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(54) **WEBBED OPPOSABLE-THUMB MITTEN**

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(57) **ABSTRACT**

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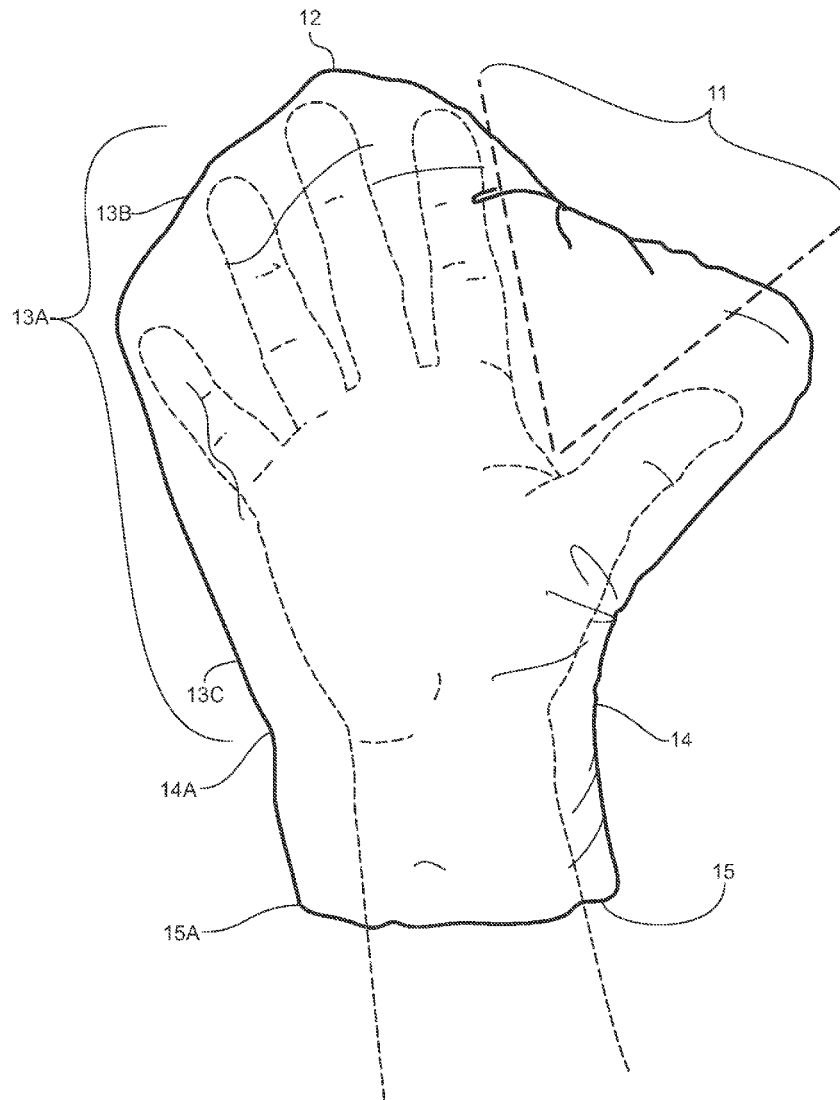
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A mitten that encapsulates the full hand, inclusive of the thumb, within a single and uninterrupted chamber that creates a microclimate shared by the entire hand and allows functional articulation of the opposable thumb. The body of the mitt has a thumb projection webbed in appearance that prevents isolation of the thumb from the remainder of the hand, which serves to enhance thermoregulation mechanisms while maximizing biomechanical function and prehensile capability both within and as transmitted through the body of the mitt.



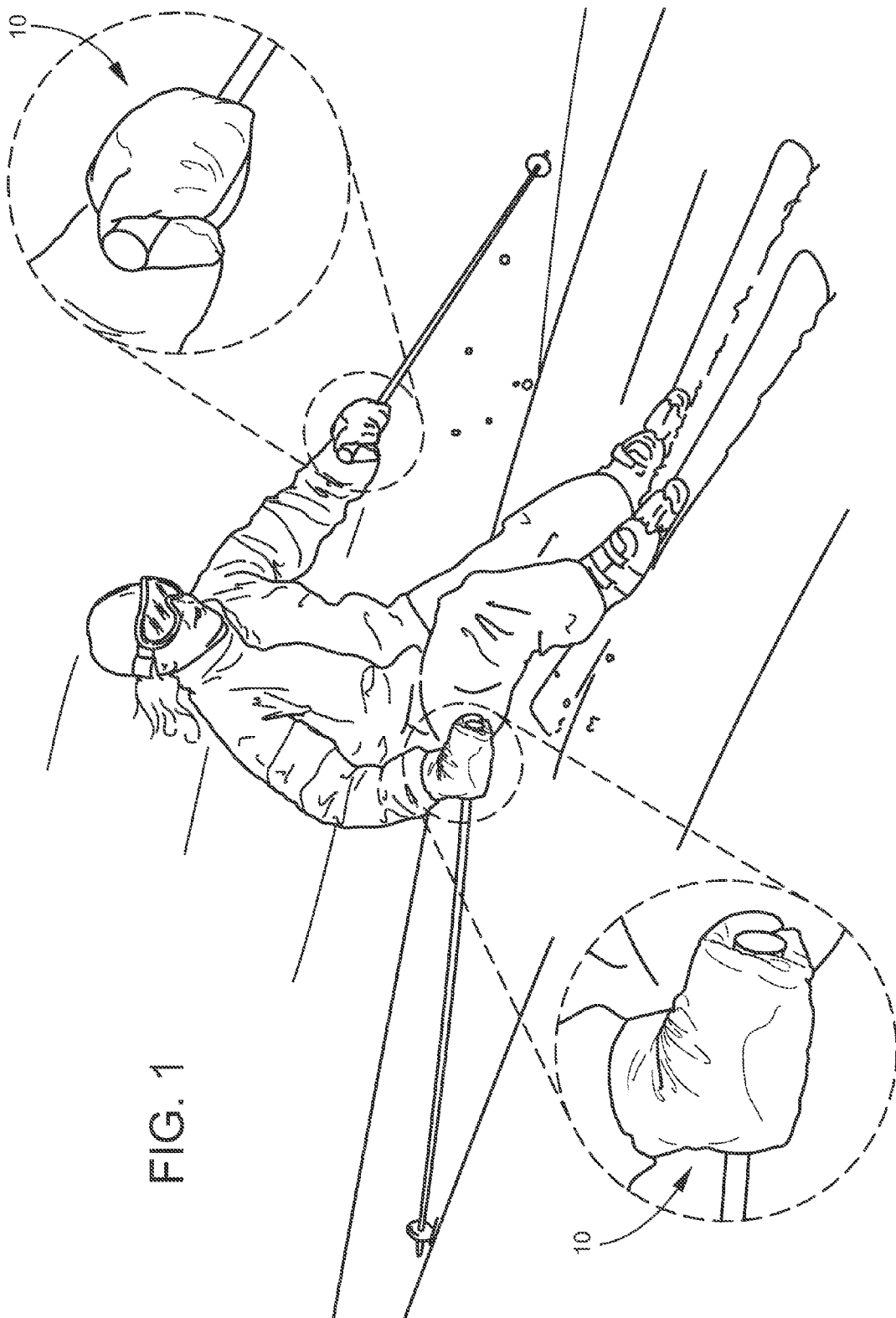


FIG. 1

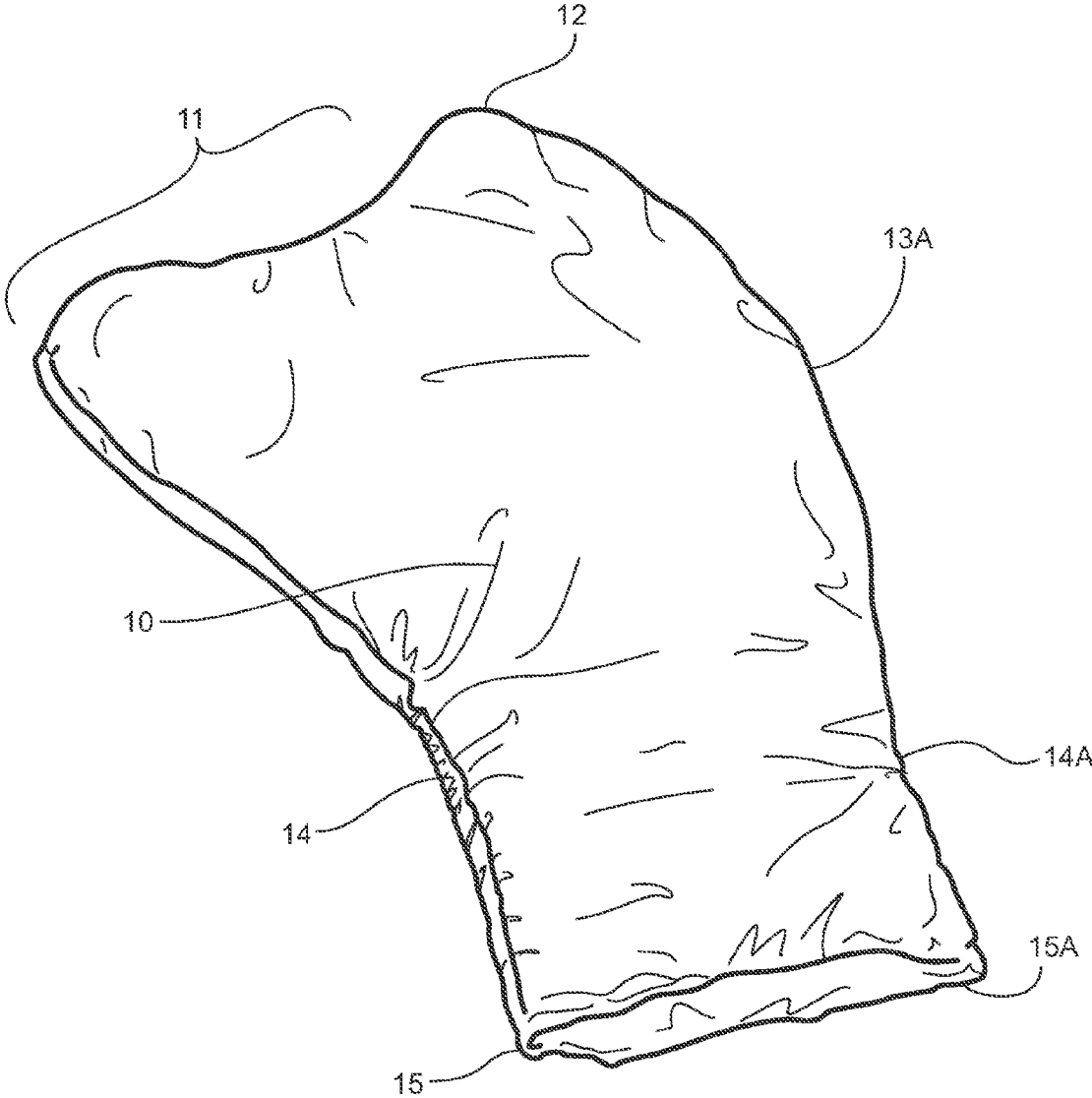


FIG. 2

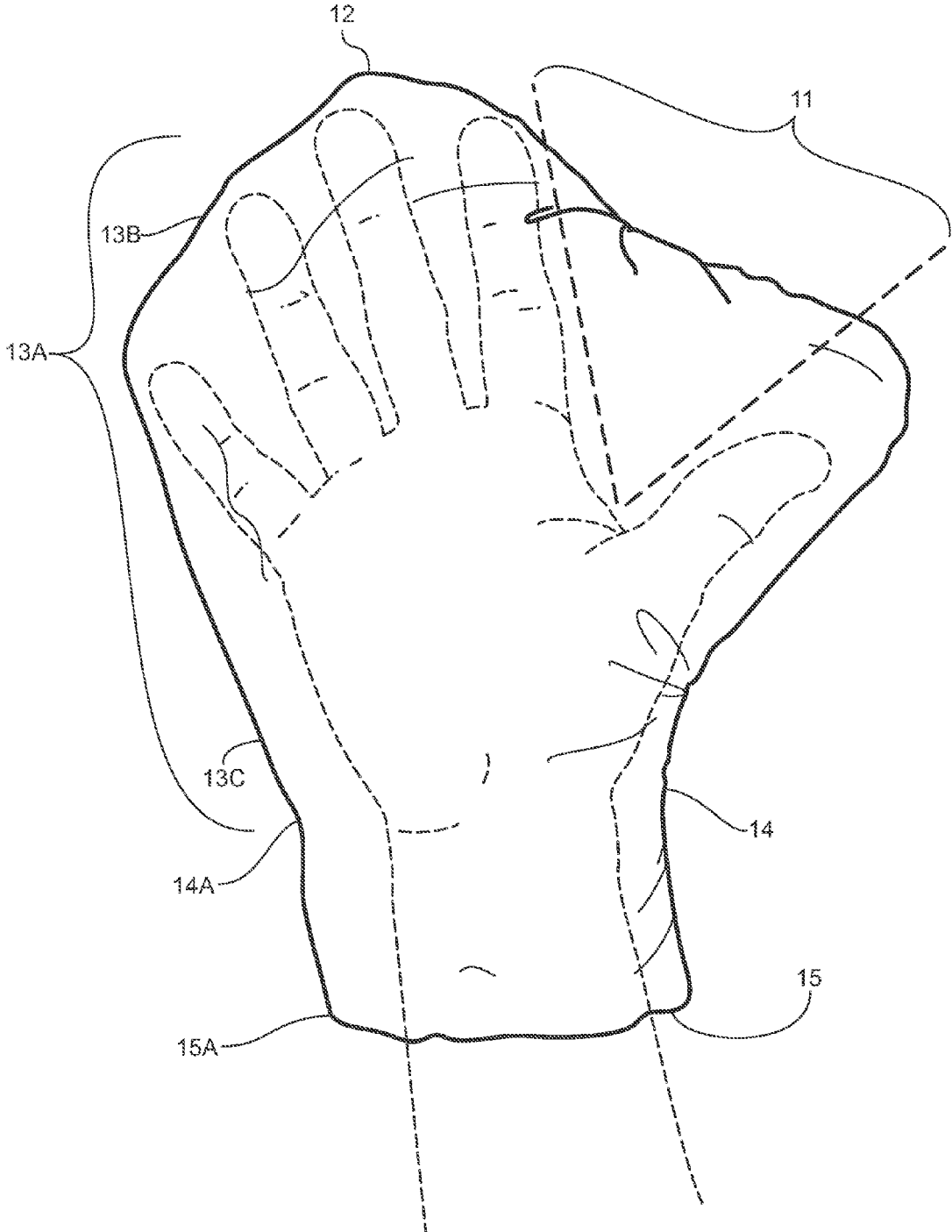


FIG. 3

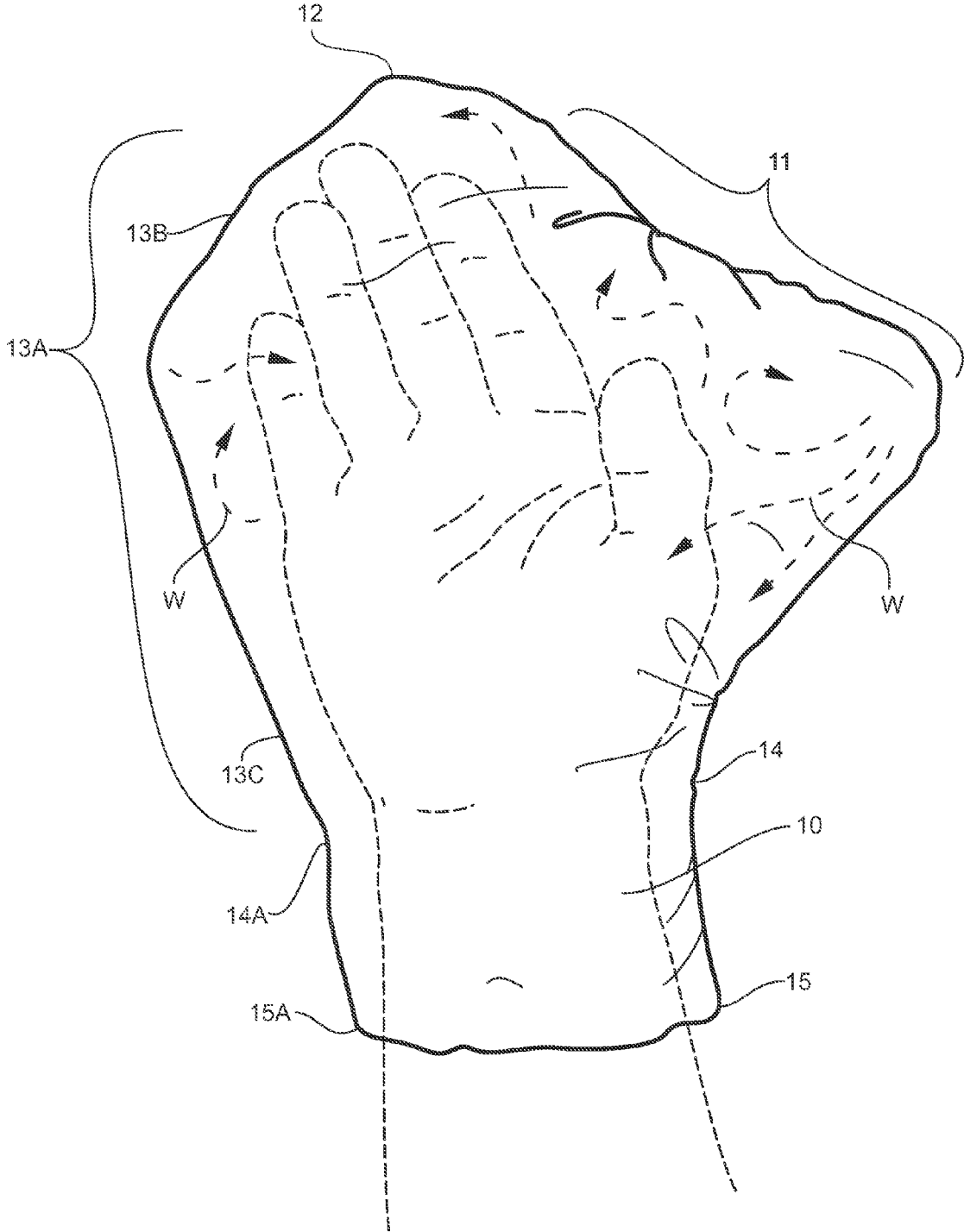


FIG. 4

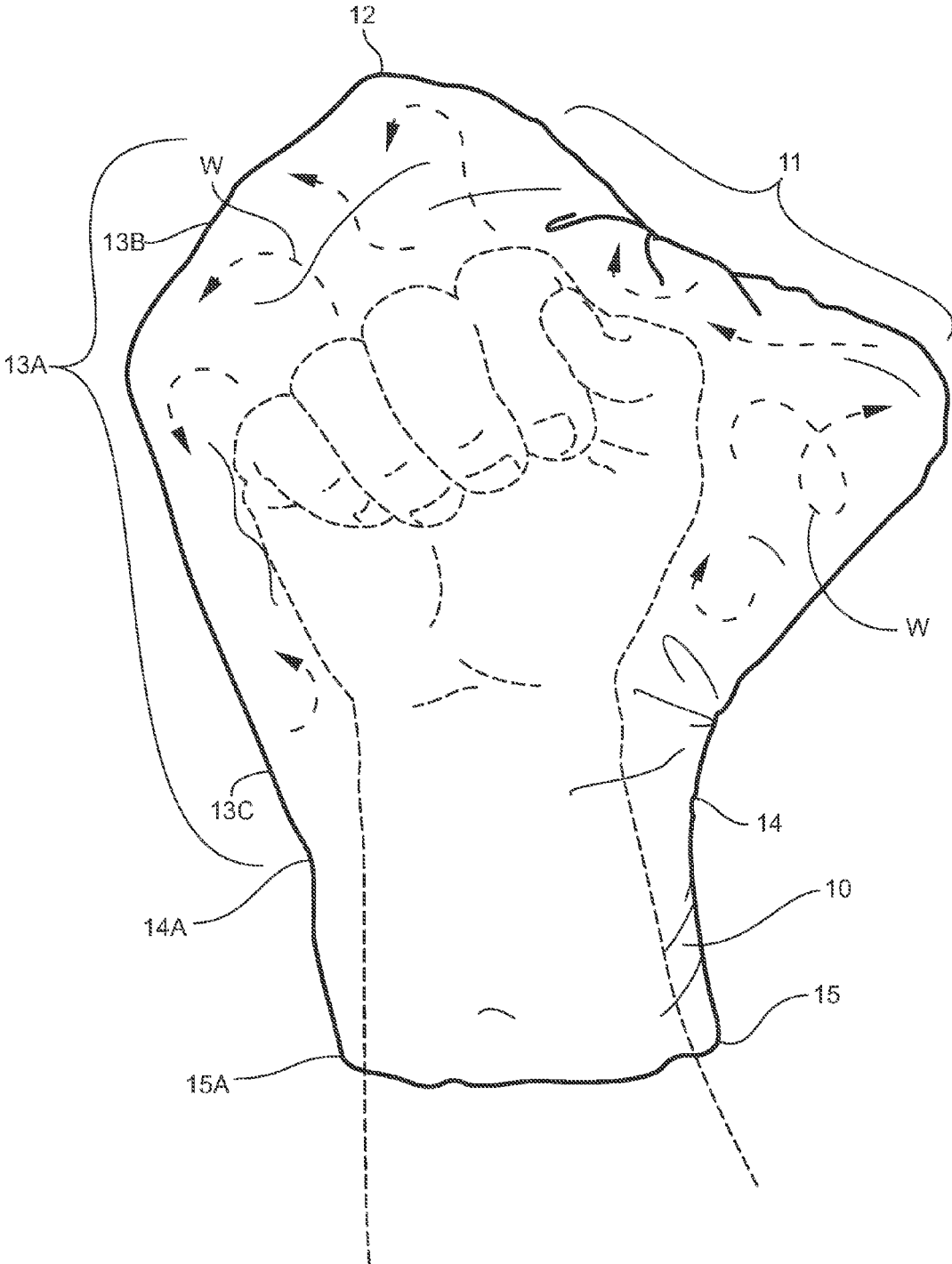


FIG. 5

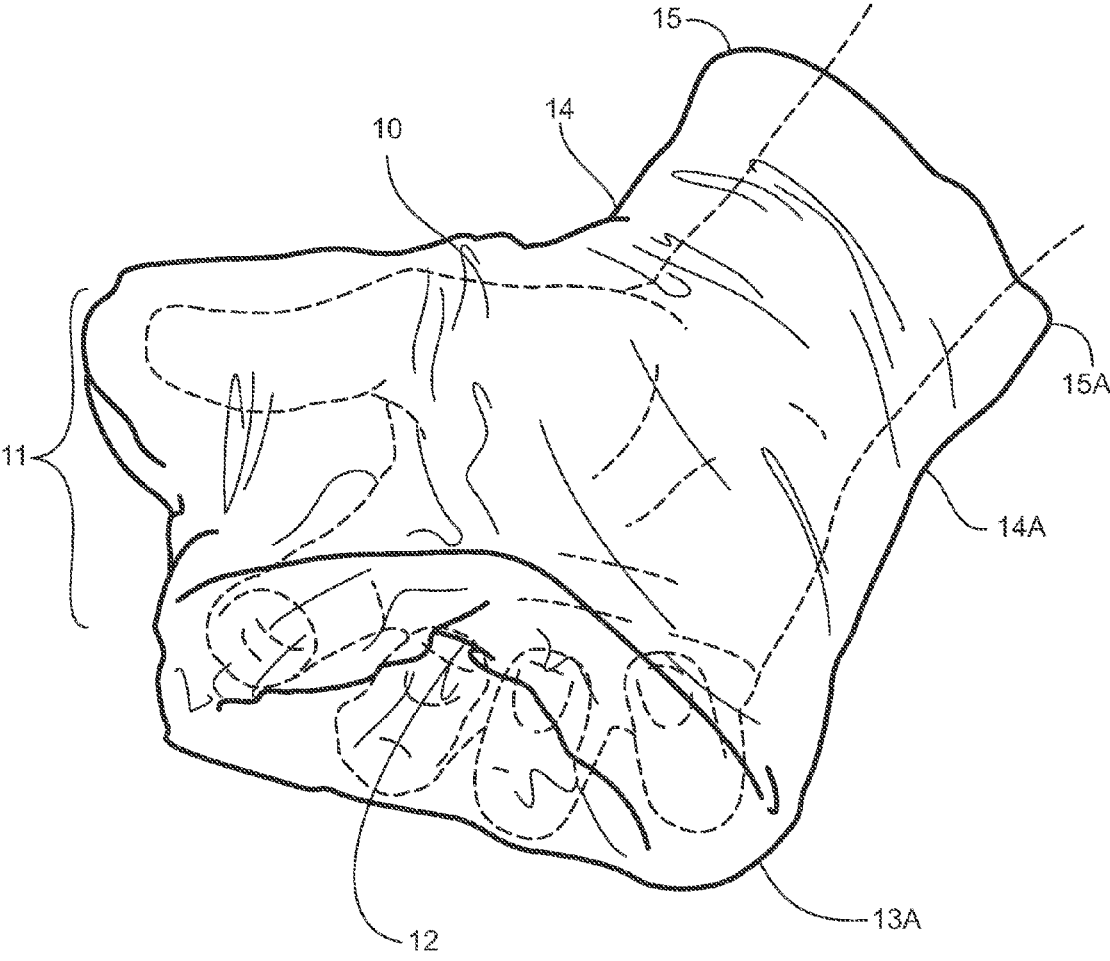


FIG. 6

WEBBED OPPOSABLE-THUMB MITTEN

[0001] This relates to the field of handwear, in particular design of said goods in a manner that maximizes realized end-function in hand protection from the elements while allowing relatively high levels of dexterity whether insulated or merely a shell. The volume of prior art serves to illustrate a high degree of perceived need for such handwear, yet despite the wide-ranging variability in said art none sufficiently or fully addresses the most basic and important aspects of elemental hand protection. In particular, prior art fails to consider the same basic thermoregulation mechanisms that lead those familiar with being outdoors in cold weather to choose mittens over gloves. Much prior art further fails to consider basic tenets of insulation or barrier protection in maximizing dead air space, creation of contiguous space, and minimizing potential for air flow.

BACKGROUND

[0002] Those who find it necessary or desirable to wear insulative or protective handwear in winter conditions typified by below-freezing temperatures know that while gloves can offer better dexterity, comparably-constructed mittens offer more warmth. The concept is relatively simple, in that each digit essentially provides its own warmth via circulation, and in the case of a glove one finger insulates one chamber. In contrast, four fingers insulate one chamber of a mitten. Although total handwear volume of a mitten might well be greater than a comparably-constructed glove, the mitten has less total individuated surface area and minimizes air movement between digits. Retaining use of the opposable thumb has presented challenges to those who design and use mittens, particularly in consideration of those circumstances requiring maximum grip if not dexterity. The only pragmatic option heretofore known was to maintain a separate chamber for the thumb that would allow use of the opposable thumb, although it negated the warmth benefit of a mitten realized by the other digits.

[0003] Prior art mitten variations are abundant with many trying to increase a user's potential for dexterity while maintaining the warmer overall construction of a mitten instead of a glove. These attempted solutions seem typified by varied construction of passages or doors via which one or all digits can protrude from the handwear without removal from the actual hand, such as found in U.S. Pat. No. 2,451,837 wherein a zipper across the palm allows the user to extend their fingers outside the mitten when dexterity is needed. Farrell's U.S. Pat. No. 2,609,543 shows a system of overlapping flaps that provide for extending digits outside the mitt, again segregating the thumb from the remainder of the hand. U.S. Pat. No. 2,315,889 by Wells shows a mitt that has a separate chamber for the thumb combined with a flap over the other digits that allows extension of all five digits from the mitt, which does not keep the digits insulated or otherwise protected, and which does not allow for full range of motion. The creation of holes in an item designed to minimize air flow and maximize dead air space is contradictory to the purported ultimate end-function. Further, while acknowledging the superior thermoregulatory benefits of a mitten the prior art ignores the fact that the thumb gains none of the benefits of the rest of the hand. Webbed handwear has focused on means of linking the digits of individual fingers as in a glove, typically for swimming, such as might be found in US Pat. 20050124237. Another

swimming mitt filed under U.S. Pat. No. 3,874,014 does not separate the fingers from one another, but does segregate the thumb with intermediary material. It seems that protecting four out of five digits was sufficient for prior designers, likely because it was deemed necessary to retain opposable-thumb action and no alternative methods were foreseen.

[0004] The perceived difficulty of allowing full thumb range of motion without restricting or in some way co-opting fingers seems to have been thought an insurmountable design problem, but the invention herein discussed does in fact provide a means to encapsulate the thumb with the other four digits while also allowing full use of the opposability of the thumb.

SUMMARY

[0005] Those who work or recreate in cold weather for extended periods have a distinct primary need to adequately insulate and protect their hands, while most will also have a strong need to retain grip and functions associated with the opposable thumb. Having realized that prior art does not offer any solutions that fully meet both of said needs led to development of the invention herein claimed.

[0006] The first step was to create an enclosure that did not separate the digits of a hand, but which also did not restrain the digits. If one were to envision a standard mitten, the first concept of the webbed opposable-thumb mitten was to add material between the forefinger and thumb such that said digits could touch each other or spread apart within the mitten. The new shape profile might be described as more webbed in appearance. Again in comparison to a standard mitten, the body of this invention was widened slightly at the distal reaches to allow for a wider spread of the fingers in its creation of a pinky digit pocket similar to that of the thumb. This expanded breadth of reach allows for more independent function of the digits, providing a means for enhancing tactility given appropriate choice of materials and construction. The webbed thumb tunnel concurrently allows for outstretch of the thumb which allows said thumb to articulate in opposition to the fingers of same hand.

[0007] While an abundance of slight alterations to shape and contour are possible, the crude form of the invention might be described as an outline of an outstretched hand. A line could be envisioned extending distally from the wrist and bending outward along the pinky finger, then traversing to the point of the middle finger and down to the far side of the thumb before making a proximal run along the thumb to the wrist. Alternate configurations could include changes to this rough outline that add concave or convex curvature. It is important to note that while this description is primarily two-dimensional and iterations could be constructed in a largely two-dimensional plane, the same profile and utility could for example easily be adapted to a three-dimensional shape with fully articulated and pre-shaped construction. So-called flat embodiments could be constructed to be fully ambidextrous or hand-specific.

[0008] Some embodiments will not be insulated and could function primarily as wind or water barriers. Though potential selection of natural or synthetic materials or any blend thereof is virtually unlimited, functional embodiments would require materials exhibiting characteristics favorable to allowing dexterous use. In other words a material that does not allow flex would also not allow articulated movement of the opposable thumb of the mitten. Possible embodi-

ments include attachment to the sleeve of a garment. Non-insulated embodiments could be useful for wind protection amongst other uses.

BRIEF DESCRIPTION OF THE DRAWINGS

- [0009] FIG. 1 shows an embodiment of the present invention in the context of one potential use;
- [0010] FIG. 2 shows the present invention in a palm-down position as worn on the right hand;
- [0011] FIG. 3 shows an outstretched hand within the body of the mitt from a right-hand palm-up position;
- [0012] FIG. 4 shows the circulation of shared warm air provided by the present invention in another palm-up position of the right hand, with the thumb contacting the hand;
- [0013] FIG. 5 shows the hand in a fist to illustrate completely natural use of hand and the even heat distribution provided by the present invention;
- [0014] FIG. 6 shows a partially closed hand within the mitt from a distal palm-up perspective.

DETAILED DESCRIPTION OF THE DRAWINGS

[0015] In reference to the drawings, which are not necessarily drawn to scale nor necessarily reflective of the full range of potential materials and construction, like numerals indicate like features throughout the series of figures, the following is noted:

- [0016] FIG. 1 shows an overview of the present invention in one of many potential ways it could be worn and used. The webbed mitts 10 allow for secure grip of a ski pole while allowing warm air from the rest of the hand to help keep the thumb warm. In such an embodiment, a skier riding a ski lift could fully extend, flex, and otherwise articulate their hands to maximize comfort. While some such embodiments could be insulated, others could be a single layer of insulated material so as to provide wind protection.
- [0017] FIG. 2 shows a single mitt 10 in a dorsal, palm-down view of the right hand. Broadly speaking, the perimeter of the mitt extends from the cuff 15 to the point of wrist constriction 14 before flaring outward so as to allow full reach of the thumb within the pocket or region of 11, then extending in a distal direction toward the tip of the hand 12, from where the body of the mitt begins back in a proximal direction toward 13A, and then flares slightly more medially toward points 14A & 15A as they reflect the opposing points of origin.
- [0018] FIG. 3 shows a fully-spread right hand in a palm-up position. The perimeter follows the same points of course as in FIG. 2, from 15 to 14 to 11; the span indicated by 11 shows the relationship of an outspread thumb and the primary webbed aspect of the present invention. As before the mitt extends from 11 to the most distal aspect 12 before returning in a proximal direction generally toward 13C. The simplest embodiment might round from 12 to 13B, and then take a relatively straight path to 13C. The preferred embodiment, however, adds a slightly webbed extension that allows greater extension or reach of the pinky finger and would include material extending from 13B to 13A before turning inward toward 13C. The extended material and volume created by following the general course of 13B to 13A to

13C provides greater grip and dexterity for the hand by allowing more dynamic interaction between the pinky and thumb.

[0019] FIG. 4 is the same perspective as FIG. 3 but shows the thumb immediately adjacent to and in contact with the body of the hand. The webbed region 11 provides a passageway of sorts that allows such unrestricted movement within the mitt, and furthermore allows Warm Air W from the whole hand to circulate and warm the entire mitt, not just the body of the mitt or just the thumb.

[0020] FIG. 5 shows the same perspective as FIG. 3 and FIG. 4 but shows the hand clenched in a fist to illustrate the full range of flexibility, natural movement and range of motion available to the hand within the webbed mitt. The hand can exercise such movement within but independently of the mitt 10, or establish dependent integrated movement of the mitt and hand by first slightly extending the hand to engage the periphery of the mitt before clenching. Warm Air W shows how design of the mitt 10, particularly in not isolating any part of the hand, maximizes shared retention and distribution of warmth for the whole hand.

[0021] FIG. 6 shows engagement of the mitt 10 by the hand to illustrate that the dexterity and range of motion provided by the present invention is not limited to the hand, itself, moving within an open area, but also readily allows for transference of hand movement, motion, and position through the body of the mitt.

1. (canceled)
2. A mitten with no individuated digits which wholly encapsulates a user's hand within a single uninterrupted compartment and intended to concurrently wear one per hand, comprising:
 - a. An assemblage of no less than one piece of woven or non-woven flexible material
 1. Said assemblage shaped to reflect and accommodate a user's outstretched hand while fully enshrouding said hand, thereby
 - a. Enabling heat production of the user's whole hand to warm the entire enclosure of said assemblage, and
 - b. Enabling free and uninterrupted biomechanical movement between the user's thumb and remainder of their hand while wearing said assemblage, maximizing natural articulation of the user's hand within said assemblage to enhance fine motor functions within and as transmitted through said assemblage
 2. Said assemblage free of divisions, seams, finger pockets or similar constructions of compartmentalization within or through the body of the mitten, thereby
 - a. Eliminating impingement of said constructions upon a user's digits to enable maximal capillary function and thermoregulation of a user's hand, and
 - b. Increasing ease of use by engaging the user's hand in a way that does not require any adjustment or re-adjustment of said hand within said assemblage, eliminating any steps that would require a user to insert, withdraw or reposition digits in compartments meant to separate said digits

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