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(54) PERFORMANCE ATHLETIC APPAREL

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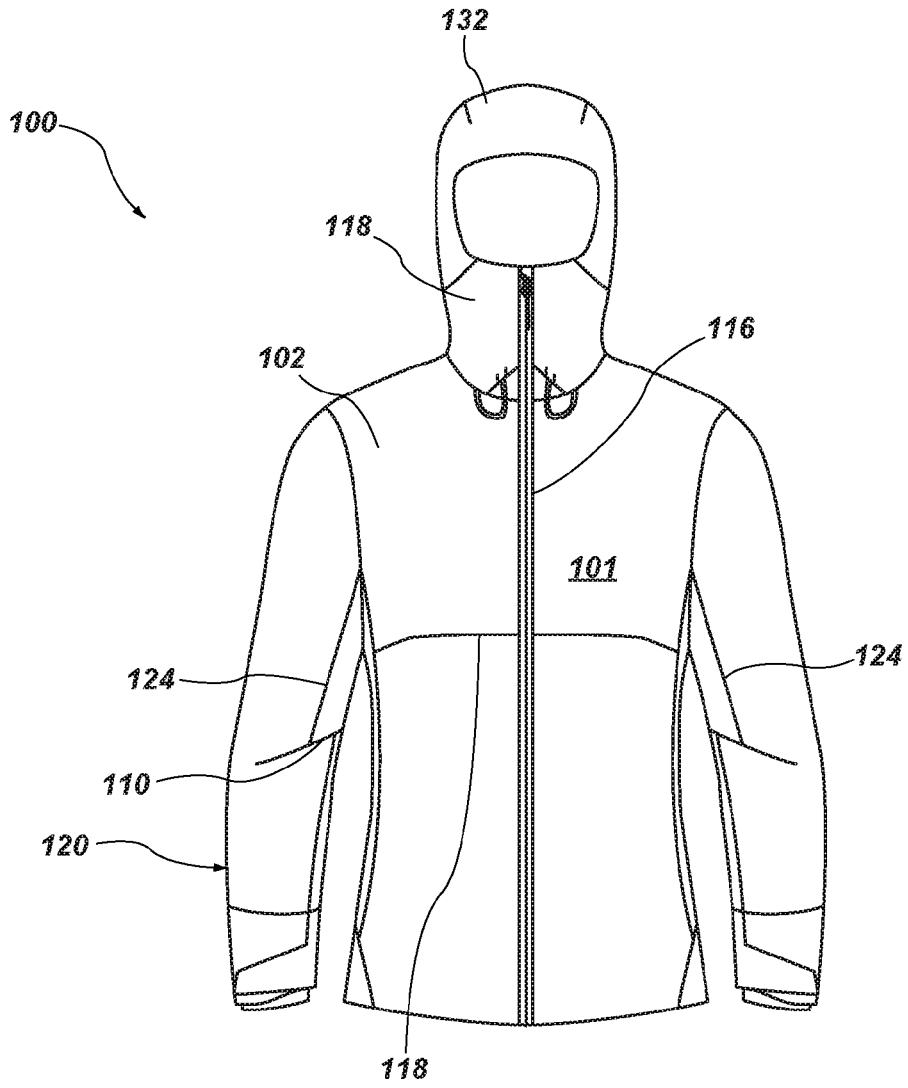
CPC ***A41D 3/005*** (2013.01); *A41D 2200/20* (2013.01); ***A41D 1/02*** (2013.01)

(57) **ABSTRACT**

Performance athletic apparel disclosed herein is designed to help athletes during customized movements and activities for their chosen sport. The disclosed apparel has a hood that is comfortable to wear, stays in place during wear, and minimizes weather exposure for the athlete. The hood further allows athletes to maintain a wide field of view. To accomplish these functions, the hood includes seams that flex along movement patterns specific to the selected sport that allow the hood to move with the athlete's head during movement and cinch cords that secure the hood in place on the athlete's head and prevent water entry, such as from wet weather conditions.



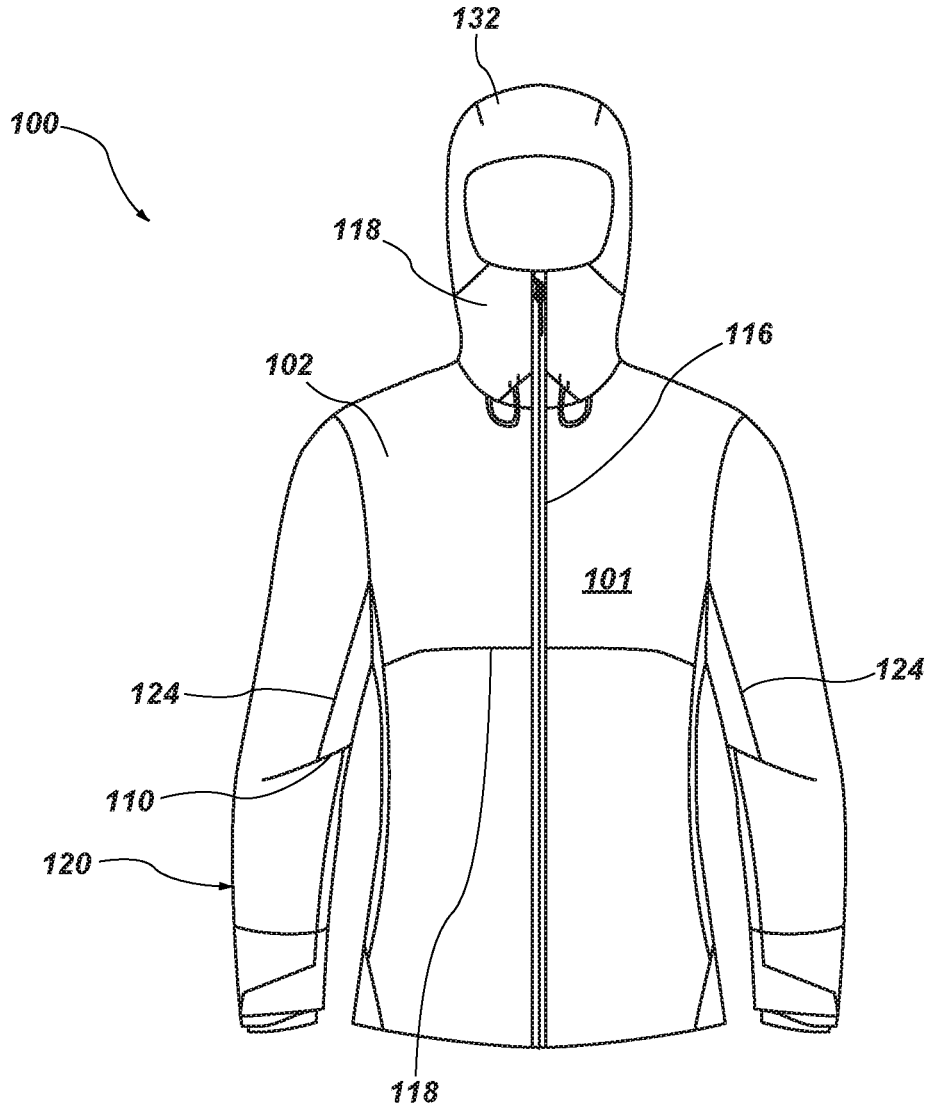


FIG. 1A

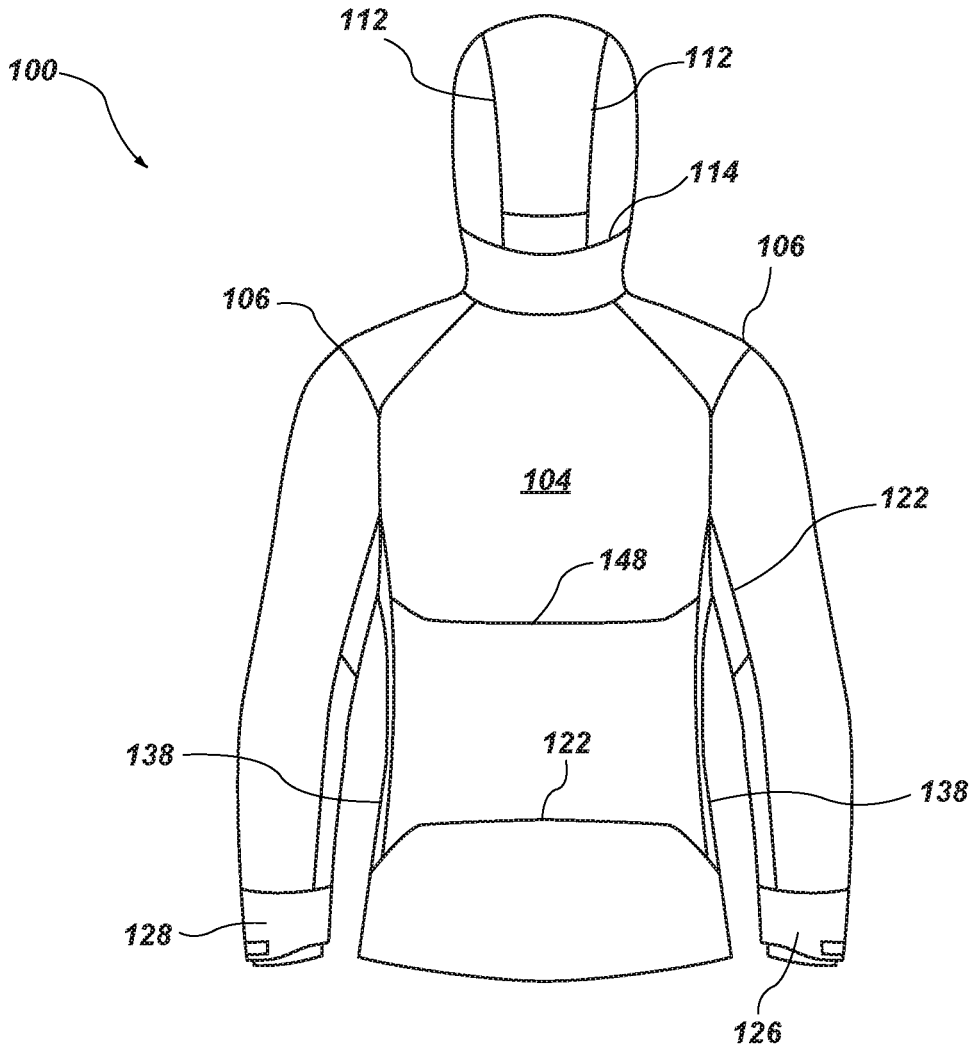


FIG. 1B

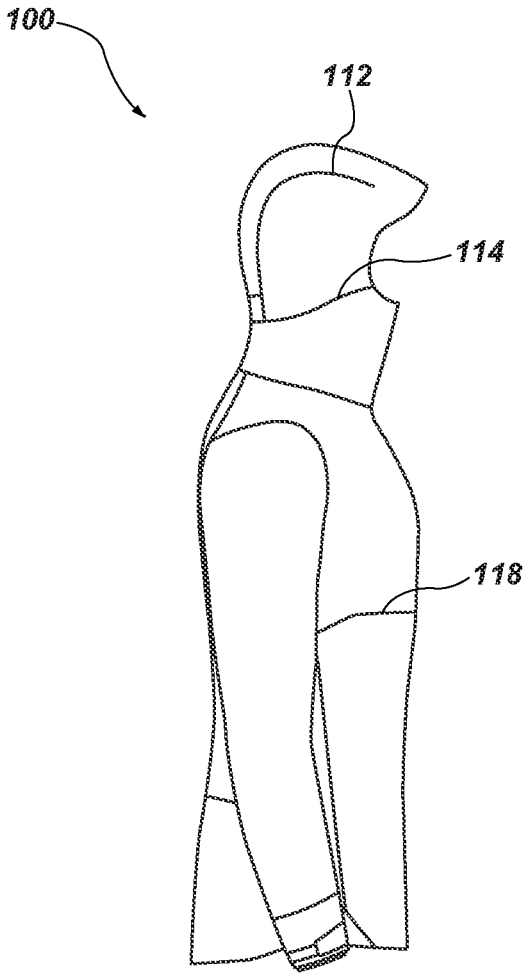


FIG. 1C

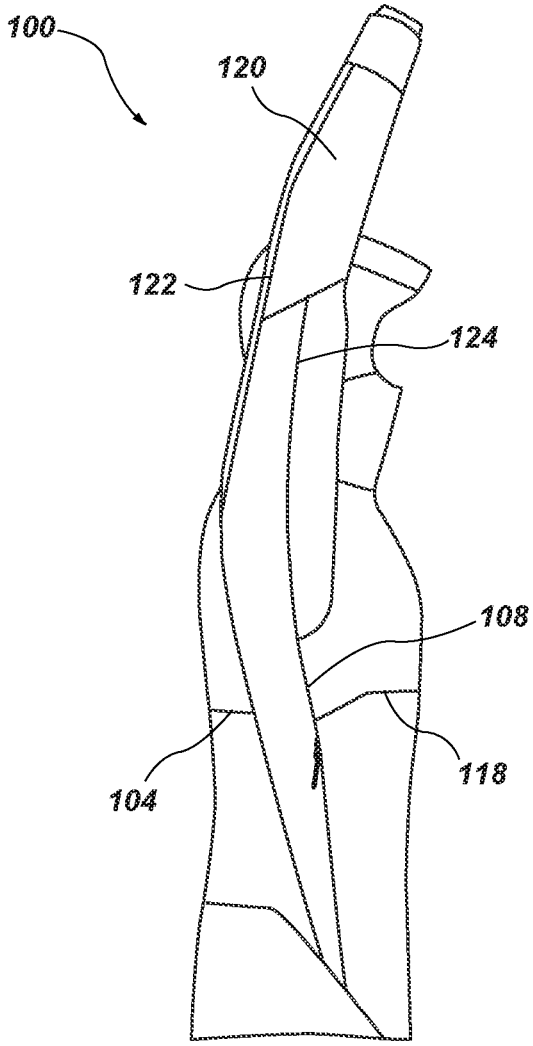


FIG. 1D

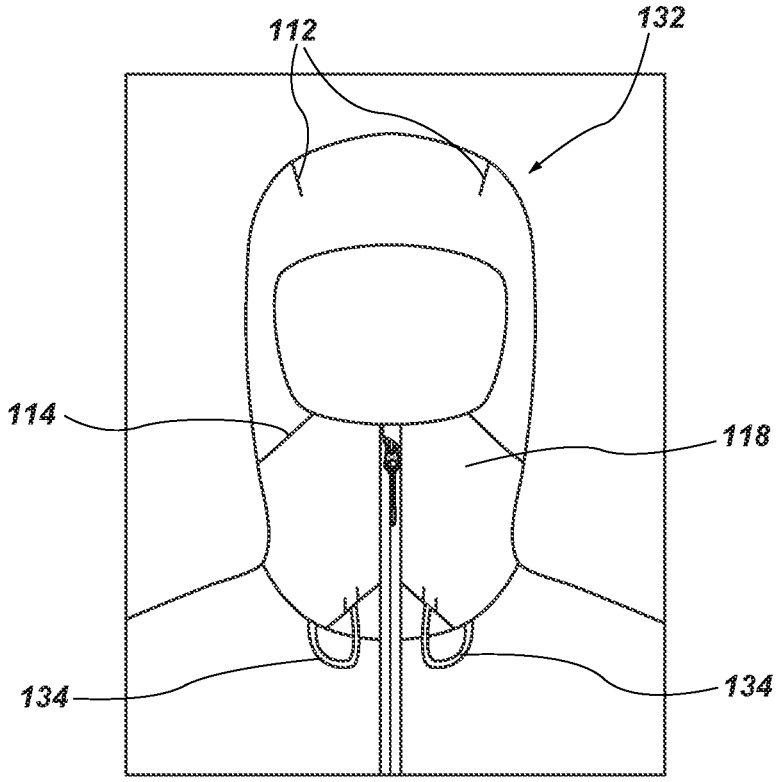


FIG. 2A

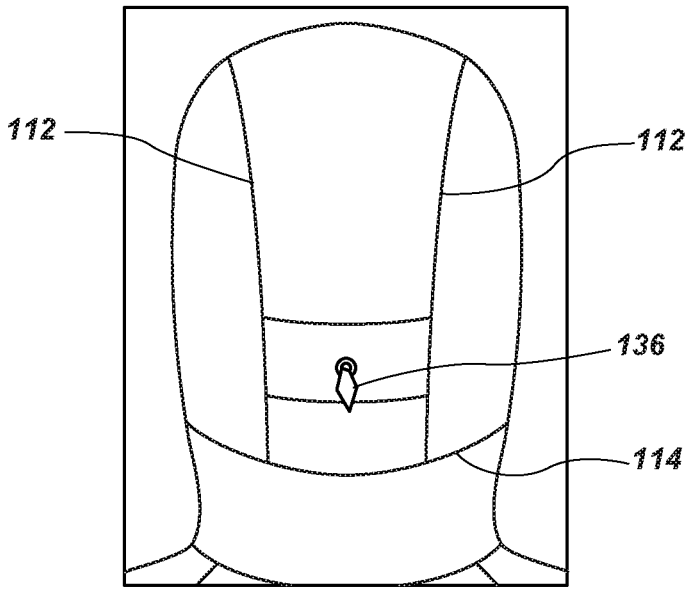


FIG. 2B

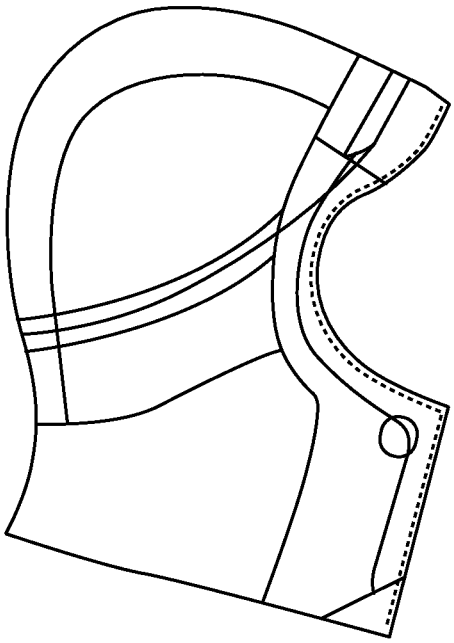


FIG. 2C

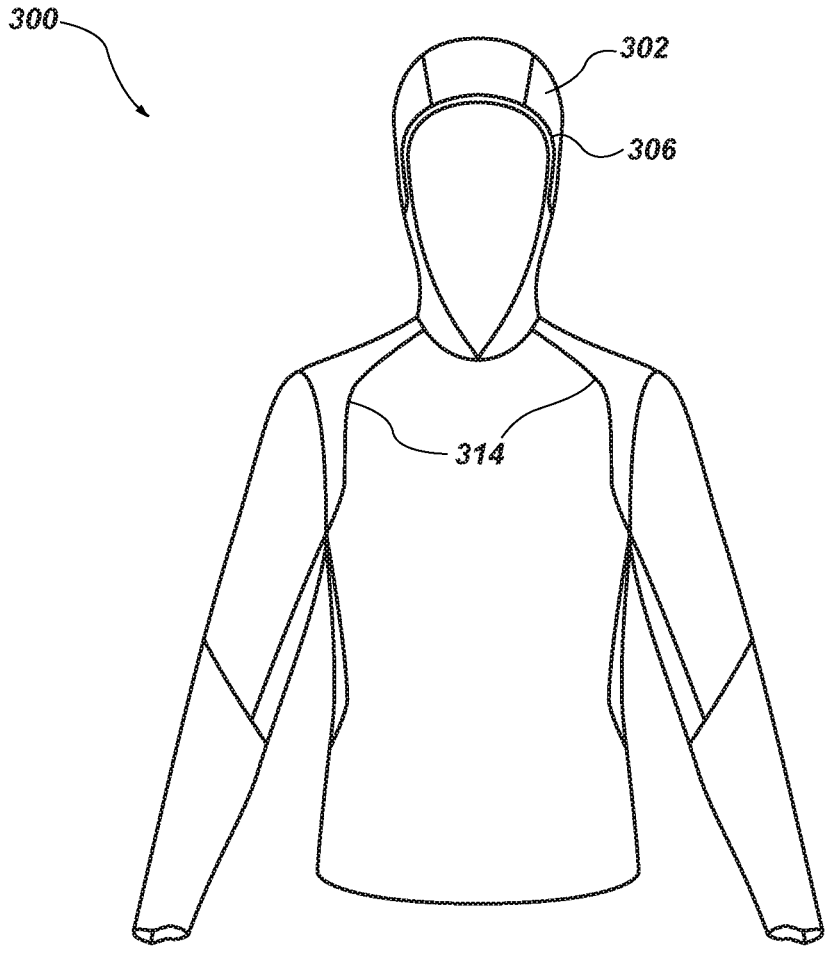


FIG. 3A

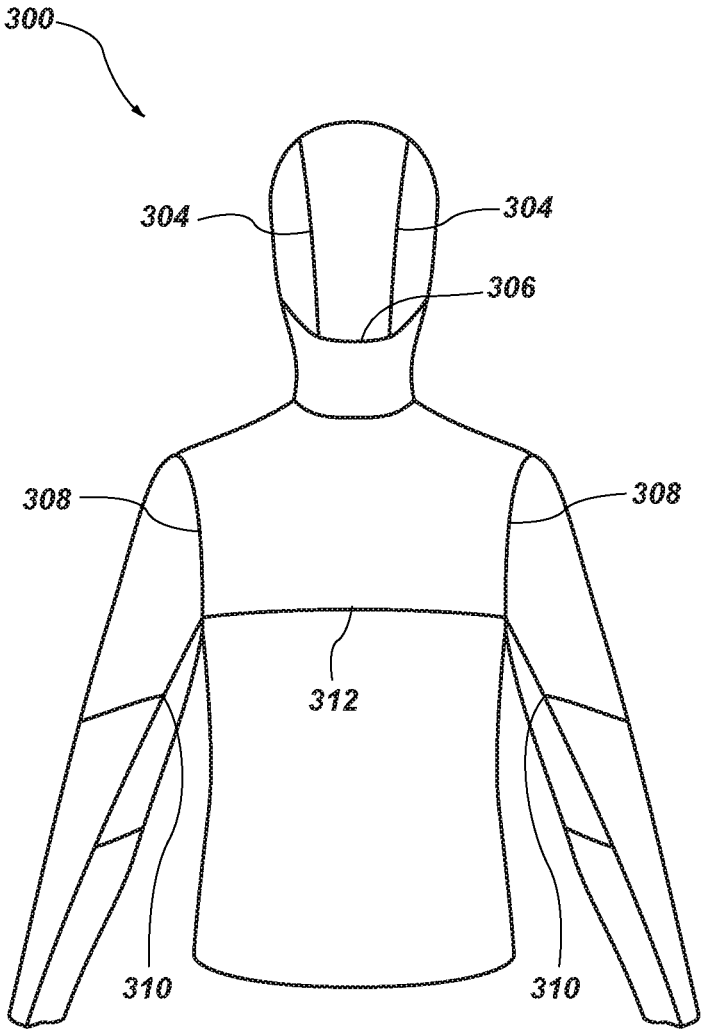


FIG. 3B

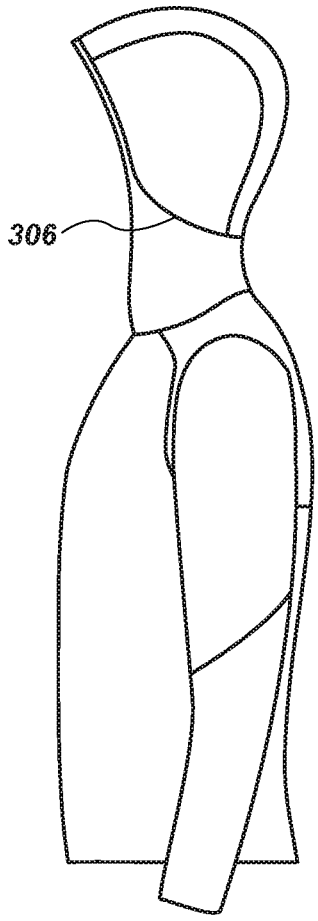


FIG. 3C

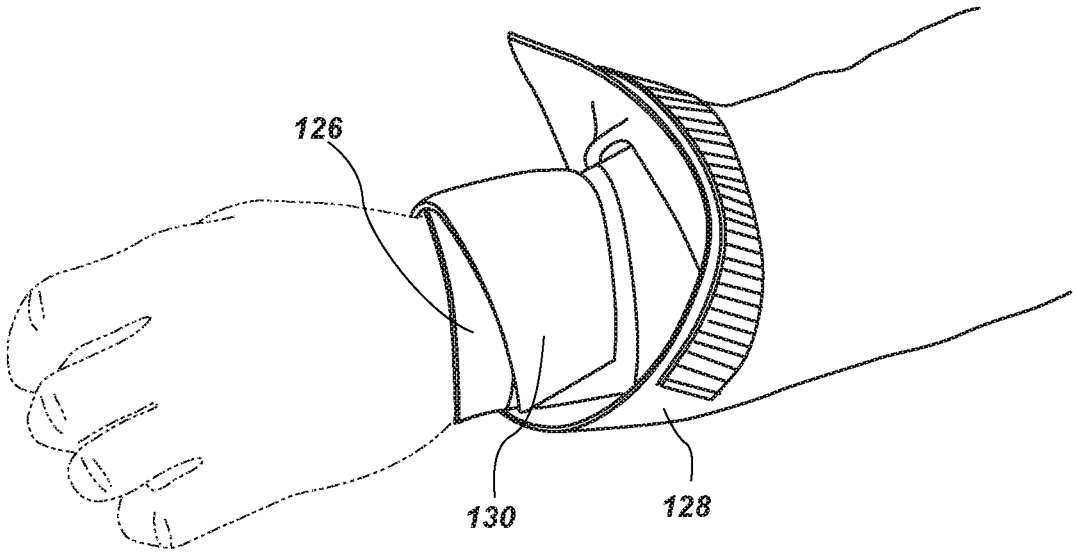


FIG. 4A

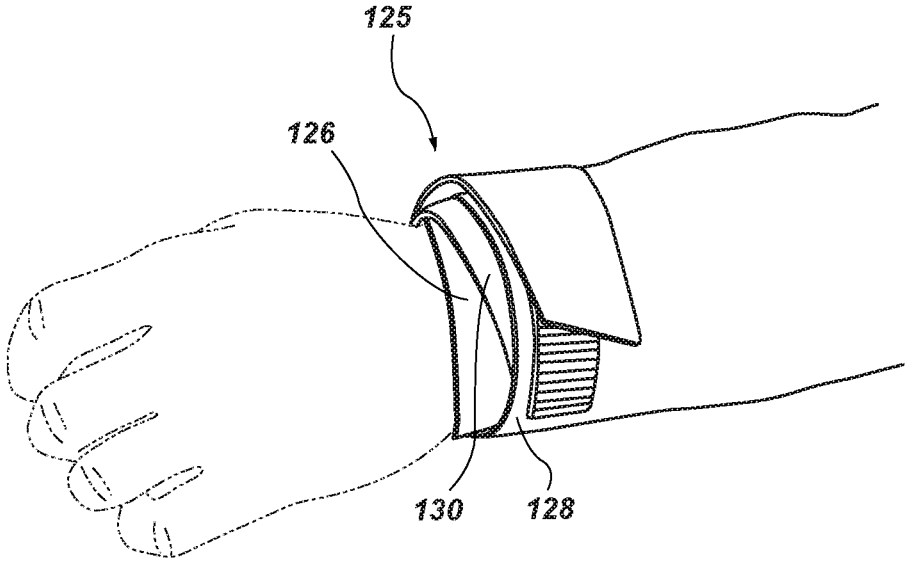


FIG. 4B

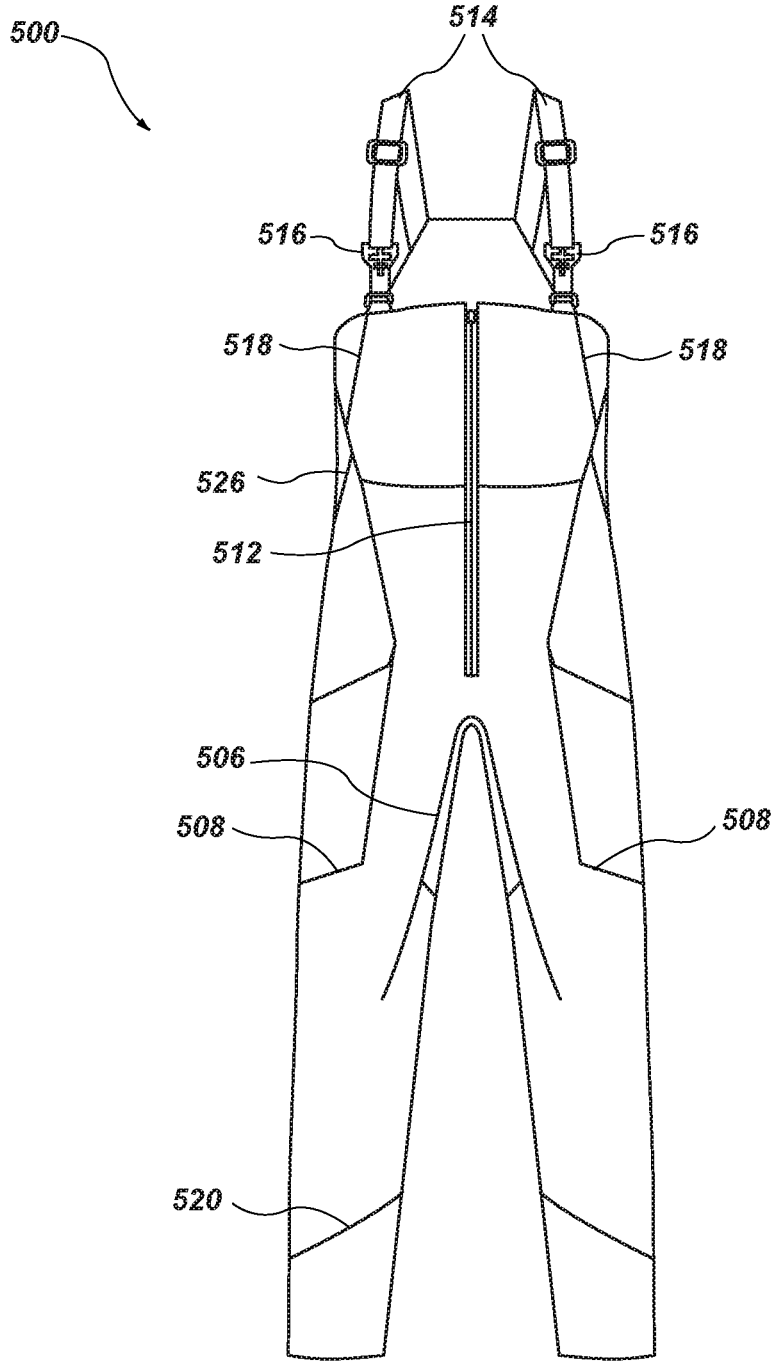


FIG. 5A

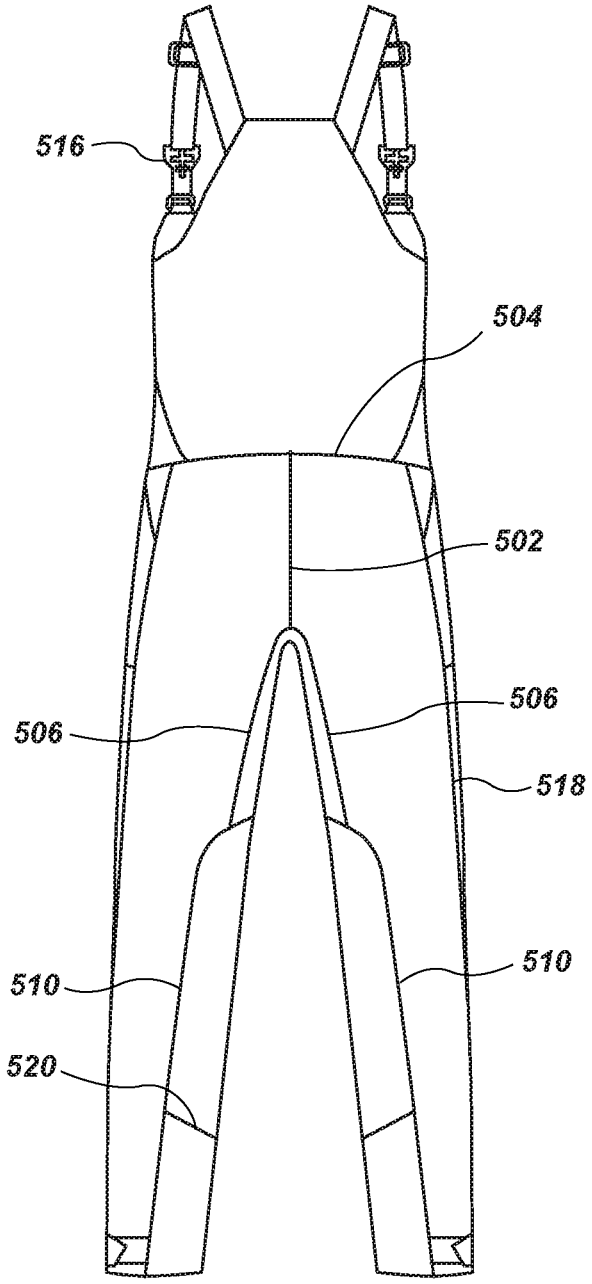


FIG. 5B

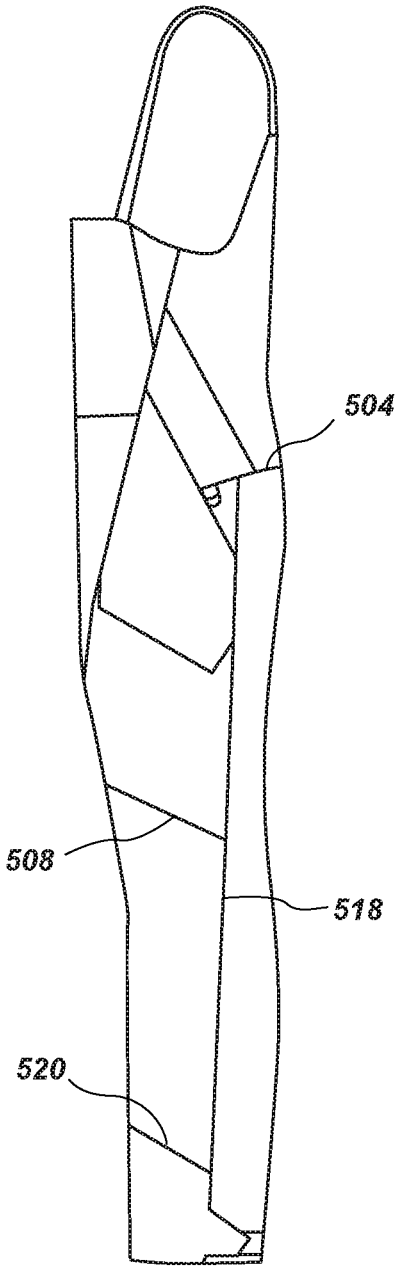


FIG. 5C

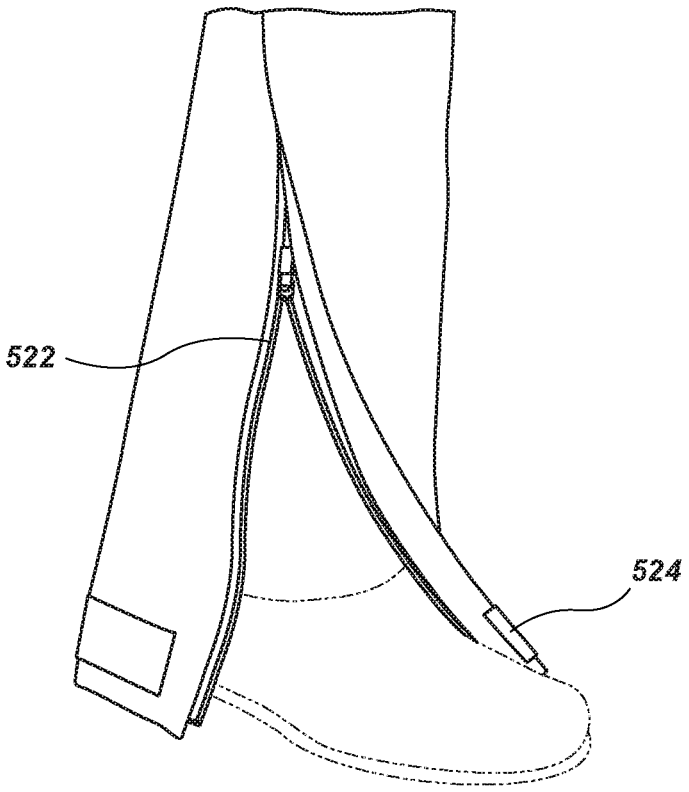


FIG. 6

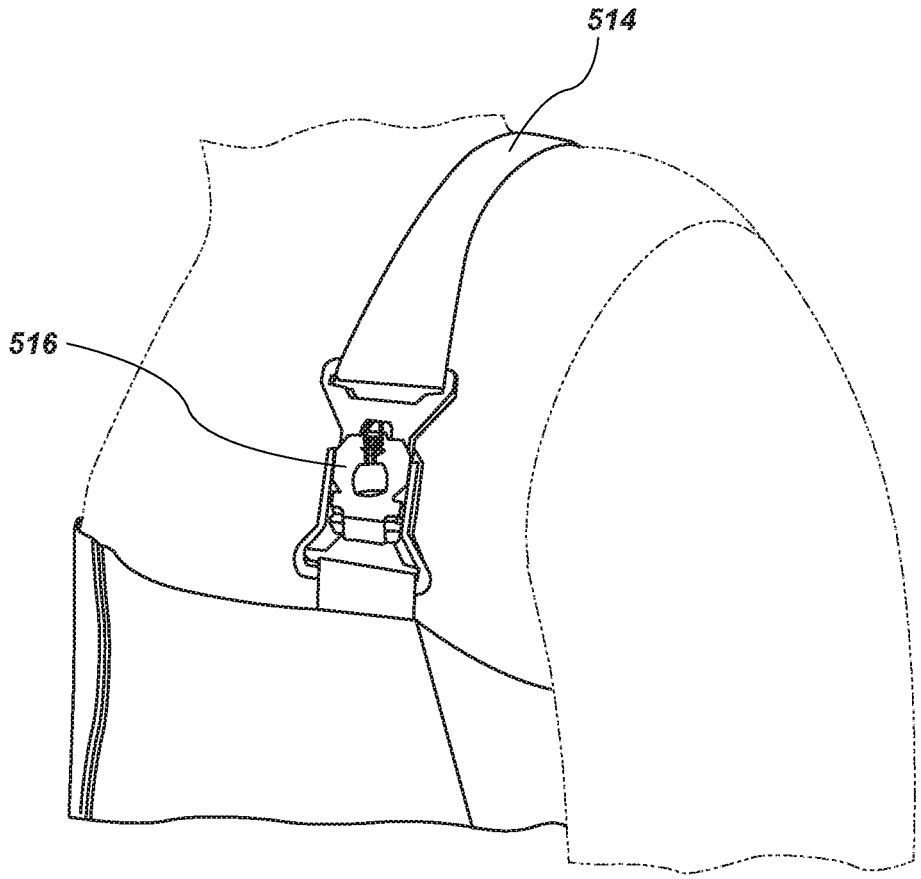


FIG. 7

PERFORMANCE ATHLETIC APPAREL

RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application Nos. 62/890,948, filed Aug. 23, 2019 and 62/890,942, filed Aug. 23, 2019, which are hereby incorporated by reference in their entirety.

BACKGROUND

[0002] Aside from natural talent, hard work, and perseverance, the equipment that athletes and enthusiasts use further allows them to achieve peak performance. Among such equipment is the apparel athletes wear. Athletic apparel provides athletes with numerous advantages. For example, athletes that compete in winter sports such as skiing and snowboarding may wear apparel made from materials such as Gore-Tex, which is a waterproof and breathable fabric. The waterproof feature of such a fabric prevents outside moisture from penetrating the fabric and helps keep the athlete warm and dry while the breathable feature allows for excess moisture and humidity from the athlete to escape from the fabric in order to keep the athlete comfortable. However, for some hybrid performance fabrics such as Gore-Tex °, there is a tradeoff between waterproofness and breathability to account for both needs of the athlete. Such fabrics cannot be fully waterproof and fully breathable at the same time. Instead, these fabrics try to balance waterproofness and breathability. For these fabrics, more waterproofness means less breathability and vice versa.

[0003] Further, performance athletic apparel is typically designed with the activity or sport in mind, which leads to selections on the fabrics based on overall athlete performance needs during the activity. However, oftentimes, conventional performance athletic apparel is designed by the cut or utility of its various features to allow the athlete to comfortably and adequately move with the apparel, especially in harsh weather conditions, such as rain and cold weather, when materials are required to protect the athlete from the elements. Specifically, anglers struggle to find performance apparel that accounts for the activities unique to their sport, such as driving a boat a high speed and handling fishing during catch, presentation, and release or capture. Water tends to soak into the anglers' jackets and other performance apparel at locations like the athlete's hood and at the cuffs of the arms.

[0004] The art could benefit from performance athletic apparel that is designed for the athlete's athletic activity of choice and provides protection against harsh weather conditions.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIGS. **1**A-**1**D illustrate various view of an example jacket according to aspects of the invention.

[0006] FIGS. **2**A-**2**C show an example hood for the jacket illustrated in FIGS. **1**A-**1**D.

[0007] FIGS. **3**A-**3**C show an example shirt with a hood according to aspects of the invention.

[0008] FIGS. **4**A and **4**B illustrate example pockets on the jacket shown in FIGS. **1**A-**1**D.

[0009] FIGS. **5**A-**5**C illustrate various views of example bibs according to aspects of the invention.

[0010] FIG. **6** shows a portion of a pant leg of the example bibs shown in FIGS. **5**A-**5**C.

[0011] FIG. **7** shows an example shoulder strap securing element of the bibs shown in FIGS. **5**A-**5**C.

DETAILED DESCRIPTION

[0012] Performance athletic apparel is disclosed herein that is customized to an athlete's activities and protects the athlete from harsh weather conditions, such as rain, moisture, and wind. Specifically, the example apparel described is customized to angling to allow anglers to move their heads freely while wearing a hood, stay dry or prevent moisture or fluids from entering vulnerable locations on the apparel, such as a hood, seams, pockets, zippers, and the like. Specifically, the disclosed apparel is designed to withstand high speeds that anglers face when traveling on a boat and to protect anglers during low speed activities like catching and handling their fish. The disclosure discusses various examples of apparel including a jacket, a shirt, and bibs, but the concepts disclosed herein can be extended to other types of apparel. Although this disclosure makes reference to athlete's wearing the described apparel, any athlete can also wear the disclosed apparel for any reason, whether or not the athlete considers himself or herself and athlete or is engaged in any particular sport.

[0013] Conventional hybrid performance materials have vulnerabilities. In the sport of fishing, the hoods for jackets, shirts, and coats pose several problems for anglers. When driving a fishing boat at high speeds, hoods are not secure and may be blown off the angler's head and may flap around in the wind. In addition to the hood fabric and components hitting the angler's face, such flapping is noisy and may obstruct the angler's vision.

[0014] Still further, hoods are not designed effectively to move in tandem with the head. The head rotates inside of the hood instead of the hood moving with the athlete's head motion. As a result, the vision of the athlete is compromised. Consequently, anglers need to turn their whole body instead if they wants to maintain proper vision. In the fishing industry, when driving a fishing boat at a high speed, anglers having to turn their heads to look left or right poses a danger because the anglers' vision straight ahead is then compromised.

[0015] Also, in rainy, cold, or marine conditions, hybrid performance materials such as Gore-Tex tend not to remain waterproof, especially at certain vulnerable areas in the apparel like a hood, at arm or leg cuffs, zippers, pockets, certain seam lines, and at other strategic areas on the apparel where water pools. Some particularly vulnerable areas along the seam lines include the cuff, zippers, sewn seam lines, and breathable areas (e.g., under the armpit). Some vulnerable areas on the apparel where water tends to pool include the top of the shoulders and the hood. Water is able to penetrate these areas and the fabric inside the apparel can start to "wet-out," which means it starts to hold water rather than repelling it from the surface. When apparel "wets-out" it become heavier and loses its ability to further wick water away from the athlete and allow air to escape. The heavier apparel can place extra weight on the athlete, which can make the athlete sore in certain areas, such as the back, knee, hip, and shoulder joints. When the apparel can no long wick water away from the athlete to allow air to escape, it is no longer breathable so water and moisture is trapped in a microclimate between the apparel and the athlete. Essentially, apparel that "wets-out" is simply is uncomfortable for anglers and make them cold.

[0016] Such vulnerabilities of these hybrid performance materials are more pronounced when they are used for sports such as fishing. As mentioned above, one of the main areas of vulnerability is the cuff. For example, when holding up a fish after it has been caught, water from rain and splashing may run down the athlete's arm. For another example, water passing from the fishing rod and reel to the hand enters under the cuff, causing mid-layer sleeves under the jacket to soak up and retain water. For yet another example, when driving the fishing boat at speed in the rain, wind forces water into any unprotected places, especially the hood because the athlete uses it during high speed travel in a boat and the cuffs because they are held up on the steering wheel.

[0017] Additionally, the pooling of water on a rain jacket, for example, may reduce the waterproofness of the rain jacket. Certain areas, such as the cuffs, zippers, seams lines, etc., are more susceptible to water pooling than others. For example, water may pool at the cuff and in areas where the cuff is vulnerable (e.g., buttons, Velcro flaps, zippers, etc.), water may leak into the inside of the rain jacket. For another example, water may pool along a zipper of the rain jacket and may leak through to the inside of the rain jacket through the gaps between the teeth of the zipper. For yet another example, water may pool at the seam lines of a rain jacket and if the material of the seam is not waterproof then water may leak through to the inside of the rain jacket through the seam line.

[0018] The present invention solves at least some of the problems mentioned above. The example performance athletic jacket described herein helps keep water out of the jacket and from pooling on the jacket, vents humidity from the athlete, and has a hood that does not interfere with the athlete's head and vision all while not impeding the range of motion of the athlete's arms. While a jacket and a shirt are used to describe the inventions herein, the same inventions could apply in other apparel, such as other designs of jackets and shirts, base layers, full-body suits, pants, and the like, and the ideas are not restricted in any way to a jacket or shirt embodiment alone.

[0019] FIGS. **1**A-**1**D show an example jacket **100** having a main body portion **101** and a hood **132** made from waterproof fabric with seam-taped construction. In one embodiment, the location of the seam lines and the patterning are chosen based on the range of motion for an angler, including, but not limited to casting, reaching into the water, catching and facilitating release of a fish, driving a boat, and the like. However, other embodiments are envisioned (e.g., game hunting, military, etc.) in which the location of seam lines and the patterning may be different and customized to that respective athlete's activities. Overall, the number of seam lines shown in the jacket **100** of FIGS. **1**A-**1**D are reduced compared to conventional rain or cold weather jackets. Reducing the number of seam lines decreases failure areas (e.g., ripping of fabric at the seams, water leaking into seams, etc.), extends the duration the athlete can wear the apparel in harsh weather conditions, and increases the range of motion for the athlete. Additionally, the seam lines are specifically moved away from areas where known motion of the athlete causes functional challenges (e.g., movement of the athlete's head when wearing the hood) and where water would pool on the jacket to maximize waterproofing by minimizing areas where water may leak into seams.

[0020] The jacket **100** is designed to mitigate restrictions on the range of motion for the athlete. This is achieved by minimizing seam lines and the strategic placement of the existing seam lines throughout the rain shell jacket. The front **102** of the jacket **100** has a shelf seam **104** shaped around the chest of the athlete. This is important so that the jacket **104** has flexibility to twist when the athlete turns his or her torso. Conventional rain jackets do not have a shelf seam at the athlete's chest and therefore minimally turn when the athlete turns his or her torso causing the athlete to experience resistance from the jacket, which forces the athlete to turn his or her legs or feet in order to achieve the desired range of motion. The shelf seam **104** shaped around the chest of the athlete allows the athlete a full range of vertical twisting motion without resistance for the torso so that the athlete does not have to turn his or her legs and feet.

[0021] The shoulders of the jacket have articulated back raglan hybrid seams **106** located on the back of the rain shell jacket below the top of the shoulder. Additionally, there are wrapping gussets **108** that run from the elbows and down the sides of the torso of the athlete. The placement of the articulated raglan hybrid seams **106** and the wrapping gussets **108** allows the athlete to lift his or her arms up, forward, and backwards without resistance from the rain shell jacket. Like the chest seam across the back of the jacket, these shoulder **106** and torso **108** seams allow the jacket to flex along those seam lines to accommodate the athlete's movement. On the other hand, when an athlete of a conventional rain jacket lifts his or her arms up, forward, and backward, the rain jacket exhibits resistance which makes the shoulders of the rain jacket bunch up and pull the sleeves up to expose the athlete's wrist and arms to the external environment and the bottom of the rain jacket lifts up to exposing the athlete's belly area to the external environment. Because the articulated raglan hybrid seams **106** and wrapping gussets **108** eliminate resistance of the jacket **100** when moving the arms up, forward, and backward, the wrists, arms, and torso of the athlete stay covered by the jacket **100** and are not exposed to the external environment. This is important for anglers since they work in wet environments and want to keep their clothing and skin underneath their jacket dry.

[0022] The elbows of the jacket **100** each have an inner elbow dart seam **110** that causes the rain shell jacket to hug the athlete's elbow and lower arm. As a result, when the athlete moves his or her lower arm, there is no resistance from the jacket and the sleeve does not move up or down at the athlete's wrist so none of the athlete's clothing or skin under the jacket is exposed to the external environment. However, the sleeves of conventional rain jackets exhibit resistance when the athlete moves his or her lower arm up or down causing the athlete's wrist to be exposed, which in turn exposes the athlete's clothing, and skin that is underneath the rain jacket to the external environment. Therefore, the inner elbow dart seams of the rain shell jacket are another feature of the rain shell jacket that keeps the athlete's clothing and skin dry and unexposed to the external environment.

[0023] The hood of the jacket has two shortened seams **112** that each run in parallel from the middle of the back of the neck to stopping short of the forehead. Additionally, there is a seam **114** that extends around the hood to wrap around the upper neck between each cheek of the athlete. The combination of these seams **112**, **114** flex with the athlete when she or he turns her or his head side to side and up and down to allow for a full range of motion (e.g., up, down, left, and right) of the athlete's head while inside the

hood of the rain shell jacket. Hoods of conventional rain jackets do not move with the athlete's head. Instead, the athlete's head moves inside the hood while the hood stays still, causing the athlete's peripheral vision to be cut off and forcing the athlete to turn his or her torso if he or she wants to look to either side. When driving boats, anglers need full use of their periphery vision. If they are forced to turn their whole torso to look to either side, the hood cuts them off from seeing what is directly in front of them, which is very dangerous, especially at high speeds. The rain shell jacket allows the athlete full use of their periphery vision while looking straight ahead or to the side since the hood follows the head when it moves.

[0024] Seam lines are the most common areas where rips and tears occur on clothing. The resistance caused by the movement of the head, torso, and arms in conventional rain jackets put added stress at the seam lines, thereby increasing the likelihood of ripping and tearing at these seam lines. By eliminating the resistance head, torso, and arm movements have on the rain shell jacket, rips and tears along the seam lines are greatly reduced.

[0025] The front of the rain shell jacket has a zippered entry **116** that includes a TIZIP MasterSeal 6 zipper that has a 3 PSI pressure rating and is well above waterproofing standards.

[0026] The zipper is heavy duty with widened seam tap for full security. The zipper is made of a durable, polyurethane-coated tape and the durable plastic teeth of the zipper are attached to the tape. The waterproof and pressure-resistant properties of the zipper are achieved by using a sealing lip at the point of interlocking. The zipper extends from the bottom of the rain shell jacket up to the top of the hood's facemask **118**. A face opening is a void in the hood that extends around the athlete's face when the jacket or other article of apparel is worn by the athlete. The interior of the zipper has a storm flap that creates a barrier between the face and the zipper pull. Additionally, the front **102** of the jacket **100** has a shelf seam **118** around the chest that provides the athlete wearing the jacket **100** with a snug fit and additional flexibility around the torso for the jacket to move with the typical movement of the athlete.

[0027] The sleeves **120** of the jacket **100** are shorter than other conventional rain jacket sleeves by approximately one inch although this range could be more or less depending on the activity of the athlete, the size of the athlete, and other design factors. Shorter sleeves avoid sleeve material bunching at the wrist during certain key movements like when the athlete reaches downwards over an object, such as the athlete reaching over the side of a boat to bring in a fish or grab a net, for example.

[0028] Strategic patterning and placement of seam lines in the arm sleeves **120** of the jacket **100** are based on body movement data collected through analysis of specific fishing movements in the examples shown in FIGS. **1**A-**1**D. Additionally, the strategic patterning and placement of the seam lines prevent the sleeve from riding up the arm during any of the angler's motions (e.g., casting motion, reeling motion, reaching motion, steering motion, etc.). For example, as described above, an inner elbow dart seam **110** wraps around the elbow, a back elbow seam **122** builds back the arm shape, and a wrapping gusset **124** allows free movement of the arm. The combination of these seams **110**, **122**, **124** prevents the sleeve from riding up the arm when the arm is extended away from the body.

[0029] Each arm sleeve **120** of the jacket **100** ends in a double-layered cuff **125** consisting of an interior cuff **126** and exterior cuff **128** that is shown in FIGS. **4**A and **4**B. The exterior cuff **128** is made from fabric and can flip up to expose the interior cuff and has hook and loop fastener flap **130** for adjusting the size and tightness of the cuff. The interior cuff **126** is made from a soft material, such as neoprene, with fabric on the face and rubber on the back. It is designed to have a slim profile so that it hugs the wrist, does not flap around in the wind or during movement of the arm, and does not allow water to leak underneath it. It also includes a 2 cm waterproof ripstop to prevent ripping of the inner cuff **126**. In this example, the ripstop is nylon, but it could alternatively be cotton and polyester if desired.

[0030] A ripstop is a woven fabric that uses a special reinforcing woven structure that makes it resistant to abrasion and tearing. During weaving, reinforcement threads are interwoven at regular intervals in a crosshatch pattern to create the ripstop. The intervals are typically 3 to 8 millimeters. Most conventional rain jackets do not have ripstops and are vulnerable to tears and holes created by tension. The ripstop for the jacket described in the present disclosure is accomplished by sandwiching the self-flap in the seam of the ripstop and then using seam tape on the inside of the seam. The corner of the tape is then pushed down out of the junction of the seam. The interior cuff **126** extends further than the exterior cuff **128** and has a neoprene closure for a complete waterproof seal even when submerged in water. Conventional rain jackets have cuffs that do not use the same neoprene and are not tight enough to achieve the waterproof seal as the jacket **100** described in the present disclosure.

[0031] The hood **132** for the example jacket **100** is designed to prevent interference to the athlete's head and vision. The hood **132** is a low profile, ergonomic hood that has the ability to stabilize and prevent water intrusion at 75 MPH speeds. The fabric hood **132** has been uniquely cut in a way that allows for full peripheral vision while covering more of the face to prevent water from intruding. It is cut so that the entire head of a range of select sized athletes (e.g., a range of average known athletes of a particular clothing size) is covered except for the area around the nose and eyes not being covered by the hood. Instead of the head moving inside of the hood while the hood stays stationary, which is the case for conventional hoods, the hood **132** of the jacket **100** described in the present disclosure is designed to move with the head. This is accomplished by creating a tight fit for the hood **132** by having seams **112**, **114** wrapping around the neck of the hood **132** to flex when the athletes twist their heads and use shock cords **134**, **136** that go around the face and head of the athlete when wearing the hood. By adjusting the shock cords **134**, **136**, the athlete is able to achieve the tight fit of the hood **132** that flex in the typical rotational movements in a horizontal and vertical plane.

[0032] The front of the hood **132** has a facemask **118** that is raised for improved water protection and wind resistance. Conventional hoods on rain jackets either do not have a facemask portion or they have a small facemask that only covers the athlete's chin. The jacket **100** described in the present disclosure covers the athlete's face all the way up to the nose so that the athlete's mouth and lips are covered by the facemask **118**. There are adjustable shock cords **134** that go around the front of the top of the head down to each side of the chin within 0.5 inch shock cord tunnels. The shock cord exits to the exterior of the jacket through a bartacked

channel at the bottom of each side of the chin. At each exit point, the shock cord goes through a plastic stabilizer so that the athlete can quickly and efficiently adjust the tightness of the hood around the face. The top of the hood above the forehead has a plastic brim stabilizer that accommodates a hat if the athlete choses to wear a hat when also wearing the hood. The stabilizer also keeps the front edge of the hood from blocking the athlete's eyes and holds the front edge of the hood out in front of the athlete's face in order to give some covered protection from rain to the athlete.

[0033] The back of the hood **132** has an adjustable shock cord **136** goes through 40 mm bonded channels from the front of the top of the head around to the back of the head where the head and neck meet. The shock cord **136** exits in the middle of the back of the hood **132**. The shock cord **136** goes through a plastic stabilizer at the exit point so that the athlete can quickly and efficiently adjust the tightness of the hood **132** around the athlete's head. There is a bonded overlap to cover the exit point of the shock cord **136** so water is prevented from entering the exit point.

[0034] The jacket **100** has enlarged pockets **138** on each side at the hips of the athlete. These pockets **138** are patterned to have an overlap to protect the zipper from rain. The pockets **138** are also angled to help reduce the likelihood that water will pool near the pockets **138**. Enlarged pockets **138** reduce the number of seams and possible failure points and also give the athlete room to store objects, such as gear and tools. Each enlarged pocket **138** has a waterproof zipper **140** with a laminated overlap for directional waterproofing, as shown in FIGS. **4**A and **4**B. The zipper **140** is offset from the fold line of the pocket flap. One side of the zipper **140** has an extended piece of fabric that folds inside the zipper when the zipper is closed. When the zipper is closed, a flap folds over the zipper. The inside **142** of the enlarged pockets are lined with microfiber or other material for insulation to retain heat so an athlete can warm his or her hands while the hands are inside the enlarged pocket. At least one, and in some examples both, of the enlarged pockets also contains an additional interior raised media pocket **144** for elevated electronic or other select object protection. The media pocket **144** is glued or otherwise releasably or permanently secured into the enlarged pocket **138** and has a zipper entry **146** that is inside the enlarged pocket **138**.

[0035] The back of the jacket **100** has a waterproof rear cape **148** vent that moves with the athlete's motion to pump heat and humidity out of the microclimate between the athlete's body and the jacket **100**. The cape vent **148** also increases the range of motion across the athlete's back area. Conventional rain jackets rely on porous structures of a waterproof, breathable fabric for it primary form of breathability and do not include a mechanical venting system such as described herein. However, porous structures in fabric sacrifice waterproofness since they are susceptible to water leaking from the exterior of the rain jacket to the interior of the rain jacket. By using a rear downward facing cape vent **148**, the jacket **100** described in the present disclosure does not sacrifice any waterproofness.

[0036] The hydrophobic mesh is breathable to vent **148** heat and moisture from the athlete of the rain shell jacket out of the cape vent. However, even though the mesh is made of material that repels water, it is a mesh so some water may penetrate through the holes of the mesh if it is saturated with water. In order to prevent this, the waterproof rear cape vent **148** covers the hydrophobic mesh so water cannot touch the hydrophobic mesh. Instead, water will just drip downwards and off the rear cape vent **148**. As described above, conventional rain jackets try to balance waterproofness and breathability. While these rain jackets may be made from waterproof materials, the areas that are made of a mesh material for breathability are susceptible to water leaking into the jacket. Therefore, these rain jackets are not completely waterproof. By using a rear cape vent **148** on top of the hydrophobic mesh, the rain shell jacket described in this disclosure is both completely waterproof and completely breathable. That is, instead of relying on the fabric's breathability like most conventional performance apparel, this disclosure adds in construction level breathability in a mechanical venting system.

[0037] As described above, around each shoulder on the back of the jacket **100** are seams **106** that are shifted to the back of the jacket **100** to avoid direct water impact to maximize waterproofness. Additionally, because these seams **106** are on the back of the jacket **100**, water does not pool on these seams because most athletes face the direction from which the rain or moisture is coming. Further, at the top of the inside of the back of the jacket **100** there is a locker loop that is made of 6 mm light nylon webbing, placed in seam, and bartacked at seam points.

[0038] A shock cord (not shown) goes around the bottom of the jacket **100** and has exit points on each side of the jacket **100**. The shock cord goes through a plastic stabilizer at each exit point so the athlete can adjust the tightness of the bottom of the jacket **100** to create a snug fit and prevent any water from entering the inside of the jacket **100** at the bottom of the jacket **100**.

[0039] An alternative embodiment of the disclosure in shown in FIGS. **3**A-**3**C. This shirt **300** has a hood with a pair of parallel, vertical seams **304** that run from the location on the hood **302** that aligns approximately the with base of the athlete's head during wear and a neck and face seam **306** that extends along the base of the back of the athlete's neck at an angle up to each respective ear of the athlete and then along the upper edge of the hood along the athlete's forehead. These seams **302**, **304** flex along a typical vertical and horizontal rotation of the athlete's head when the hood is worn. Similar to the jacket described above, the shirt example shown in FIGS. **3**A-**3**C have shoulder seams **308**, elbow gussets **310**, and a torso seam **312** that all flex along the typical motion for an angler. The shirt also includes a pair of chest seams **314** that extend from the athlete's neck down the front of the athlete's chest to provide flexion for the shirt sleeves during the athlete's typical movement.

[0040] Embodiments of the disclosed bibs are shown in FIGS. **5**A-**5**C. The bibs **500** are typically worn by anglers in an overall fashion during fishing for similar reasons that the jacket is worn, which is to prevent rain, other moisture or fluids, and cold from affecting the angler during use. As with the jacket embodiment discussed above, the disclosed bibs can be worn for any reason by any wearer. The example described herein are discussed in relation to an athlete wearing them for angling but the disclosure is not limited to this use.

[0041] The rain shell bibs **500** are made from waterproof fabric with seam-taped construction. In one embodiment, the location of seam lines and the patterning were chosen based on the range of motion for an angler. However, other embodiments are envisioned (e.g., game hunting, military,

etc.) in which the location of seam lines and the patterning may be different. Overall, the number of seam lines are reduced compared to conventional fishing bib pants. Reducing the number of seam lines decreases failure areas (e.g., ripping of fabric at the seams, water leaking into seams, etc.). Additionally, the seam lines are moved away from areas where water would pool on the rain shell bib pant to minimize areas where water may leak into seams.

[0042] The bibs **500** are designed so that there are no restrictions on the range of motion of the wearer. This is achieved by minimizing seam lines and the strategic placing of the existing seam lines throughout the bibs **500**. Conventional bib pants can move off center when the athlete moves his or her legs and can bunch up when sitting and standing. In order to prevent this, the back of the bibs **500** has a seam **502** that goes from the top of the center of the buttocks to the groin of the athlete and an elastic band **504** that goes around the back of the athlete at the hips. This seam **502** and elastic band **504** keep the bibs **500** centered when the athlete is moving his or her legs and bending down. It also prevents the bibs **500** from moving up or down on the athlete when sitting or standing.

[0043] The groin and inner thigh area of the bibs **500** have a gusset **506** that goes from one inner thigh up to the groin and down to the other inner thigh. This gusset **506** provides extra space in the inner thigh and groin region of the bibs **500**, which allows the athlete to spread and move his or her legs without any resistance or riding up of the bibs' pant legs. Conventional bib pants do not have this extra space in the inner thigh and groin region, which makes the pant legs susceptible to riding up the athlete's legs when he or she spreads and moves his or her legs, which may expose the athlete's clothing and skin that is underneath the pant legs to the external environment.

[0044] The pant legs of the bibs **500** each have a knee dart seam **508** and seams **510** at the back of each of the calf muscles. The knee dart seams **508** have a clean fit around each knee to accommodate resistance-free knee movement and the seams **510** at the back of each calf muscle wrap around each calf muscle to provide a snug fit for the lower leg of the bibs **500**. The pant legs of conventional bib pants ride up the athlete's legs when she or he bends her or his knees, which exposes clothing or skin that is underneath the bibs to the external environment. However, because of the knee dart seams **508** and the seams **510** at the back of each calf muscle, the pant legs of the disclosed bibs **500** stay in one place and do not ride up the athlete's legs or expose any of the athlete's clothing or skin that is underneath the bibs.

[0045] As with the seams in the jacket and shirt examples discussed above, the seam lines of the bibs **500** are the most common areas that rip and tear. The resistance caused by the movement of the upper legs at the hip, the lower legs at the knee, and the waist when reaching down in conventional bib pants legs put added stress at the seam lines, thereby increasing the likelihood of ripping and tearing at these seam lines. By eliminating the resistance upper leg, lower leg, and waist movements have on the bib pant, rips and tears along the seams lines are greatly reduced.

[0046] The front of the rain shell bib pant has a zipper **512** in the center that extends down to the wearer's groin area. The zipper **512** for the bibs **500** is a TIZIP MasterSeal 6 zipper that has a 3 PSI pressure rating and is certified for space suits to prevent the vacuum of space from sucking out the air inside the space suit. The zipper **512** is heavy duty with widened seam tap for full security. The zipper **512** is made of a durable, polyurethane-coated tape and the durable plastic teeth of the zipper are attached to the tape. The waterproof and pressure-resistant properties of the zipper **512** are achieved by using a sealing lip at the point of interlocking.

[0047] The bibs **500** have elastic 38 mm elastic shoulder straps. These straps **514** allow for equal distribution of weight on the shoulders. Each strap **514** has an easy release securing element **516**, such as a magnetic Fidlock buckle that is rated to carry 70 kg and allow the user to quickly and efficiently detach, adjust, and re-attach each shoulder strap **514**. Additionally, each shoulder strap **514** may be detached with one hand. Conventional bib pants have shoulder straps that are not magnetic buckles which requires the wearer to use both hands (i.e., one hand on each part of the buckle) in order to buckle the strap around his or her shoulder. Further, each strap **514** may be adjusted by a 38 mm elastic adjuster. Underneath the shoulder straps **514** at the chest of the athlete wearing the bibs **500**, there are interior pockets **518** on each side. These pockets **518** are lined with microfiber or other material with thermal properties that can help the pockets serve as hand warmers for the wearer.

[0048] As described above, each pant leg of the bibs **500** has a knee dart seam **508** that creates a clean fit to accommodate knee movement and there is a center groin gusset **506** that adds free-range movement. Otherwise, there are minimal seams in the groin area to allow for flexion of the bibs **500** and to prevent pooling of water. The side seam **518** for each pant leg has an overlap to protect from vertical and directional water flow and there are seams **520** on each pant leg that wrap around the back calf muscles. Further, in order to avoid seam failure, there are minimal seam lines on the bibs **500** where the athlete's buttocks would be.

[0049] A full leg waterproof zipper **522** runs down the side from the hip to the bottom of each pant leg of the bibs **500**, a portion of which is shown in FIG. **6**. This allows for the athlete to unzip the zipper **522** as far up the leg to the hip as necessary to easily place her or his leg into the pant legs of the bibs **500** without taking off boots, gear, or sitting down. These zippers also prevent the bibs **500** from butterflying open when taking the pants on and off. Conventional bib pants require the wearer to remove his or her boots prior to putting on or taking off the bibs. The zippers have been designed into each pant leg so that they do not get caught on the fabric and can be used with only one hand. Each zipper has a directional flap to direct water away from the zipper.

[0050] The bottom of each pant leg of the bibs **500** has a security cuff **524** that has a 38 mm Velcro strap that is sewn into the fabric and is used to adjust the tightness of the pant leg cuff around the wearer's ankle and cover the zipper **522** that runs down the side of each pant leg. This helps to keep water from soaking up through the user's skin and midlayer pants that are typically worn underneath the bibs **500**.

[0051] Around the waist of the rain shell bib pant is an elastic waistband **504**. The waistband **504** is concealed in a laminated, waterproof 38 inch channel that has been shrunk by 15% for a clean fit without compromising waterproofing. The waistband **504** hugs the lower back and rests on the top of the hips. It expands and retracts as the wearer of the bibs **500** moves, which allows the bibs **500** to distribute its weight proportionately throughout the athlete's body instead of concentrating the weight load of the bibs **500** on the

athlete's back and adding pressure from the shoulder straps **514** on the athlete's shoulders.

[0052] The bibs **500** have watertight thigh pockets **526** with additional laminated angled storm flaps for a fully waterproof construction, which are shown in FIG. **7**. The flaps are move freely at each side to make it easier to move when putting hands in and out of pocket. Instead, the top of the each flap is secured to the seam line. The flaps prevent water from pooling on the pocket zipper, since in conventional bib pants the zipper can act as a dam to pool water. Additionally, the flaps guard against water entry through the zipper. The top of the pocket is laminated and taped to the inside of the flap. The zipper is a bonded laminated reverse coil zipper placed 5 mm above the edge of the bottom of the flap. The bottom of the pocket ends in a flap to allow for a bigger pocket so a full hand can go in and out easily.

[0053] The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be used for realizing the invention in diverse forms thereof.

1. An article of apparel, comprising:

a main body portion;

a hood attached to the main body portion, the hood having a flexible seam that extends along either or both of a vertical or horizontal axis, the vertical or horizontal axis corresponding to a vertical or horizontal head movement of a wearer when the article of apparel is worn by the wearer.

2. The article of apparel of claim **1**, wherein the main body portion is a jacket.

3. The article of apparel of claim **1**, wherein the main body portion is a shirt.

4. The article of apparel of claim **1**, wherein the hood has two flexible seams that run along the vertical axis.

5. The article of apparel of claim **4**, wherein the two flexible seams run along the vertical axis from a location on the hood that corresponds with the base of the back of the neck of the wearer over a top of the head of the wearer to a forehead of the wearer.

6. The article of apparel of claim **5**, wherein the hood further comprises a face opening and the two flexible seams run along the vertical axis to a position that is a distance short of the edge of the face opening.

7. The article of apparel of claim **4**, wherein the two flexible seams are parallel.

9. The article of apparel of claim **7**, wherein the hood further comprises a horizontal flexible seam that extends along the horizontal axis.

10. The article of apparel of claim **9**, wherein the horizontal flexible seam extends between the two flexible seams that run along the vertical axis.

11. The article of apparel of claim **9**, wherein the horizontal flexible seam is positioned on the hood is a location that corresponds to the base of the head of the wearer.

12. The article of apparel of claim **1**, wherein the hood has two flexible seams, a first flexible seam runs along the vertical axis and a second flexible seam runs along the horizontal axis.

13. The article of apparel of claim **1**, wherein the hood further comprises a facemask that extends around a portion of a face of the wearer.

14. The article of apparel of claim **1**, wherein the hood further comprises a shock cord that extends around a portion of the hood to adjust a size of the hood at a location that corresponds to a neck of the wearer.

15. The article of apparel of claim **1**, wherein the hood further comprises a shock cord that extends around a portion of the hood to adjust a size of the hood at a location that corresponds to a back of the head of the wearer.

16. The article of apparel of claim **1**, wherein the hood further comprises a face opening and a shock cord that extends around the face opening.

17. The article of apparel of claim **16**, wherein the face opening is shaped to extend above a mouth of the wearer.

18. The article of apparel of claim **16**, wherein the face opening is shaped to extend below a chin of the wearer.

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