **155**, and the battery **164** over a wide enough area on a user's shoulders to avoid irritation. For use in an operating room, it is preferable that the textile or material used to make the straps **202** and **204** meet guidelines for garments worn in hospital operating rooms as set forth by the AORN.

[0068] In a preferred embodiment, the first and second straps **202** and **204** are attached to the second surface **176** of the inner liner panel **172** by fasteners **206**. It is contemplated that the fasteners **206** include, but are not limited to, snaps, VELCRO® hook and loop fastener, and buttons. It is also contemplated that the straps **202** and **204** are permanently attached onto the inner liner panel **172**, as by stitching, adhesives or the like.

[0069] Preferably, the straps **202** and **204** are adjustable in length, allowing the user to adjust the length of the straps **202** and **204** for different sized wearers, and also to allow the wearer to adjust the straps **202** and **204** to dispose the temperature regulating elements **62**, **154**, and **155** in a comfortable location on the wearer's body. In a preferred embodiment, the straps **202** and **204** have releasable couplings **208**. The releasable couplings **208** include, but are not limited to,

plastic or metal side release buckles, VELCRO® hook and loop fastener, snaps, buttons, D- or O-rings and snap hooks, and grommets and snap hooks. The releasable couplings **208** segment portions of the straps **202** and **204** such that the segmented straps **202** and **204** are releasably joined by the couplings. When a user wants to release the straps **202** and **204** and the attached inner liner panel **172**, the user applies pressure to both sides of the buckle or other coupling to release the straps **202** and **204**.

[0070] In the preferred embodiment, the straps **202** and **204** are attached to the inner surfaces **56** and **58** of the front panels **16** and **18** and the inner surface **54** of the back panel **14** with fasteners **210** disposed on a first surface **212** of the strap **202**, and on a first surface **214** of the strap **204**. Complementary fasteners **216** are disposed in corresponding locations on the inner surfaces **56** and **58** of the front panels **16** and **18** and the inner surface **54** of the back panel **14**. The fasteners **210** and **216** include, but are not limited to, VELCRO® hook-and-loop fasteners, snaps, or buttons. It is contemplated that the fasteners **210** are readily disposed on a second surface **218** of the strap **202**, and on a second surface **220** of the strap **204**. Further, it is also contemplated that the fasteners **210** are disposed on both surfaces of the straps, such that the inner liner panel **172** and attached strap assembly is reversible.

[0071] Alternatively, there are loops **222** attached to the inner surfaces **56** and **58** of the front panels **16** and **18**, and the inner surface **54** of the back panel **14** for the straps **202** and **204** to thread or pass through. Preferably, one end of the loops **222** is removably attached to the inner surfaces **56** and **58** of the front panels **16** and **18**, and the inner surface **54** of the back panel **14** with fasteners **224**. The fasteners **224** include, but are not limited to, VELCRO® hook-and-loop fasteners, snaps, or buttons. Additionally, it is contemplated that the loops **222** are permanently stitched or otherwise fastened into the inner surfaces **56** and **58** of the front panels **16** and **18**, and the inner surface **54** of the back panel **14**.

[0072] In an embodiment, the straps **202** and **204** and inner liner panel **172** are not attached in any way to the inner surfaces **56** and **58** of the front panels **16** and **18**, and the inner surface **54** of the back panel **14**, and the straps **202** and **204** rest on the shoulders of the wearer without being attached to the garment. This allows the liner panel **172** and attached straps **202** and **204** to be worn with any already available garment, and does not require modification of the garment.

[0073] FIGS. 13A-13D show four contemplated configurations for the straps **202** and **204**. FIG. 13A shows the strap **202** attached at two locations on the second surface **176** of the inner liner panel **172**, and resting on the wearer's right shoulder. Likewise, the strap **204** is attached at two locations on the second surface **176** of the inner liner panel **172**, and rests on the wearer's left shoulder. The straps **202** and **204** cross each other on both the wearer's chest and back. Preferably, the second surface **176** of the inner liner panel **172** faces towards the wearer, and the first surface **174** with pockets **60**, **72**, and **90** attached faces outwardly. However, it is contemplated that the straps **202** and **204** are attached on the first surface **174** of the inner liner panel **172**. Further, it is also contemplated that the surface with pockets **60**, **72**, and **90** attached faces towards the wearer.

[0074] FIG. 13B shows the strap **202** attached at two locations on the second surface **176** of the inner liner panel **172**, and resting on the wearer's right shoulder. Likewise, the strap **204** is attached at two locations on the second surface **176** of

the inner liner panel 172, and rests on the wearer's left shoulder. However, the straps 202 and 204 do not cross at all.

[0075] FIG. 13C shows the strap 202 attached at two locations on the second surface 176 of the inner liner panel 172, and resting on the wearer's right shoulder. Likewise, the strap 204 is attached at two locations on the second surface 176 of the inner liner panel 172, and rests on the wearer's left shoulder. The straps 202 and 204 cross each other on the wearer's chest, but not the wearer's back.

[0076] FIG. 13D shows the strap 202 attached at two locations on the second surface 176 of the inner liner panel 172, and resting on the wearer's right shoulder. Likewise, the strap 204 is attached at two locations on the second surface 176 of the inner liner panel 172, and rests on the wearer's left shoulder. The straps 202 and 204 cross each other on the wearer's back, but not the wearer's front. While these strap configurations have been shown and described in conjunction with FIGS. 13A-13D, other strap configurations and attachments are contemplated.

[0077] FIG. 14 shows the inner liner panel 172 with four attachment straps 226, 228, 230, and 232 attached to the second surface 176 of the inner liner panel 172 at four locations. In the preferred embodiment, the attachment straps 226, 228, 230, and 232 each have plastic connectors 234 disposed at the ends of the attachment straps. Preferably, the straps 202 and 204 have connectors 236 disposed at both ends of the straps 202 and 204. The connectors 236 are complementary to all of the connectors 234 disposed at the ends of the attachment straps 226, 228, 230, and 232. Therefore, it is contemplated that the straps 202 and 204 are readily connected to the attachment straps 226, 228, 230, and 232 in the configurations shown and described in FIGS. 13A-13D. Additionally, other strap configurations and connections are contemplated.

[0078] It is also contemplated that the straps 202 and 204 are attached to the inner liner panel 172 with VELCRO®, with a long strip of VELCRO® disposed on the second surface 176 of the inner liner panel 172. Preferably, therefore, the straps 202 and 204 are readily connected to the VELCRO® hook and loop fastener material on the second surface 176 of the inner liner panel 172 in the configurations shown and described in conjunction with FIGS. 13A-13D. Additionally, other strap configurations and connections are contemplated. It is also contemplated that straps 202 and 204 are readily attached to the first surface 174 of the inner liner panel 172.

[0079] Referring now to FIG. 15-16, an alternate embodiment of the garment is shown, generally designated 240. Components shared with the garment 10 are designated with identical reference numbers. A main feature of the garment 240 is that the inner liner panel 172 has a strap 242, preferably adjustable, attached, allowing a user to wear the inner liner panel 172 and the attached strap 242 in a belt-like manner around the wearer's waist.

[0080] As shown in FIG. 15, the strap 242 is preferably passed between the backing strip 182 and the inner liner panel 172, through the opening between where the backing strip 182 and the inner liner panel 172 are fastened by complementary fasteners 178 and 184.

[0081] Preferably, the strap 242 is made of an elastic material, with complementary connectors 244 disposed at each end of the strap 242. The set of complementary connectors 244 include, but are not limited to, VELCRO® hook-and-

loop fasteners, buckles, buttons, and snaps. Additionally, it is contemplated that the strap 242 is made of any soft, comfortable textile.

[0082] As shown in FIGS. 16A-16C, other strap 242 arrangements are also contemplated. Referring now to FIG. 16A, in a preferred embodiment, the strap 242 passes through the side openings 132, 136, 140, and 142 in the pockets 60, 72, and 90 attached to the first surface 174 of the inner liner panel 172. The strap 242 is also threaded through removable attachments 148 and 150.

[0083] As shown in FIG. 16B, it is also contemplated that there are loops 246 attached to the second surface 176 of the inner liner panel 172. The strap 242 is threaded through the loops 247 on the second surface 176 of the inner liner panel 172.

[0084] FIG. 16C shows an alternate view of the embodiment shown in FIG. 15, with the strap 242 disposed between the inner liner panel 172 and the backing strip 182.

[0085] While a particular embodiment of the present temperature regulating garment has been described herein, it will be appreciated by those skilled in the art that changes and modifications may be made thereto without departing from the invention in its broader aspects and as set forth in the following claims.

What is claimed is:

1. A garment for regulating temperature, comprising:
  - a body including a back panel and at least one front panel and at least partially joined along at least one common edge;
  - an inner liner panel fastened to an inner surface of at least one of the back panel and to the at least one front panel with a first surface facing the inner surface of the back panel and the at least one front panel, and a second surface opposite to the first surface of the inner liner panel; and
  - at least one pocket having top, bottom and side edges, being fastened to at least one of the first and second surfaces of the inner liner panel, said at least one pocket having at least one side opening.
2. The garment of claim 1 wherein said inner liner panel is attached to at least one of the inner surface of said back panel and the at least one front panel with at least one fastener.
3. The garment of claim 1 further comprising at least one backing strip fastened to the inner surface of at least one of the back panel and to the at least one front panel, and being configured for releasably accommodating said liner panel.
4. The garment of claim 3 wherein said inner liner panel is fastened to said at least one backing strip with at least one fastener.
5. The garment of claim 1 wherein said inner liner panel is fastened to at least one strap.
6. The garment of claim 1 wherein said at least one pocket is a double pocket which includes at least one first pocket and at least one second pocket being fastened to at least one of the first and second surfaces of said inner liner panel, said second pocket being fastened to at least one of an outer and an inner surface of said first pocket or directly to said at least one of the first and second surfaces of said inner liner panel such that said second pocket lies inside said first pocket, said second pocket having a length extending approximately half a length of said first pocket.
7. The garment of claim 6 wherein said second pocket is fastened to one of the outer surface of said first pocket and directly to said at least one of the first and second surfaces of

said inner liner panel on at least one side of said second pocket, said second pocket having at least one opening.

**8.** The garment of claim **1**, further including multiple pockets, at least one said pocket disposed on a section of said inner liner panel corresponding to each of said front and back panels, each said pocket having a side opening such that the openings of adjacent pockets are generally aligned with each other.

**9.** The garment of claim **8** further including at least one removable attachment disposed on at least one of the first and second surfaces of the inner liner panel, said attachments being generally aligned with said side openings.

**10.** The garment of claim **1** further comprising at least one temperature regulating element disposed inside one or more of said pockets, each said at least one temperature regulating element configured for maintaining a desired temperature within said inside chamber.

**11.** The garment of claim **10** further including a battery pack connected to said at least one temperature regulating element for providing power to said element.

**12.** The garment of claim **1** further including at least one removable attachment attached to at least one of the first and second surfaces of the inner removable liner panel to create a passage constructed and arranged for receiving at least one wire from said at least one temperature regulating element.

**13.** The garment of claim **12**, wherein the at least one removable attachment is attached to the at least one of the first and second surfaces of the inner removable liner panel with at least one fastener.

**14.** The garment of claim **1**, wherein said at least one side opening is approximately two inches in length.

**15.** The garment of claim **1** wherein at least one of said pockets is made of a material taken from the group consisting of polyester mesh, GORE® surgical fabric and polyester fabric.

**16.** A strip for use with a garment for regulating temperature having a body including a back panel and at least one front panel and at least partially joined along at least one common edge, said joined panels defining an inside chamber, said strip comprising:

a cloth web having a surface;  
at least one removable attachment disposed on the surface of the cloth section of the strip; and  
at least one pocket having top, bottom, and side edges, being fastened to the surface of the cloth web of the strip on at least one said side edge of the at least one pocket, said at least one pocket having at least one side opening.

**17.** The strip of claim **16** further comprising at least one temperature regulating element disposed inside one or more of said pockets, each said at least one temperature regulating element configured for maintaining a desired temperature within the inside chamber.

**18.** The strip of claim **17** further including a battery pack connected to said at least one temperature regulating element for providing power to said element.

**19.** The strip of claim **18** wherein said at least one removable attachment attached to the strip creates a passage constructed and arranged for receiving at least one wire from said at least one temperature regulating element.

**20.** The strip of claim **17** further including at least one strap attached to said cloth web having a surface.

\* \* \* \* \*