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(54) **HOT AND COLD ATHLETIC RECOVERY SUIT**

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(57) **ABSTRACT**

The invention is directed to an athletic recovery suit wherein selectively heated and cooled sections are provided throughout the suit material. A full body embodiment is provided as well as any number of body-part specific accessories. The suit fabric comprises an innermost fabric layer for direct contact with skin which lies within a layer of interspersed heated and cooled cells. Active heating and cooling may be done by any of a variety of methods. Outside of the cell layer is a vibrating or massaging layer, which again may be powered or operated by any of a number of mechanisms. The outermost layer is an insulating layer.

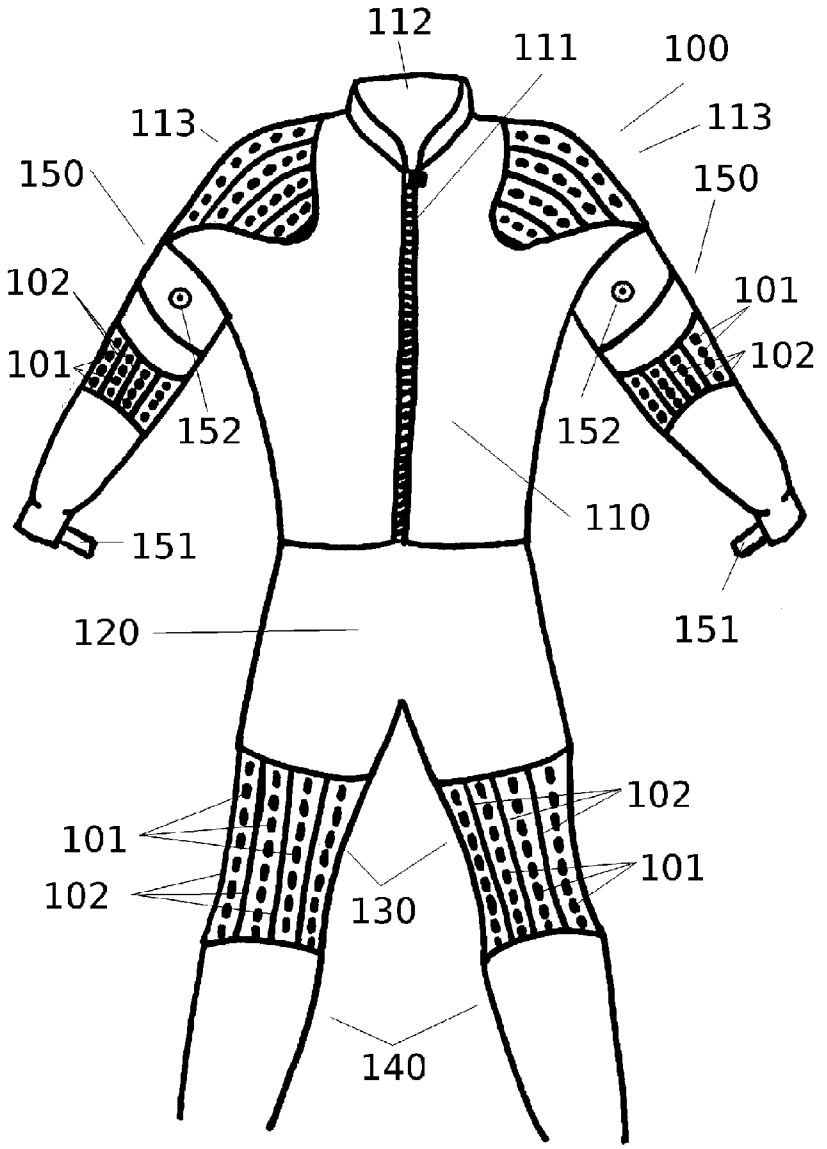


FIG. 1

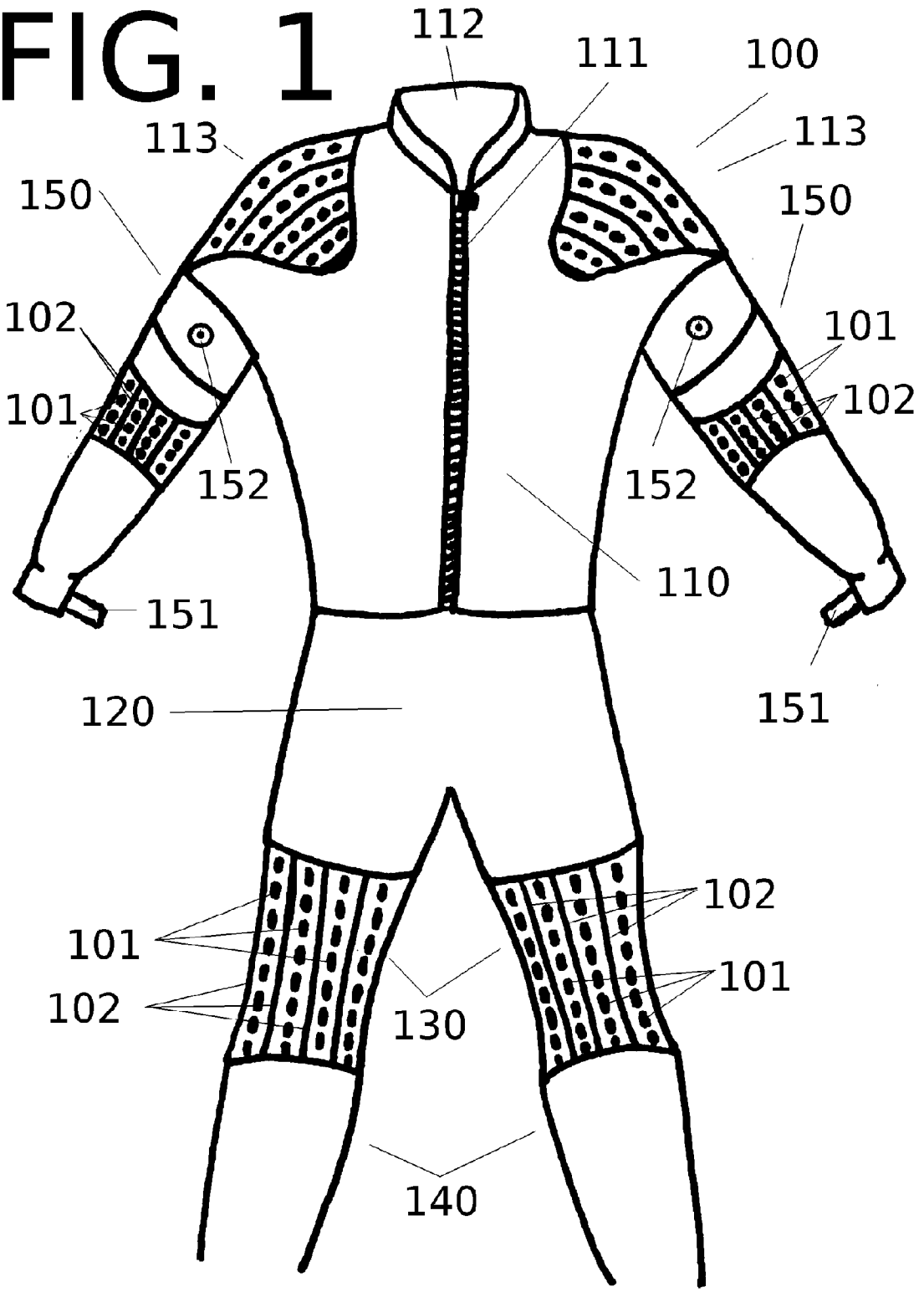

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FIG. 2

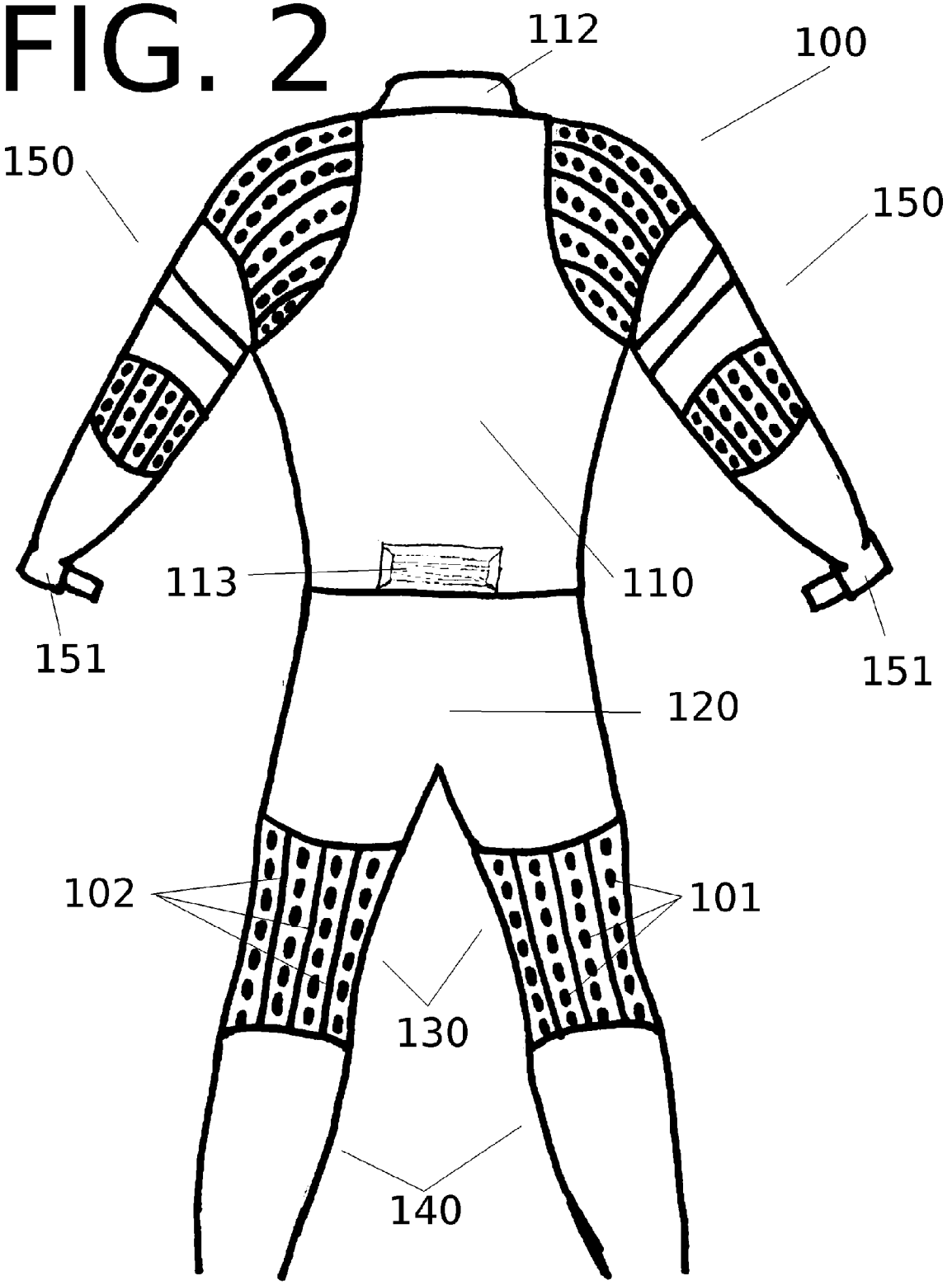


FIG. 3

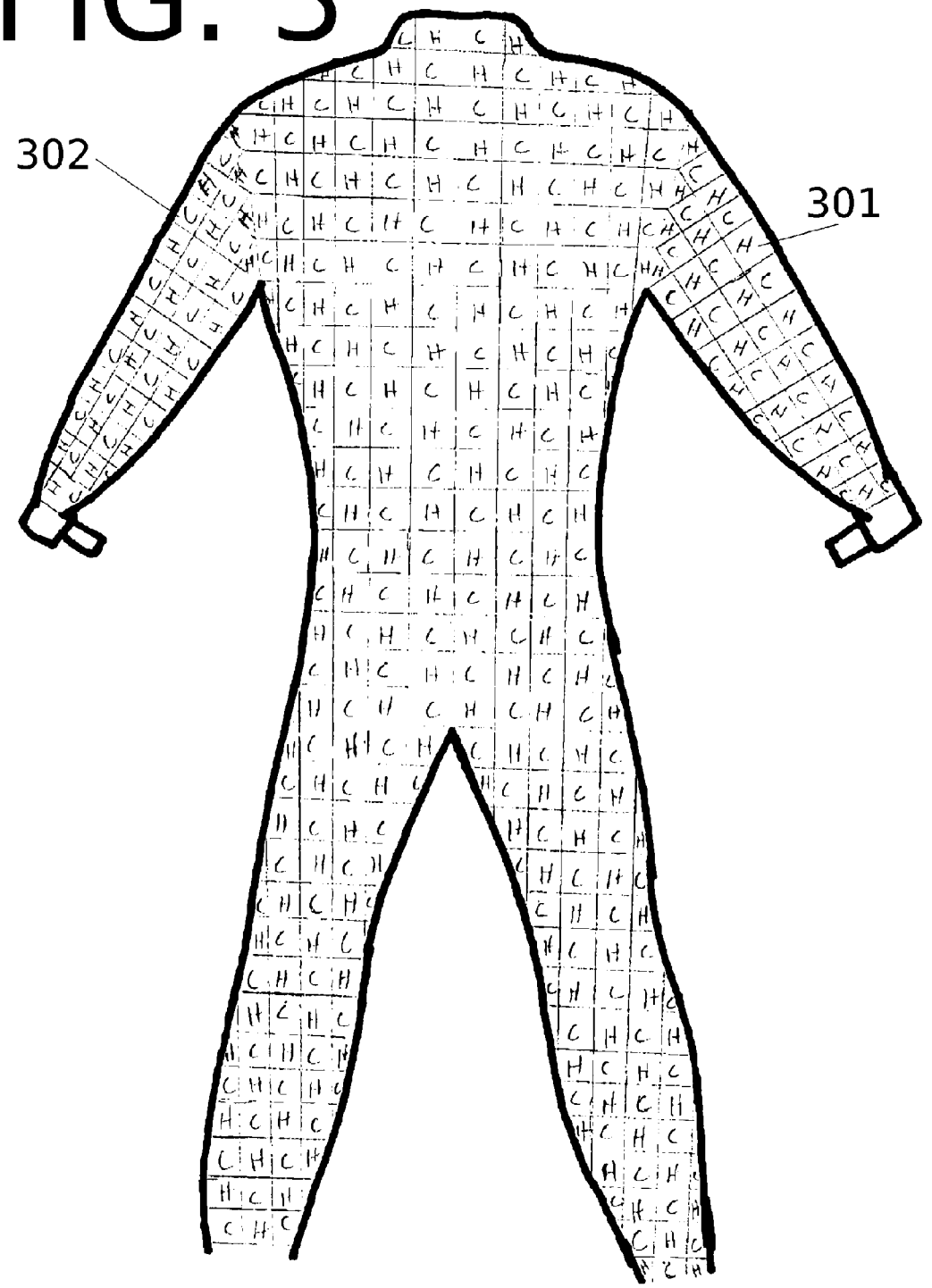


FIG. 4

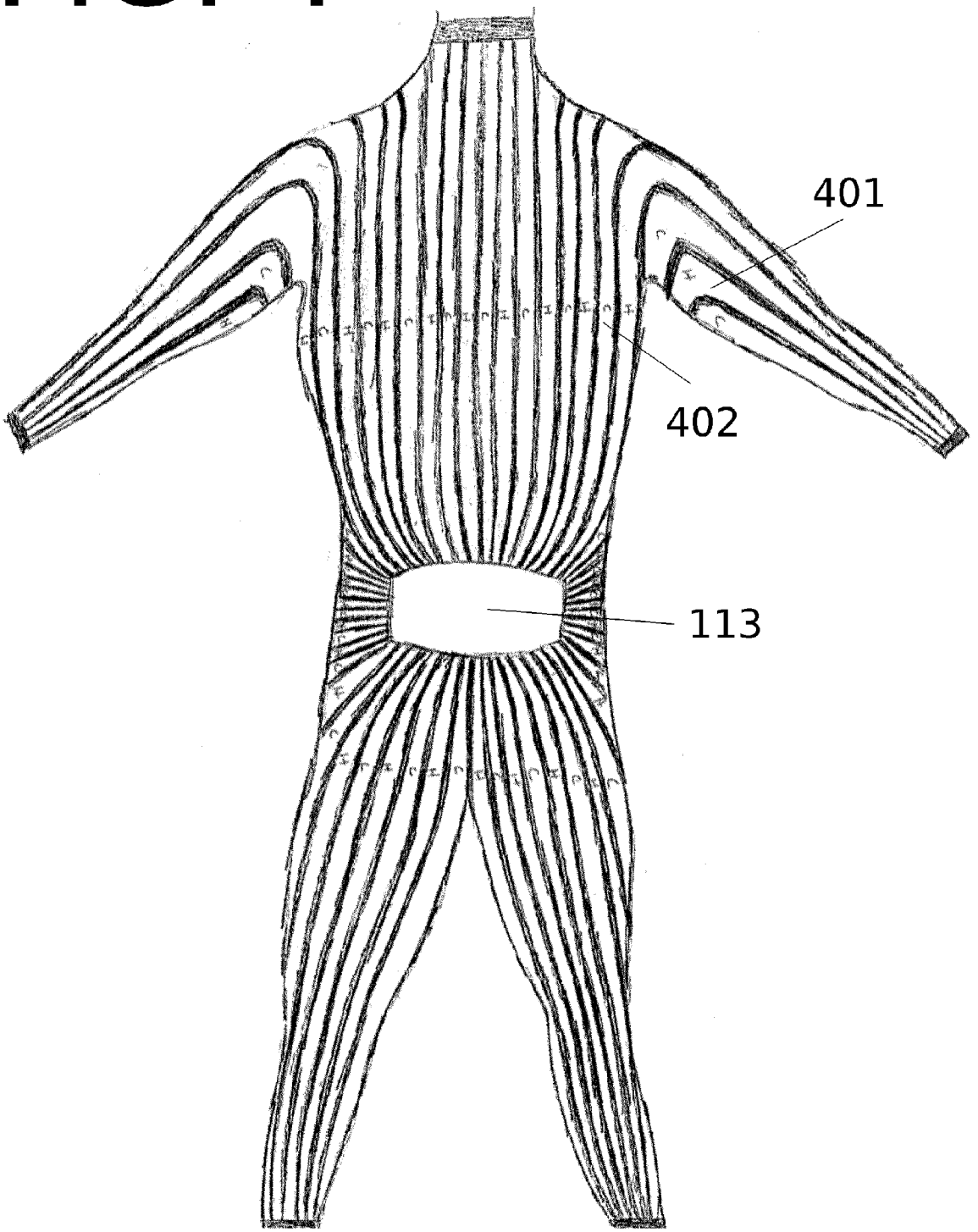


FIG. 5

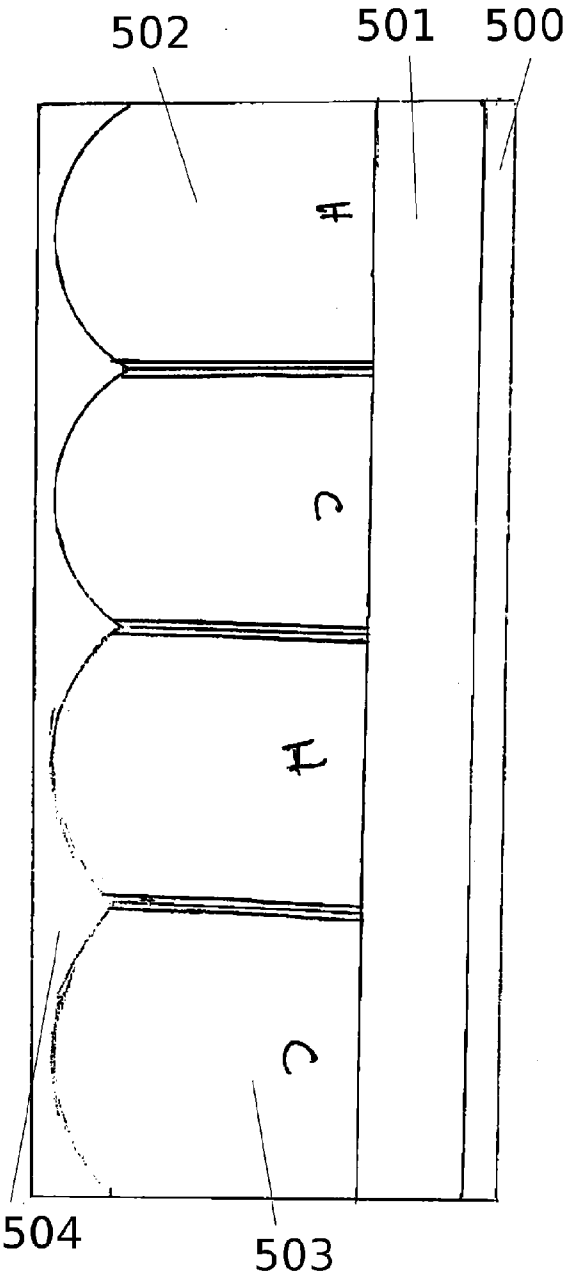


FIG. 6

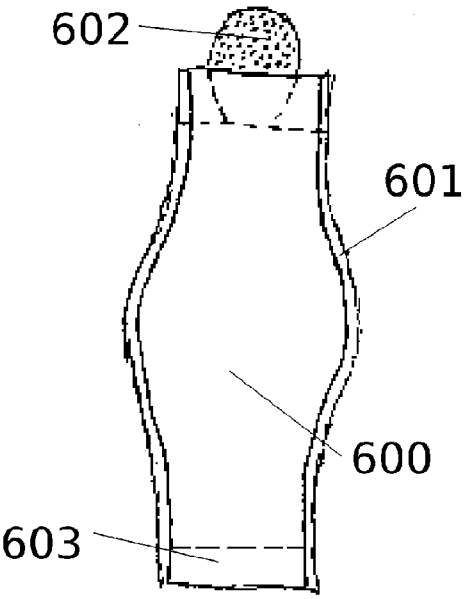
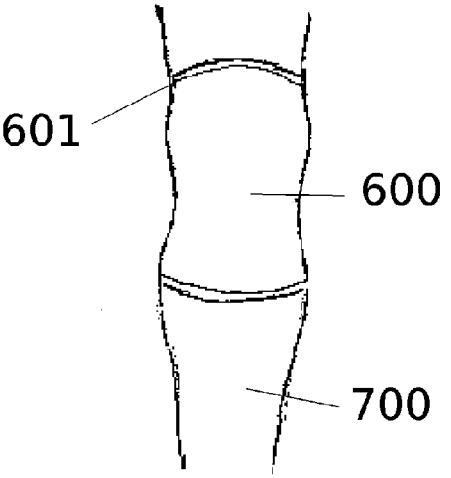


FIG. 7



HOT AND COLD ATHLETIC RECOVERY SUIT

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Not Applicable

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable

PARTIES TO A JOINT RESEARCH AGREEMENT

[0003] Not Applicable

REFERENCE TO SEQUENCE LISTING, A TABLE, OR A COMPUTER PROGRAM LISTING COMPACT DISK APPENDIX

[0004] Not Applicable

BACKGROUND OF THE INVENTION

[0005] The invention relates generally to heating and cooling packs, massage devices, and garments for application to a user's body and particularly to athletic recovery garments that can selectively and controllably apply heating, cooling and massage to different parts of the user's body. Hot and cold packs have long been applied to different parts of the human body as treatment for a variety of injuries and conditions. Likewise, mechanical and manual massage techniques have long been used to ease sore and stiff muscles. Numerous wraps, bags, devices, and garments have been proposed, some passively cooled or heated and some actively cooled or heated, but none that allows complete active heating and cooling of the whole body or selective portions thereof in in combination with mechanical massage a single garment or set of accessories.

SUMMARY OF THE INVENTION

[0006] Accordingly, the invention is directed to an athletic recovery suit wherein selectively heated and cooled sections are provided throughout the suit material. A full body embodiment is provided as well as any number of body-part specific accessories. The suit fabric comprises an innermost fabric layer for direct contact with skin which lies within a layer of interspersed heated and cooled cells. Active heating and cooling may be done by any of a variety of methods. Outside of the cell layer is a vibrating or massaging layer, which again may be powered or operated by any of a number of mechanisms. The outermost layer is an insulating layer. Electronic control and power supply structures may be placed at the small of the back or on other exterior location.

[0007] It is an object of the invention to provide an athletic recovery suit that is actively, selectively, and controllably heated and cooled.

[0008] It is an object of the invention to provide a suit or accessory that can apply targeted hot or cold treatment to a particular limb or body region.

[0009] It is an object of the invention to provide a visually appealing garment or accessory that may be worn by an athlete or other person after completing a high exertion activity such as an athletic competition, athletic practice, or fitness workout to apply hot and cold treatment while the wearer goes about other activities.

[0010] It is an object of the invention to provide an athletic workout and recovery suit with active heating and cooling as well as automated vibration or massage treatment.

[0011] Additional features and advantages of the invention will be set forth in the description which follows, and will be apparent from the description, or may be learned by practice of the invention. The foregoing general description and the following detailed description are exemplary and explanatory and are intended to provide further explanation of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The accompanying drawings are included to provide a further understanding of the invention and are incorporated into and constitute a part of the specification. They illustrate one embodiment of the invention and, together with the description, serve to explain the principles of the invention.

[0013] FIG. **1** shows a front view of the first exemplary embodiment.

[0014] FIG. **2** shows a rear view of the first exemplary embodiment.

[0015] FIG. **3** shows a rear view of how the first exemplary embodiment may be divided into heated and cooled regions.

[0016] FIG. **4** shows a rear view of how the second exemplary embodiment may be divided into heated and cooled regions.

[0017] FIG. **5** shows an exemplary cross sectional view of the material of the first exemplary embodiment.

[0018] FIG. **6** shows the first exemplary accessory to the first exemplary embodiment.

[0019] FIG. **7** shows the first exemplary accessory attached to a limb.

DETAILED DESCRIPTION OF THE INVENTION

[0020] Referring now to the invention in more detail, the invention is directed to an athletic recovery suit. The general concept of the suit is that controllably heated and cooled cells are dispersed throughout the material. FIG. **1** shows the first exemplary embodiment. In the first exemplary embodiment, a full body suit **100** is provided. The material of the suite **100** is further described below. In general the suit **100** may offer any desired style details such as lapels, cuffs, pockets, decorative seams, printed or silk-screened indicia and the like. It is preferable that the suit **100** be aesthetically pleasing, and suitable, for example, to be worn by an athlete in during post-competition social activities or media appearances. While the material of the suit **100** is general solid and fluid impermeable, the joint regions and other regions may feature air-permeable breathing holes **101** and embedded elastic tensioning members **102**, which ensure that the suit **100** remains form fitting at the wearer's joints.

[0021] A torso region **110** covers the user's chest and is fastened about the user's chest with a zipper **11** or alternatively with buttons, snaps, Velcro, or other fasteners. A collar **112** of any style may be provided. A shoulder region **113** is attached at two arm openings to the torso region **110** and may utilize the aforementioned breathing holes **101** and elastic tension members **102**. Arm regions **150** attach to the shoulder regions **113**. The torso **110**, shoulders **113** and arms **150** may be connected together by stitching or monolithic creation of the composite material described below, but should have suitable channels for the device's utility functions also described

below. The arms **150** terminate in adjustable cuffs **151**; adjustability may be achieved by a Velcro strip and complementary patch which may be fastened about the wrist to any desired tightness. The torso **110**, shoulders **113** and arms **150** may be attached, for example at the back of the garment, to a pair of shorts **120**, the shorts being attached to a pair of knee regions **130**, which may employ the breathing holes **101** and elastic members **102** described above. The knee regions **130** may be attached to a pair of calf regions **130**, with the garment terminating at the wearer's ankles or, optionally, including a foot covering or stirrup.

[0022] A battery or plug-in power source **113** may be attached to the suit **110** at any convenient and unobtrusive location, such as the small of the back. Controls **152** for the functions described below may be placed at any easily reached location, such as the front upper arms. The material of the suit **100** may be divided into a plurality of cells, as shown in FIG. **3**. Cells may be heated **301** or cooled **302**. FIG. **4** shows an alternative embodiment in which heated regions **401** and cooled regions **402** are interspersed as stripes rather than cells. FIG. **5** shows a cross section of how the composite material of the suit **100** may be constructed. An outer insulating layer **500** blocks thermal and moisture transfer between the suit **100** and the environment. A vibrating or massaging layer **501** sits directly within the outer insulating layer. A layer of alternating heated cells **502** and cooled cells **503** sits within the massaging layer **501**. A moisture-absorbing and moderately insulating layer **504** sits within the alternating heated cells and in direct contact with the user's skin. The moisture absorbing layer **504** may be made removable for washing, for example with Velcro, snaps, hooks, or other fasteners. The moisture absorbing layer **501** may be placed in direct contact with the wearer's skin or an undergarment. Optionally, the wearer may cover his body with a thermally transmitting and moisture-retaining lotion or gel material.

[0023] To achieve electromechanical massage, the massaging layer **501** may contain many small electromechanical rotation or vibration devices, or may employ piezoelectrics, or other well-known technologies. The heated and cooled cells may employ electrochemical heating or cooling, or may thermoelectric devices, or may employ circulating warmed or cooled liquid from a central heating and/or refrigeration system, for example located within a compartment shared with the battery **113**. Electricity may be conducted through wires embedded in the material of the suit **100** and fluids may be circulated through flexible channels embedded in the material of the suit **100**. Control over the thermal components and massage components may be achieved electronically with appropriate circuits or microprocessor and appropriate software. Control inputs **152** would at least provide on/off functionality for heating, cooling, and massage, but may also permit selective heating, cooling, and massage of different body regions as well as timed heating, cooling, and massage of the entire body or different regions. Further, programs may be provided or user-entered to provided different patterns of heating, cooling, and massage to different body regions over time.

[0024] In addition to the full body suit **100**, individual limbs or body regions may be covered by accessories employing the same structure as the suite **100**. FIG. **6** shows an example of one such accessory. An accessory cover **600** is made of the composite material of FIG. **5**, and features a soft sewn-over edge **601** and a Velcro or other fastener having a tab **602**, for example carrying hook Velcro or male snap or the like which fastens to an attachment region **603** which is covered with loop Velcro, or female snaps or the like. FIG. **7** shows how the accessory of FIG. **6** may be affixed to a wearer's leg **700**. A device covering for the accessory may be affixed to the covering or external to it and, like the garment device casing **113** may contain a power source, heating and cooling system, and any necessary electronics.

[0025] While the foregoing written description of the invention enables one of ordinary skill to make and use what is presently considered to be the best mode thereof, those of ordinary skill in the art will understand and appreciate the existence of variations, combinations, and equivalents of the specific embodiment, method, and examples herein. The invention should, therefore, not be limited by the above described embodiment, method, and examples, but by all embodiments and methods within the scope and spirit of the invention.

I claim:

1. An athletic and workout recovery garment comprising:
(a) one or more garment regions composed of a material;
(b) said material further comprising an innermost moisture-absorbing layer, a heated and cooled layer, a massage layer, and an outermost insulating layer;
(c) said heated and cooled layer being affixed to the outer surface of said moisture-absorbing layer;
(d) said massaging layer being affixed to the outer surface of said heated and cooled layer;
(e) said outermost insulating layer being affixed to the outer surface of said massaging layer;
(f) said heated and cooled layer further comprising a network of interspersed heated and cooled regions;
(g) said massaging layer further comprising a network of electromechanical massage elements;
(h) a power source;
(i) said power source being affixed to said one or more garment regions;
(j) a centralized or distributed means for providing heat to said heated regions;
(k) a centralized or distributed means for providing cooling to said cooled regions;
(j) one or more control devices;
(j) said one or more control devices being in electronic communication with said means for providing heat to said heated regions, said means for providing cooling to said cooled regions, and said electromechanical massage elements; and
(k) said one or more control devices being affixed to the exterior of said one or more garment regions, whereby, a wearer may experience simultaneous heating, cooling, and massage.

2. The garment of claim **1** wherein:
(a) said one or more garment regions further comprise a full body garment;
(b) said full body garment comprising a pair of arm regions;
(c) a torso region;
(d) a shorts region;
(e) a pair of leg regions;
(f) said arm regions featuring hand openings at their lower ends;
(g) each of said arm regions featuring an elbow region about at its center;
(h) said arm regions being affixed to said torso region;
(i) said torso region featuring a pair of shoulder regions;

(j) said torso region featuring a neck opening;
(k) said torso region featuring a frontal opening extending from the wearer's waist to the wearer's neck;
(l) said frontal opening being affixed on each side to a separable garment fastening means for closing, opening, and reclosing said frontal opening;
(m) the back of said torso region being affixed to the back of said shorts region;
(n) said shorts region being affixed to said leg regions;
(o) each of said leg regions featuring an opening at its lower end;
(p) each of said leg regions featuring a knee region at about its center;
(r) said knee regions, said elbow regions, and said shoulder regions all featuring a plurality of fluid-permeable holes;
(s) said knee regions, said elbow regions, and said shoulder regions all featuring a plurality of longitudinally oriented elastic tension members affixed within the region or on one or more of the inner and outer surfaces; and

whereby, a wearer may experience simultaneous heating, cooling, and massage over his entire body.

3. The garment of claim **2** wherein each of said hand openings is circumscribed by a strap; said strap being affixed at its first end to the arm region; a means for removably attaching said strap to said arm opening being provided and affixed to the second end of said strap and to the outer surface of said arm region upon which said hand opening is located.

4. The garment of claim **2** wherein said power source, said means for providing heat to said heated regions, and said means for providing cooling to said cooled regions are located within a device casing located at the lower back of said torso region.

5. The garment of claim **2** wherein said heated and cooled layer is interspersed with heated regions and cooled regions in a pattern of about square regions extending around the entire garment.

6. The garment of claim **2** wherein said heated and cooled layer is interspersed with heated regions and cooled regions in a pattern of about linear regions extending around the entire garment.

7. The garment of claim **2** wherein said one or more control devices provide for selective or simultaneous heating, cooling, and massage of individual garment regions or of the entire garment.

8. The garment of claim **1** wherein said one or more garment regions comprises a region shaped to be affixed to a single body region.

9. The garment of claim **8** wherein said region shaped to be affixed to a single body region is elongated and affixed at both ends to complementary sides of a means for removably fastening one end of said region shaped to be affixed to a single body region to the other, whereby said region shaped to be affixed to a single body region may be removably fastened about a single body region or extremity.

10. The garment of claim **9** wherein said heated and cooled layer is interspersed with heated regions and cooled regions in a pattern of about square regions extending around the entire garment.

11. The garment of claim **9** wherein said heated and cooled layer is interspersed with heated regions and cooled regions in a pattern of about linear regions extending around the entire garment.

12. The garment of claim **9** wherein said one or more control devices provide for selective or simultaneous heating, cooling, and massage of individual garment regions or of the entire garment.

13. The garment of claim **1** wherein:
(a) said one or more garment regions further comprise a full body garment;
(b) said full body garment comprising a pair of arm regions;
(c) a torso region;
(d) a shorts region;
(e) a pair of leg regions;
(f) said arm regions featuring hand openings at their lower ends;
(g) each of said arm regions featuring an elbow region about at its center;
(h) said arm regions being affixed to said torso region;
(i) said torso region featuring a pair of shoulder regions;
(j) said torso region featuring a neck opening;
(k) said torso region featuring a frontal opening extending from the wearer's waist to the wearer's neck;
(l) said frontal opening being affixed on each side to a separable garment fastening means for closing, opening, and reclosing said frontal opening;
(m) the back of said torso region being affixed to the back of said shorts region;
(n) said shorts region being affixed to said leg regions;
(o) each of said leg regions featuring an opening at its lower end;
(p) each of said leg regions featuring a knee region at about its center;
(r) said knee regions, said elbow regions, and said shoulder regions all featuring a plurality of fluid-permeable holes;
(s) said knee regions, said elbow regions, and said shoulder regions all featuring a plurality of longitudinally oriented elastic tension members affixed within the region or on one or more of the inner and outer surfaces;
(t) each of said hand openings is circumscribed by a strap;
(u) said strap being affixed at its first end to the arm region;
(v) a means for removably attaching said strap to said arm opening;
(w) said means for removably attaching said strap to said arm opening being affixed to the second end of said strap and to the outer surface of said arm region upon which said hand opening is located;
(x) said power source, said means for providing heat to said heated regions, and said means for providing cooling to said cooled regions are located within a device casing located at the lower back of said torso region; and
(y) said one or more control devices provide for selective or simultaneous heating, cooling, and massage of individual garment regions or of the entire garment

whereby, a wearer may experience simultaneous heating, cooling, and massage over his entire body.

14. The garment of claim **13** wherein said heated and cooled layer is interspersed with heated regions and cooled regions in a pattern of about square regions extending around the entire garment.

15. The garment of claim **13** wherein said heated and cooled layer is interspersed with heated regions and cooled regions in a pattern of about linear regions extending around the entire garment.

16. The garment of claim **1** wherein said one or more garment regions comprises:

(a) a region shaped to be affixed to a single body region;

(b) said region shaped to be affixed to a single body region is elongated and affixed at both ends to complementary sides of a means for removably fastening one end of said region shaped to be affixed to a single body region to the other; and

(c) wherein said one or more control devices provide for selective or simultaneous heating, cooling, and massage of individual garment regions or of the entire garment.

17. The garment of claim **16** wherein said heated and cooled layer is interspersed with heated regions and cooled regions in a pattern of about square regions extending around the entire garment.

18. The garment of claim **16** wherein said heated and cooled layer is interspersed with heated regions and cooled regions in a pattern of about linear regions extending around the entire garment.

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