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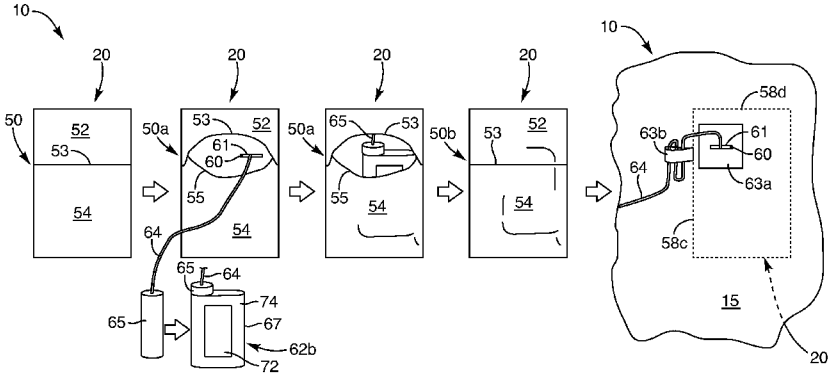


FIG. 12

(57) Abstract: An innerwear system (10) combines a form fitting article of clothing (80), worn as a layer (80), typically below a presentation layer (70) of street clothing (70) or conventional clothing (70). The innerwear article of clothing (80) is provided with a pocket (20) having two opposing and overlapping pockets (52, 54) as the cover portion (52) and containment portion (54), respectively. The smaller (inverted, cover) pocket (52) overlaps the upper portion of the lower (upright, main) pocket (54) or containment portion (54). Fingers of a user may reach under the cover (52), engage the edge of the containment (54), and open a "mouth" (50) to insert securely an object (62) such as a phone (62a), insulin pump system (62b), personal article (62), or the like. A stabilized access port (60) out through the cover (52) or inward through the clothing article (80) may pass a line (64) from the contained object (62).

WO 2016/054386 A1

INNERWEAR POCKET SYSTEM AND METHOD

1. Related Applications

This application claims the benefit of co-pending U.S. Patent Application Serial No. 14/871,697 filed September 30, 2015 for INNERWEAR POCKET SYSTEM AND METHOD, which claims the benefit of co-pending U.S. Provisional Patent Application Serial No. 62/071,813, filed October 4, 2014 for POCKET INNERWEAR; A SYSTEM AND METHOD FOR INSTALLING STORAGE SYSTEMS IN UNDERGARMENTS AND CLOTHING, and claims the benefit of co-pending U.S. Provisional Patent Application Serial No. 62/122,438, filed October 20, 2014 for POCKET INNERWEAR; A SYSTEM AND METHOD FOR INSTALLING STORAGE SYSTEMS IN UNDERGARMENTS AND CLOTHING; A MEDICAL DEVICE ON PERSON STORAGE SYSTEM, both of which are hereby incorporated herein by reference in their entirety.

2. Field of the Invention

This invention relates to clothing and, more particularly, to novel systems and methods for creating specialized pockets therefor.

3. Background Art

Clothing is presumptively a part of modern culture. Having existed for millennia, articles of clothing originally began as robes, togas, and other articles ranging from undergarments to outer garments, and on to weatherproof outerwear.

As a practical matter, pockets were not a part of clothing even as recently as the 19th century. Eventually, clothing came to include pockets. Thereafter, pockets were introduced as permanent parts of regular clothing.

Open pockets are common. These include pockets having an opening accessible without opening any closure. Likewise, pockets having closures exist and have existed for many years. Closures may include buttons, hook-and-loop fasteners, snaps, zippers, and the like. Typically, such closure mechanisms are secured to operate between a covering flap or the article of clothing itself, and an outer surface of a pocket itself.

Pockets are a convenience. They can sometimes be an inconvenience. Pockets in articles of clothing are necessarily and most typically general purpose pockets to fit or receive a variety of items. Depending on convenience, structure of the article of clothing, and so forth, a closure may or may not be included.

Often, a closure is not included, such as in a breast pocket of a dress shirt in men's clothing, an inside breast pocket in a sports coat, suit, dinner jacket, or other open shirt pocket. An inherent presumption for these is that the pocket will not be turned upside down.

Work clothes, active wear, or clothing for athletic and other active endeavors may be more likely to include some type of covering (a flap or tab), having a closure mechanism to maintain it in a closed position and permit release for access to the pocket.

Outer clothing or the presentation clothing that is typically seen by others than the wearer typically is comparatively loose fitting. Looseness itself presents certain problems in securing articles in pockets. Underwear, sports inner layers, exercise and yoga outfits, dance wear, and other innerwear may be form fitting or may also be loose.

It would be an advance in the art to provide a new article of clothing, a new type of pocket, and a combination of both to provide more secure containment of articles within a pocket of innerwear on active users.

It would be an advance in the art to provide certain improvements in closure systems. It would also be an advance in the art to provide easy access and re-closure with a single hand and no alignment or force. It would be an advance to provide to articles in a secure pocket for devices such as music play devices, mobile phones, insulin pumps, and the like.

For example, type I diabetics, those acquiring the disease while juveniles, may rely on an insulin pump rather than periodic injections. An insulin pump has mass, has three dimensions of space that it occupies, and does not readily fit any current pocket system. Moreover, an infusion site will typically include a catheter for receiving a needle or probe from an insulin pump. Moreover, tubing extends between the infusion site and an insulin pump itself. Managing that pump, preventing kinks in it, concealing the tubing, managing it against being caught, cut, crimped, or the like is problematic. Meanwhile, reducing the length of the tube from a standard system is problematic, as it restricts movement.

Thus, it would be an advance in the art to provide a pocket that is convenient, lightweight, secured firmly against the body of a user at a location that is not exposed to bumping, damage, or the like, and provides concealment yet easy access. A simple, smooth, unobtrusive pocket would be a substantial advance in the art.

As another example, mobile telephones are ubiquitous. It would be an advance in the art to provide a system that is secure, yet easily accessible. In fact, it would be an advance in the art to provide a closure mechanism that does not require great attention, multiple hands, alignments, substantial force, tiny hands, or the like.

BRIEF SUMMARY OF THE INVENTION

In view of the foregoing, in accordance with the invention as embodied and broadly described herein, a method and apparatus are disclosed in one embodiment of the present invention as including a

pocket operating as a storage compartment having a unique cover and closing mechanism for the cover. This storage compartment or pocket may be stretchable, elastically to receive and retain a small item such as a mobile phone, debit card, personal electronics item, personal protection tool (*e.g.*, spray, edged weapon, firearm), insulin pump, other medical device, or the like.

It may be made of a larger size and placed in a location whereby it may be accessible for its purpose. For example, a flask, small book, tablet, an electronic tablet, or other personal effects may be secured therein. Likewise, in certain embodiments, a pocket in accordance with the invention may be smaller, specially sized, configured, and constructed to accommodate an insulin pump system.

The cover is designed to secure any item placed therein, even in a fully upside down wearer position. Likewise, the cover is secured against jarring or quick changes of direction, such as may occur during athletic activities, including any number of games, climbing, running, work, and so forth.

A feature of selected embodiments of an apparatus, system, and method in accordance with the invention may include a port or aperture, properly reinforced and stabilized as required or needed, for passing a line from the contained object within the pocket to a location outside the pocket.

For example, a cover may include an aperture passing the cord (line) of a headset or earbuds from a contained MP3 or other audio player, mobile phone, iPod, or the like outside the pocket to the head and ears of a user.

In another example, a pocket may include an interior aperture passing inward through the article of clothing to which the pocket is attached. This aperture may pass a line, such as an insulin tubing line, from an insulin pump contained within the pocket inward (or inside the apparel, considering that this is clothing) in order to reach an infusion site, typically on the abdomen of a user.

In one embodiment, a pocket in accordance with the invention may include a containment portion that represents and functions somewhat like a conventional pocket. Above and covering the containment portion is the cover portion. In such an embodiment, the containment portion is partially covered by the cover portion. This does not mean that the cover portion is simply a flap. A cover portion may be called a flap, but does not flap and cannot flap. Rather, the cover portion encloses and overlaps the upper edge of the containment portion.

Moreover, the cover portion is fully seamed along (near) its left and right edges. Thus, an upper region and edge of the containment portion is overlapped by a lower portion and edge of the cover or cover portion. The cover portion is a pocket over a pocket, fully seamed on three sides or edges, along its left and right sides, as well as its top edges.

The storage or containment portion is also seamed on three sides or edges, along its left and right edges and along its bottom edge. Thus, in one embodiment, a pocket in accordance with the invention actually includes two traditional pockets, one right side up and one upside down. The one upside down overlaps the upper portion and edge of the one that is right side up.

One may ask how such a pocket opens. The pocket opens by displacement and distortion of one or both of the containment portion and the cover portion.

For example, the bottom edge of the top portion or cover portion may be thought of as a lip, an upper lip of the mouth. Meanwhile, the upper edge of the containment portion or the lower portion may be considered a lower lip. The pocket is opened by reaching a member such as a digit of the hand inside under the cover portion, engaging the lower lip on the containment portion, and spreading the upper lip and lower lip apart. This necessarily involves distortion of the cover portion and containment portion. This may stretch the fabric of the cover, the containment, the base garment, or all three. It may instead (or also) draw their left and right sides closer together. However, the resulting open mouth then provides a sufficiently large opening to insert any object sized to be contained therein.

Once an object to be contained is fully within the containment portion as far as it will go, the cover portion may be drawn over it if necessary. The natural movement of the underlying fabric of the article of clothing returns to a form fitting position on the user. This return to form fitting returns the containment portion to a location underneath the cover portion. The side seams of each draw the containment portion and cover portion automatically into proper alignment.

No amount of movement can dislodge the contained object from the pocket. This is in large part because the pocket in accordance with the invention is not one but two pockets in the conventional sense. The pocket of the invention may be thought of as two conventional pockets inverted and overlapping one another.

Depending on the application of the pocket in accordance with the invention, one ore more apertures may be formed. For passing a line out from the contained object to the environment outside (or inside) the article of clothing, an aperture may be formed. It may be augmented by one or more stabilization mechanisms, such as a binding seam, satin stitch, reinforcement, grommet, or the like. It may be sized to permit passage of a cord, plug or both to an audio jack, as known in the art, to plug into the contained object.

By the same token, a system that contains an insulin pump, a hearing aid, another medical device, monitor of some type, or the like may rely on an aperture formed between the pocket and the inside of the article of clothing on which the pocket is sewn. Thus, the garment receives an aperture, properly stabilized by binding, reinforcement or other technique in order to durably pass a line from the object or device inside the containment portion. The line exits the pocket through the wall or fabric of the clothing article to be disposed as required.

For example, in the case of an insulin pump, the line is a tube passing inward through clothing from an insulin pump as the object in a containment portion of the pocket. Passing to an infusion site, the line may terminate in a needle to be received inside a catheter installed to administer insulin to the wearer.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing features of the present invention will become more fully apparent from the following description and appended claims, taken in conjunction with the accompanying drawings. Understanding that these drawings depict only typical embodiments of the invention and are, therefore, not to be considered limiting of its scope, the invention will be described with additional specificity and detail through use of the accompanying drawings in which:

Figure 1 is a front perspective view of a system in accordance with the invention illustrating various optional locations for positioning a pocket system in accordance with the invention in an article of clothing (*e.g.*, innerwear) on a user;

Figure 2 is a front elevation view of a user wearing a system of innerwear containing pockets in the various optional locations in accordance with invention;

Figure 3 is a rear elevation view thereof;

Figure 4 is a right side elevation view thereof;

Figure 5 is a left side elevation view thereof;

Figure 6 is an exploded view illustrating various locations on a body of a user, where a band or cuff (*e.g.*, garter) may secure a pocket in accordance with invention thereto;

Figure 7A is a perspective view of one embodiment of a pocket in accordance with invention;

Figure 7B is an alternative embodiment of a lace pocket in accordance with invention on the fabric of an article of clothing as in Figures 1 through 6;

Figure 8 is a rear perspective view of one embodiment of a pocket having an opening providing access to the interior of an article of clothing;

Figure 9A is a front elevation view of one embodiment of a pocket, in accordance with invention, suitable for holding a device or object such as a mobile phone or audio player;

Figure 9B is a rear elevation view thereof;

Figure 9C is a right side elevation view thereof;

Figure 9D is al eft side elevation view thereof;

Figure 9E is a top plan view thereof;

Figure 9F is a bottom plan view thereof;

Figure 10A is a front elevation view of an alternative embodiment of a pocket, in accordance with invention, such as may secure an insulin pump or other medical device;

Figure 10B is a rear elevation view thereof, illustrating the pocket only, and not the base fabric of the article of clothing on which it is worn;

Figure 10C is a right side elevation view thereof;

Figure 10D is a left side elevation view thereof;

Figure 10E is a top plan view thereof;

Figure 10F is a bottom plan view thereof;

Figure 11 is a front elevation view of a pocket in accordance with invention undergoing a process of opening, filling, and closing, including receiving an object and a line connected through a port to that object;

Figure 12 is an illustration of front and rear elevation views of a pocket undergoing a process for opening and filling a pocket in accordance with invention with an object, for example, an insulin pump, also including threading a line from the pump through an aperture into the interior of the article of clothing; and

Figure 13 is an exploded view of various alternative embodiments of innerwear and outerwear, the former provided with various embodiments of pockets in accordance with invention, and the latter illustrating examples of outerwear that may be worn over innerwear, thus hiding a pocket in accordance with invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

It will be readily understood that the components of the present invention, as generally described and illustrated in the drawings herein, could be arranged and designed in a wide variety of different configurations. Thus, the following more detailed description of the embodiments of the system and method of the present invention, as represented in the drawings, is not intended to limit the scope of the invention, as claimed, but is merely representative of various embodiments of the invention. The illustrated embodiments of the invention will be best understood by reference to the drawings, wherein like parts are designated by like numerals throughout.

Referring to Figures 1 through 5, while referring generally to Figures 1 through 13, a system 10 in accordance with the invention may include various articles 10a, 10b of innerwear 10. Herein, whenever a reference numeral is used, it refers to the item identified thereby. Use of a trailing letter after a reference numeral refers to a specific instance of such an item as is indicated by the reference numeral. Thus, it is not necessary to define every instance, and one may speak of all instances by referring only to the numeral.

Thus, a system 10 of innerwear 10 may include a top article 10a, a bottom article 10b, or both, 10a, 10b. Typically, a surface 11 or outer surface 11 of such an article 10 will contain or exhibit some choice of color. As a practical matter, innerwear 10 may include sports wear, exercise clothing, athletic apparel, yoga or dance wear, biking shorts, underwear, or the like. Thus, a typical consideration and characterization of innerwear 10 in accordance with the system 10 is a form fitting garment whose outer surface 11 effectively tracks the surface of the skin of a user therebelow, against, or behind.

As a practical matter, innerwear 10 may include an article of under clothing, or sports or athletic clothing that is used in gym or an athletic or recreational activity. Thus, although the expression “innerwear” 10 is used, in some situations, a wearer may actually treat the innerwear 10 as an outer layer of clothing. Nevertheless, in many situations, innerwear 10 may be covered with another outer layer of clothing that may be referred to as street clothing, or the like.

A system 10 in accordance with the invention benefits from the form fitting nature of innerwear 10, and may rely on that feature to provide securement, prevention of escape, and ready maintenance of momentum of a contained article near and with the body of a user.

Referring to Figures 2 through 5, while continuing to refer generally to Figures 1 through 13, a system 10 of innerwear 10 may be presented with a frontal region 12 or frontal aspect 12. A standing user or upright user may define an axis 13 running nominally vertically through the center of a user. Likewise, the article 10 may include a rear region 14 or rear aspect 14 covering the back surface of a user.

In general, the fabric 15 of which the innerwear 10 is manufactured is typically formed of a fiber, whether natural or synthetic, having woven into it, or as an integral part of it, an elastomeric fiber. It is typically a knit fabric. Thus, the fabric 15, when worn, is typically under tension along its surface 11. This tension provides a certain amount of force.

Tension is defined as a stress, which in engineering parlance is a unit of force per unit of area across which the force acts. Thus, a tensile force or tension force acting on a cross sectional area of a material, such as the fabric 15 may be defined as a tensile stress.

Typically, the left side aspect 16 and the right side aspect 18 or regions 16, 18 are not entirely unique, compared to the frontal 12 and rear 14 aspects. Rather, the curvature of the human body provides an arcuate shape in which the different aspects 12, 14, 16, 18 viewed are not mutually exclusive areas.

Referring to Figures 1 through 5, and Figures 1 through 13 generally, a system 10 may include a pocket 20. A pocket 20 may be placed in any of several available locations. For example, the innerwear 10 may include a neck region 22 near a neck of a user. An arm region 24 may include simply an arm hole or may include a sleeve. Meanwhile, a shoulder region 25 may simplify to a narrow strap, or may include a larger panel covering a shoulder of a user, and extending to connect to a sleeve.

Likewise, a torso region 26 may include the region from the shoulders and arms of a user down toward a hip region 32. In fact, a torso region 26 may be considered to divide more or less into a thoracic region 27 above and an abdominal region 28 therebelow. A waist region 30 may separate the thoracic region 27 from the abdominal region 28. However, may actually be somewhat coincident with the abdominal region 28. Typically, a waist region 30 lies above the hip bone of a user.

In that regard, the hip region may include that region from about the top of the hip bone down to about the beginning of a thigh. Thus, the thigh region 34 begins at some location below the hip of a user, and extends to about the knee region 36 near a knee 42c of a user.

Similarly, a calf region 38 begins somewhere below the knee 36, and includes the large calf 42d muscle area, down to some location above an ankle region 39. The ankle region 39 extends between a calf region 38 and a foot.

Within each of these regions 22, 24, 25, 26, 27, 28, 30, 32, 34, 36, 38, 39, exist various regions of relief 40 or relief regions 40 and protrusion regions 42. A relief region 40 may be thought of as a region 40

that is adjacent to or somewhat protected by a protrusion region 42 in the vicinity. It may be selected to be inboard, outboard, front, or back of any bodily member, such as a thigh, arm, ankle, and so forth.

For example, a relief region 40a in the shoulder region 25 forms something of a depression 40a between a shoulder and the pectoral muscles that tend to protrude therebeyond. Thus, a relief region 40a provides something of a depression or a region that is protected against bumping, jostling, impact, and the like by adjacent protrusions or protrusion regions.

Similarly, a relief region 40b may be referred to as a sternum region 40b, and typically operates as a depression below the pectoral region of a user. Similarly, a region 40c may be protected by an arm of a user and the pectoral muscles, rib cage, and so forth.

A region 40d referred to here as a rib region 40d typically is protected by an arm outboard therefrom. It may be represented as a depression associated with a waist region 30 or a comparatively narrower part of the thoracic region 27.

A hip region 40e, 40f is that region forward of or behind a hip bone of a user. It is protected thereby. Because hands and arms will typically be outboard thereof, and the hip bones likewise, a flat 40e, 40f, 40k or depression 40e, 40f, 40k may exist wherein a pocket 20 may be located. Thus, one will see that the optional pockets, locations 20a, 20b, 20c, 20d, 20e, 20f, 20k correspond to a shoulder pocket 20a, sternum pocket 20b, pectoral pocket 20c, rib pocket 20d, hip pocket 20e, or hip pocket 20f, 20k. Each of these pockets 20 may be positioned in a relief region 40 appropriate for where they are, without inconvenience, interference, or the like for a wearer.

Similarly, a thigh pocket 20g may be located in a relief region 40g near the lower end of the thigh, and above a knee region 36. Specifically, a knee 42c represents a protrusion. In both forward-to-backward dimensions and side-to-side dimensions, a knee 42c represents a protrusion region 42c. Accordingly, immediately thereabove, a narrowing portion 40g of a thigh region 34 (relief region 40g) may receive a pocket 20g protected by the bulk of the muscles in the thigh region 34 and the bulk of the size of the knee 42c, as protrusion regions 42c, 42g.

In yet another embodiment, a pocket 20h may be placed between a knee region 36, or a knee 42c, and the bulk muscle or calf 42d of the calf region 38. Thus, for example, the bulk of the calf 42d muscle and the bulk of the knee 42c may provide a relief region 40h suitable for receiving a pocket 20h.

Similarly, an ankle pocket 20g may be placed in a relief region 40j between a foot of a user and the calf region 38. Thus, the calf 42d operates as a protrusion 42d protecting the ankle relief region 40j, and thus providing the location 40j for the ankle pocket 20g.

The various articles of clothing 10a, 10b or innerwear 10a, 10b, may include a rather open expanse 44 sewn together at various locations or closed off at edges by seams 46. Thus, any border 48 or edge 48 may be closed with a seam 46. Similarly, the shape of a top article 10a or bottom article 10b may be determined and controlled by the shape of the open expanses 44, and the locations of seams 46 securing them together.

Referring to Figure 6, while continuing to refer generally to Figures 1 through 13, a cuff 49 or band 49 may form a particular stretching, elastomeric article 10 or article of innerwear 10. The cuff 49 may include a pocket 20 oriented in any suitable direction for appropriate wear. Accordingly, in the figure, beginning at the top and moving clockwise, a cuff 49 may be placed in the top of a boot. Next, a cuff 49 may be worn in the lower area of a thigh region 34 above a knee region 36.

Similarly, in the calf region 38 a cuff 49 may be worn above the bulk of the calf 42d itself, and below the knee 42c in the available relief region 42d. Similarly, the next location shows an ankle region 39 in which an ankle relief region 40j receives a cuff 49 containing and supporting a pocket 20. Finally, in yet another alternative embodiment, a cuff 49 in the next configuration may fit between an elbow and a bicep (or between bicep and shoulder) on an arm of a user, thereby securing a pocket 20 thereat.

Still referring to Figure 6, while continuing to refer generally to Figures 1 through 13, the cuff 49 or band 49 will typically rely on a certain degree of friction due to an elastomeric character. In certain embodiments, a cuff 49 may be a closed loop of material. In other embodiments, it may be openable and closed selectively with a fastener. For example, a zipper, snap, buttons, hook-and-loop fastener, or the like may be used to fit the band 49 snuggly around an appendage.

In another example, when the cuff 49 is secured in the top of a boot, a portion of the cuff 49 may extend, exposing part of the pocket 20 outside the boot for access. Similarly, a band 49 or cuff 49 in an ankle region 39 may tuck inside a low boot or short boot, or be placed just above a shoe or short boot.

Thus, a band 49 or cuff 49 may rely on another article of clothing, such as a boot, or shoe, to maintain its position. Likewise, it may rely on the change in cross section of a knee region 36 or the calf muscle in the calf region 38 to restrict it from sliding down with motion and gravity influences. In other embodiments, wherein the pocket 20 is secured to another innerwear article 10 then the supporting forces are provided by the system 10 itself, and need not be directly related to frictional forces, or changes in section, and so forth.

Referring to Figures 7 through 10F, while continuing to refer generally to Figures 1 through 13, a pocket 20 in accordance with the invention may actually include the system 10 including a particular article 10 of clothing that may be a top article 10a, bottom article 10b, or the band 49. The article 10 is formed of, and represents, a fabric 15 or layer 15 to which a pocket 20 is secured.

A pocket 20 may be made of a cover 52 overlapping a containment 54. Both may be of the same or different fabrics 15. "Stretch" fabrics 15 seem to serve best. They are typically "knit" fabrics. Cross-woven fabrics work, but require slack in the article 10 in not elastomeric.

The cover 52 or top flap 52 is actually not a flap at all, but is a second conventional-like pocket 52 inverted. For example, the lower edge 53 of the cover 52 overlaps the top edge 54 of the main portion 54 or containment 54. Thus, the cover 52 represents a "pocket" in a conventional sense that overlaps the main portion 54 of the pocket 20 or containment 54 of the pocket 20. Thus, the overlap region, between the lower

edge 53 or top lip 53 on a mouth region 50 or mouth 50, overlapping the top edge 55 or bottom lip 55 provides securement of any content within the pocket 20.

Seams 58 are best double seams 58. The mouth seam portion 56 extends, and may be sewn double that or more in order to secure against all the forces that will be applied repeatedly to open the mouth 50. The mouth seam portion 56 may simply be an extension of the main seams 58 of the pocket 20.

For example, a top seam 58a secures a portion (*e.g.*, top edge) of the cover 52. A bottom seam 58b secures a portion (*e.g.*, lower edge) of the containment 54 along its width 57a. Meanwhile, the left side seam 58c and the right side seam 58d may extend along the entire height 57b (length 57b) of the pocket 20. These 58c, 58d secure both the cover 52, and the containment 54. For durability, additional seaming 58 may be placed to secure the mouth seam portion 56 by resisting pulling forces when opened.

In other embodiments, the mouth seam portion 56, may simply be those portions of the side seams 58c, 58d that extend along the mouth region 50 between the lower edge 53 of the cover 52 and the top edge 55 of the containment 54.

One will also note that the apertures 60 may be single or multiple with respect to a particular pocket 20. For example, in one embodiment, the aperture 60a may be placed through the material forming the cover 52. A suitable reinforcement 61 such as a grommet 61, a satin-stitch seam 61, a button hole seam 61, or the like may be used to reinforce the aperture 60. Continuing use and wear of objects moving through the aperture 60 may be protected against by the reinforcement 61.

The seams 58 may be made by thread. In other embodiments, some other fastener 58 may include a bonding agent, such as a heat-activated glue or the like. Fusible fabrics including "iron-on" fabrics may bond or fuse. Thermoplastics may be used to form thermally activated glues. In other embodiments, a fabric formed of a synthetic material may be used to bond to the underlying clothing article 10.

A reinforcement patch 63a may optionally be added as a backing material to the fabric material 15 of the pocket 20, or to the material of the fabric 15 of the clothing article 10 to which the pocket 20 is attached.

Referring to Figure 8, while continuing to refer generally to Figures 1 through 13, in the containment of an insulin pump 62b as the device 62 to be held within a pocket 20, an additional loop 63b may be added. It may be secured by or may operate as a reinforcement 63a as well. However, typically, the accessories 63a, 63b or features 63a, 63b may be used for reinforcing the aperture 60b, and stabilizing the apertures 60 against the line 64 that extends from the pocket 20.

Referring to Figures 9A through 9F, in one embodiment of a pocket 20 in accordance with the invention, the pocket 20 may be sized to fit an object or device such as a mobile phone, electronic tablet, audio player, pocket book, debit card, tool, weapon, or the like. The size and shape of the pocket 20 may accordingly provide for a mouth region 50. The mouth 50 will open adequately to receive the object 62 and automatically close to secure to it within the pocket 20. Again, Figures 9A through 9F simply illustrate the details of the pocket 20, and not the backing fabric 15 or article 10 that constitutes the principal garment 10 of the innerwear system 10.

In that regard, the system 10 may involve an article 10 visible as outerwear as well. However, the benefit of concealment is improved if the article 10 is innerwear, such as underwear 10, base layers 10 of active wear 10 for sporting activities, or the like. Nevertheless, in some sports activities, the outerwear used includes singlets, tank tops, t-shirts, capris, tights, leggings, form fitting trousers or pants, shorts, and so forth. Thus, the underlying fabric 15 or article 10 formed of a fabric 15 is removed in Figures 9A through 9F, and Figures 10A through 10F in order to simply illustrate the pocket 20 itself.

Referring to Figures 10A through 10F, in certain embodiments, the cover 52 of a pocket 20 need not contain an aperture 60. In the illustrated embodiment, the pocket 20 of Figures 10A through 10F applies to various situations. In one embodiment, a line 64 may be passed out through the mouth region 50, by passing over the top edge 55 of the containment 54, and under the lower edge 53 of the cover 52 in order to pass outside the pocket 20.

However, in one currently contemplated embodiment, the pocket 20 relies on an aperture 60b formed in the underlying fabric 15 of the article 10 to which the pocket 20 attaches. For example, an insulin pump system 62b may pass a line 64 through an aperture 60b in the fabric 15, toward the interior of the article 10, between the body of a user, and the article 10.

Also, for example, a comparatively long line 64 delivering insulin to an infusion site may pass through the base material 15. It may be collected or gathered in a loop 63b for that purpose. The residual length of the line 64 may then proceed on to the infusion site. To that end, a backer 63a or reinforcement 63a may be sewn, ironed, or otherwise bonded to the fabric 15 to extend about the aperture 60b.

A similar patch 63a or reinforcement 63a may be placed under the loop 63b to stabilize that elastic loop 63b with respect to the fabric 15 of the article 10 by distributing forces, the reinforcement 63a resists tearing, separation, or excessive distortion.

Referring to Figure 11, use of a system 10 in accordance with the invention may involve the use of a pocket 20 illustrated by the configuration 20a of Figure 11. Digits (fingers, thumb, both) of a user may be inserted under the cover 52 and over the containment 54. One may hook the edge 53 to draw open the mouth 50a into an open configuration. Thereafter, in the configuration 20c, the pocket 20c, receives an object 62 or device 62 placed into the open mouth 50a.

Once the object 62 or device 62 has been placed inside the containment 54, the edge 53 cover 52 may be drawn over the top of the object 62, if the object 62 is taller than the edge 55. Otherwise, release will let the cover 52 return automatically, thus arriving at the closed and filled configuration of the pocket 20d.

Ultimately, in the pocket 20d or the configuration of the pocket 20d, a line 64 may be placed through the aperture 60a. This may be done by placing a plug through the aperture 60a into a jack in the object 62. In this instance, the illustrated embodiment of the line 64 connects to earbuds 68, such as those used in listening to an audio player, mobile phone, or the like.

Referring to Figure 12, a pocket 20 may be configured as an insulin pump pocket 20a in a closed configuration 20a. It may be opened by drawing apart the lower edge 53 of the cover 52 away from the

upper edge 55 of the containment 54. Thus, the pocket 20b is effectively a pocket 20 in the configuration of being opened at the mouth 50. In the configuration 20c of the pocket 20 the insertion configuration 20c includes the pump system 62b being inserted into the mouth 50 to be secured within the containment 54. Again, once the device 62, in this case a pump 62b system, is securely within the containment 54, the cover 52 may be drawn down (automatically or by finger) over the containment 54. This results in the configuration 20d of the pocket 20.

From the back side of the article 10 to which the pocket 20 pertains, as illustrated, the reinforcement patch 63a may surround the aperture 60. Meanwhile, an elastic loop 63b may secure to the article 10 of clothing. It may have its own backing 63a therebetween. Excess line 64 for delivering insulin to an infusion site from the pump system 62b may be gathered and secured by the loop 63b.

One will note that the cover 52 may constitute another, inverted, conventional pocket, where the word term "pocket" here now means a conventional pocket 20. It inverts over and opposite the containment 54 or main compartment 54. Two conventional pockets inverted may render both inoperable. However, a conventional pocket as a top cover 52, provides securement against inverted users, active motion, jostling, bouncing, and the like of objects 62 or devices 62 within the pocket 20. Virtually any motion short of ripping fabric 15 will not result in release of the device 62, under any circumstance.

Referring to Figure 13, while to continue generally to Figures 1 through 13, various types of innerwear are illustrated. For example, moving clockwise from the top of the figure a pair of tights 80a or leggings 80a, a pair of shorts 80b, and the like represent innerwear bottom portions 10b. Meanwhile, the tank top 80c, t-shirt 80d, and camisole 80e represent innerwear tops 10a. The pocket 20 in accordance with the invention may be worn on any of these articles 10 in an appropriate location, at least one of which is included in each.

Nevertheless, in such embodiments, if the particular article 10 is worn as the outermost layer, the pocket 20 will be visible, whether that is desired or not. When the pocket 20 should be hidden, another layer 76, outerwear 76, may cover the innerwear 10. For example, a conventional, loosely fitted jacket 70a, blouse 70b, skirt 70c, or trouser 70d may be worn over any corresponding article of innerwear 10 as a top outerwear piece 76a or a bottom outerwear piece 76b. Thus, any of the objects 62, devices 62, or others 62 may be carried in a pocket 20 suitably configured, on any particular article 10 in a system 10 in accordance with the invention.

As one can see, a pocket 20 in a system 10 in accordance with the invention ensures that items cannot fall out. A pocket 20 may be hidden or strategically placed on an item of innerwear 10, which may include athletic clothing 10, dance wear 10, yoga wear 10, exercise wear 10, and similar articles 10. Likewise, underwear 10 (*e.g.*, briefs, bras, camisoles, under shirts, tights, etc.) and the like may also receive pockets 20 in accordance with the invention.

Typically, the materials 15 or fabrics 15 of which the pockets 20 and articles of clothing 10 are fabricated include elastomeric (elastic) fibers, are knit, or both, so they are typically "stretchy." Lace,

netting, and other deformable, discontinuous-surface fabrics 15 may also be used. See-through fabrics may permit operation of devices through front control panels 72 on their faces 74 without removal from the pocket 20.

For example, Spandex™ is a fabric that includes elastomeric fibers as well as conventional fibers such as synthetic materials (nylon, polyester, etc.) natural materials (*e.g.*, cotton, wool, etc.). It serves well for such functions. Similarly, any elastomeric fabric 15 may be suitable for pockets 20. In certain embodiments, the pockets 20 may be formed of lace, netting, latticed materials, loosely woven materials, knit materials, and so forth.

Even without stretch fabrics, a mouth 50 of a pocket 20 may be opened by gathering and pulling on the underlying fabric 15 of the article 10 of clothing. However, it has been found suitable to use a stretch fabric 15 for the article of clothing 10 as well as the pocket 20.

Such a system 20 having a containment portion 54 and a cover portion 52 is effectively two pockets, in a conventional sense. That is, each is seamed 58 on three sides. The two components 52, 54 share an overlapping mouth area 50. Such a system 10 is suitable for holding a cell phone 62a, debit card 62a, cigarettes 62a, insulin pump 62a, other objects 62, or the like. Larger items such as smart phones, electronic notepads, small tablets, paperback books, flasks, handguns, and the like may be held in larger embodiments of the pockets 20.

Whether turned upside down, jarred, or exposed to rapid movements otherwise, even a heavy mobile phone cannot be jarred out of the pocket 20. The cover 52 being sewn 58 on three sides and having a shared mouth seam region 56 on the sides 58c, 58d may effect closure automatically with no intervening actions by the hand of a user. Simply put, the fabric 15 of the article of clothing 10 draws the mouth 50 closed automatically due to the form-fitting nature of the article of clothing 10.

The materials may include radiation-frequency-blocking fabric. Radio frequencies in the range of from about ten megahertz up through about thirty gigahertz may be blocked by available fabrics 15. Each of the fabrics 15 in an article of clothing 10, a pocket 20, or both may be lined with or formed of a radiation-frequency-blocking fabric of this type. For example, whether bonded together as a layered or laminated fabric 15, or sewn on after-the-fact with the pocket 20, such a liner may line the article 10, the pocket 20, or both against the escape of radiation within the selected frequency range.

Stretch laces have been found suitable. The band 49 (strap 49, cuff 49, garter 49, or the like) provides a method to implement a pocket 20 in the absence of another, larger, covering article 10. Tank tops 80c, leggings 80a, biking shorts 80b, boots 84, and the like all receive and carry well the pockets 20 in accordance with the invention.

It has been found that double stitching the seams 58a, 58b, 58c, and 58d seems to serve best. It is not required. In fact, in some embodiments, a zig zag stitch or the like has been found suitable. Similarly, as can be seen, the lace edge 53 in Figure 7B forms the lip 53 or lower edge 53 of the cover 52. Thus, the decorative element completely obscures any sewing or the presence of the mouth region 50.

Typically, the materials may be from about three to about four inches (7.5 to 10 cm.) wide, and from about five to about seven inches (12.5 to 18 cm.) long. For example, the width 57a and the length 57b of a pocket 20 may be sized for the specific device 62. For smart phones 62a and the like, a pocket 20 on the order of three and a half inches (8 cm.) by about six inches (15 cm.) has been found suitable for cell phone use. On the other hand, it has been found that a width 57a of about three inches (7.5 cm.) wide with a length 57b of about four to five and a half inches (10 to 14 cm.) is functional for an insulin pump 62b. In most insulin pump systems 62b, an overall height of about four inches (ten centimeters) has been found suitable.

Typically, an insulin pocket 20, such as a hip pocket 20e, 20f may typically be positioned about three inches (7.5 cm.) above a bottom edge of top 10a. This should be just below and in board of the top of the hip bone. Typically in rib placement, for an adult, a height of about ten inches (25 cm.) above the bottom of a tank top 80c or the like is adequate.

In general, for a child, a target dimension or distance between the bottom seam 58b of a pocket 20 and the bottom edge of a top article 10a may be about three inches (7.5 cm.). For adults, a distance of about three inches (7.5 cm.) also serves for an insulin pocket 20 as a hip pocket 20e, 20f. Rib pockets 20d, 20k on the other hand at ten inches (25 cm.) above the bottom edge of the article 10a may be suitable for women with about twelve inches (30 cm.) suitable for men, depending, of course, on height and build for each.

Location of a pocket 20 is a matter of convenience and comfort. Typically, relief locations 40 are no-hit spots 40 where a contained device 62 is unlikely to be struck, damaged, moved, or to transfer impact to a user. Typically, such relief regions 40 cover soft tissues of the body and are obscured or hidden within the body's outer profile. Thus, they may be placed in any of the locations illustrated in Figures 1 through 5 or others.

However, the hip locations 40e, 40f and the rib locations 20d, 20k may serve best as locations 40 for insulin pockets 20. For some adults, a sternum pocket 20b may also serve as a suitable insulin pump pocket 20. One reason for this is that infusion sites are typically around the abdomen, the belly, where tissues are thicker, less mobile, with comparatively large expanses available. This avoids interference from bones, thin layers of tissue over joints, and the like.

Whether worn on snug outer clothing, other types of wear such as innerwear, underwear, briefs, or the like, the controller 67 of devices 62 may be accessible for control through the pocket 20 if they have a control screen 66 or control button 72 on a front face 74 thereof. For example, an insulin pump system 62a may include a cylinder 65 or reservoir 65 integrated therewith or in nearby proximity. In such an embodiment, a screen 66 or control panel 66 may sit on a front face 74 where it is viewable through netting or lace forming the containment portion 54 of a pocket 20. Thus, it has been found that the control panel 66 may be operated by a user without removing the device 62 from within the pocket 20.

Of course, the specific locations of various pockets 20 on various articles of clothing 10 may vary depending on the size of a user. For example, a size two through four toddler may wear a top 10a about thirteen inches long (33 cm.) by about six inches wide (15 cm.). Meanwhile, shirts size five through eight in

children's sizes may be about fifteen inches long (38 cm.) by about eight inches wide (20 cm.). Shirts in sizes nine through ten are about seventeen inches long (43 cm.) by about ten inches wide (24 cm.).

Larger innerwear top 10a sizes for adults, particularly women, may range from about twelve inches across (30 cm.) to about fifteen inches long (38 cm.). Heights corresponding thereto range from about twenty seven inches (68 cm.) to about thirty inches (76 cm.).

For men, innerwear shirts 10a may range from about fifteen inches (38 cm.) to about eighteen inches (45 cm.). Corresponding heights range from about thirty inches (76 cm.) to about thirty three inches (83 cm.).

Typically, a button hole of about seven millimeters length is adequate for an aperture 60. Meanwhile, the seams 61 or other reinforcements 61 therearound may be a satin stitch button hole seam 60 as is known in the art, a grommet 61 or the like. The button hole 60 may range from about seven millimeters to about twenty millimeters in diameter. The size of the aperture 60 may actually be a matter of personal choice.

The present invention may be embodied in other specific forms without departing from its purposes, functions, structures, or operational characteristics. The described embodiments are to be considered in all respects only as illustrative, and not restrictive. The scope of the invention is, therefore, indicated by the appended claims, rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed and desired to be secured by United States Letters Patent is:

1. A method of forming a pocket (20) on an article of clothing (10), the method comprising:

providing an article of clothing (10) comprising an expanse of fabric (15);

providing a containment portion (54) having a containment perimeter defined and entirely circumscribed by a top edge (55) and a remaining edge, the top edge (55) being free and the remaining edge being bound to the expanse of fabric (15), rendering the containment portion (54) a first sub pocket (54) having a containment opening, open in a single direction corresponding to the top edge;

providing a cover portion (52) having a cover perimeter defined and entirely circumscribed by a bottom edge (53) and a residual edge, the bottom edge (53) being free and the residual edge bound to the expanse of fabric (15);

overlapping the top edge (55) and the bottom edge (53) by a distance selected to render the cover portion (52) a second sub pocket (52), inverted to open only along the bottom edge (53) thereof and completely enclosing the containment opening against passage of an object (62) out of the containment opening; and

securing the cover portion (52) and the containment portion (54) to the article of clothing (10).

2. The method of claim 1, further comprising selecting a relief region (40) as a location for securing the pocket (20), comprising the containment portion (54), the cover portion (52), and a portion of the fabric (15).

3. The method of claim 2, wherein the relief region is selected to corresponding to a portion of the article of clothing sized and shaped to overlie soft tissue of a user proximate a protrusion corresponding to a bodily member thereof.

4. The method of claim 3, wherein the relief region (40) is positioned proximate one of a shoulder, a sternum, an arm, a rib, a hip, a thigh, a calf, and an ankle.

5. The method of claim 4, wherein at least one of the containment region (54) and the cover region (52) is rectangular in shape.

6. The method of claim 5, wherein the pocket (20) is substantially rectangular in shape.

7. The method of claim 6, wherein the article of clothing (10) is an article of innerwear (80) effectively form fitting about a body of a wearer.

8. The method of claim 7, further comprising forming an aperture (60) in the pocket (20) providing access by an elongate line (64) to an interior portion of a cavity formed by the pocket (20) between the fabric (15) and at least one of the cover region (52) and the containment region (54).

9. The method of claim 8, wherein the aperture (60) defines a perimeter and the method further comprises providing a reinforcement (61) to the aperture by securing to the perimeter at least one of a seam (61), a grommet (61), and a backing layer (63a).

10. The method of claim 9, wherein at least one of the fabric (15), the cover portion (52), and the containment portion (54) are formed of a cloth containing a knit, elastomeric material.

11. An apparatus (10) comprising:

a base (10) comprising a first fabric (15);

a containment portion (54) having a containment perimeter defined and entirely circumscribed by a top edge (55) and a remaining edge, the top edge (55) being free and the remaining edge being bound to the base (10), thereby rendering the containment portion (54) a first pocket (54) having a containment opening, open in a single direction corresponding to the top edge (55);

a cover portion (52) having a cover perimeter defined and entirely circumscribed by a bottom edge (53) and a residual edge, the bottom edge (53) being free and the residual edge bound to the base; and

a mouth (50), comprising a region from proximate the top edge (55) to proximate the bottom edge (53) openable by separating the top (55) and bottom (53) edges away from the cover portion (52) and the containment portion (54), respectively.

12. The apparatus of claim 11, further comprising a perimeter defining an aperture (60) in at least one of the cover region (52), containment region (15), and base (10), the perimeter being sized to permit penetration therethrough by a an elongate object (64) having an effective (hydraulic) diameter substantially less than the length of both the top edge (55) and bottom edge (53).

13. The apparatus of claim 12, further comprising a reinforcement (61) extending about the perimeter, selected from stitching (61), a grommet (61), fabric (63a), and a combination of at least two thereof.

14. The apparatus (20) of claim 13, further comprising:

the cover portion (52) defining three cover edges bound to the base (10) and a cover mouth edge (53) extending free from the base (10);

the containment portion (54) defining three containment edges bound to the base (10) and a containment mouth edge (55) extending free from the base (10);

the cover portion (52) and containment portion (54) overlapping one another between the cover mouth edge (53) and containment mouth edge (55) to form an upright pocket (54) of the containment portion (54) and an inverted pocket (52) of the cover portion (52).

15. The apparatus (20) of claim 14, wherein:

the cover portion (52) comprises a top seam and the containment portion (54) comprises a bottom seam, each opposite one another;

the cover portion (52) and containment portion (54) share side seams (58c, 58d); and

the top seam (58a), bottom seam (58b), and side seams (58c, 58d) completely limit motion of an object (62) therewithin between the containment portion (54) and the base (10).

16. The apparatus (20) of claim 15, further positioned on the base (10) at a relief region (40), corresponding to a portion of the base (10) selected to overlie soft tissue of a user proximate a protrusion (42) corresponding to a bodily member thereof.

17. The apparatus (20) of claim 16, wherein the relief region (40) is positioned proximate one of a shoulder, a sternum, an arm, a rib, a hip, a thigh, a calf, and an ankle.

18. The apparatus (20) of claim 17, wherein the apparatus (20) is substantially rectangular in shape, and the base (10) is an article of clothing (10) effectively form fitting about a body of a wearer.

19. The apparatus (20) of claim 11, wherein an aperture (60) provides access by an elongate line (64) to an interior portion of a cavity formed between the base (10) as an interior wall and the cover portion (52) and containment portion (54) combined as an exterior wall thereof.

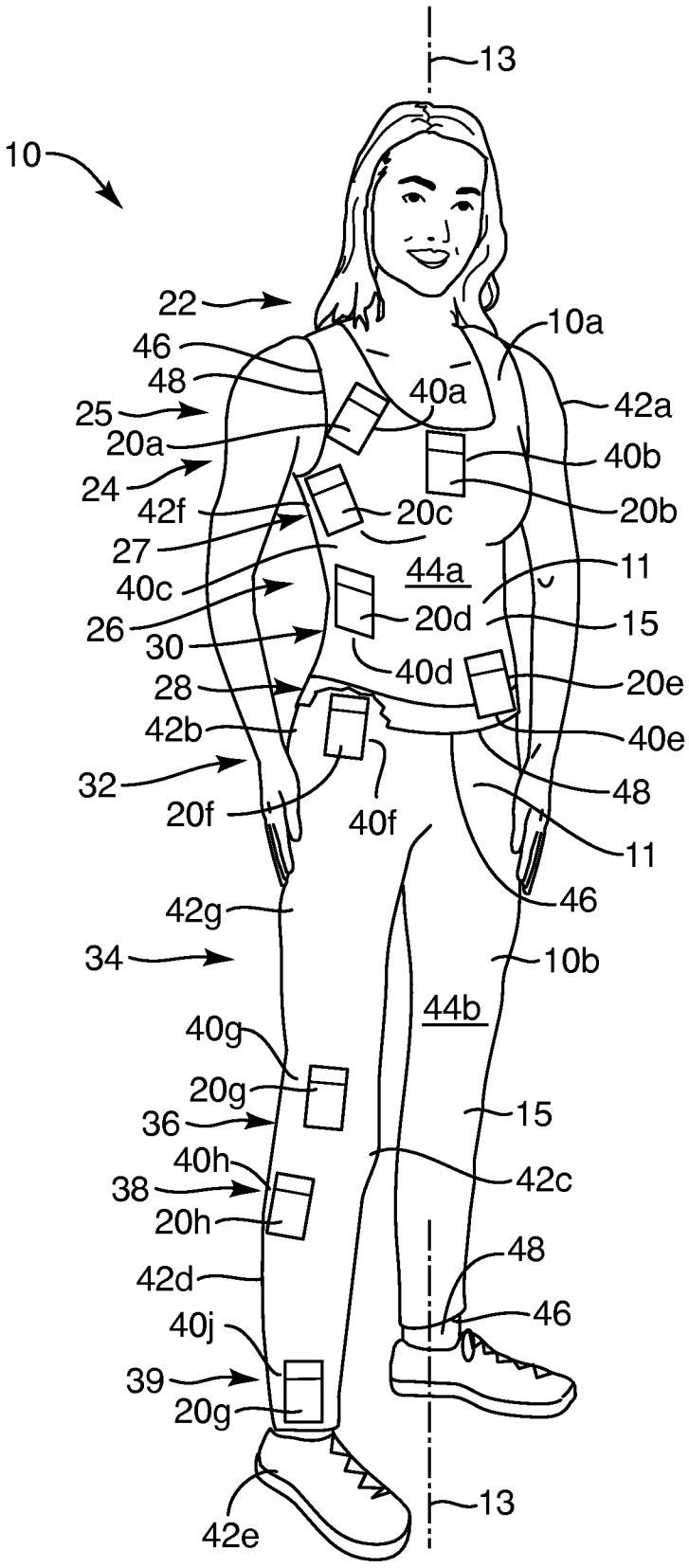
20. A method of securing an object (62) to clothing (10), the method comprising:

providing an article of clothing (10) comprising an expanse of fabric (15);

providing a containment (54) defining a first perimeter entirely circumscribed by a top edge (55) and a remaining edge, the top edge (55) being free and the remaining edge being bound to the expanse of fabric (15);

providing a cover (52) having a second perimeter defined and entirely circumscribed by a bottom edge (53) and a residual edge, the bottom edge (53) being free and the residual edge bound to the expanse of fabric (15); and

overlapping the top edge (55) and the bottom edge (53) by a distance selected to render the cover (53) inverted to open only along the bottom edge (53) thereof and completely enclosing the containment opening proximate the top edge (55) thereof against passage of an object (62) out of the containment opening.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10
22
46
48
25
20a
24
42f
27
40c
26
30
28
42b
32
20f
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34
40g
20g
36
40h
38
20h
42d
40j
39
20g
42e
13
10a
40a
42a
40b
20b
20c
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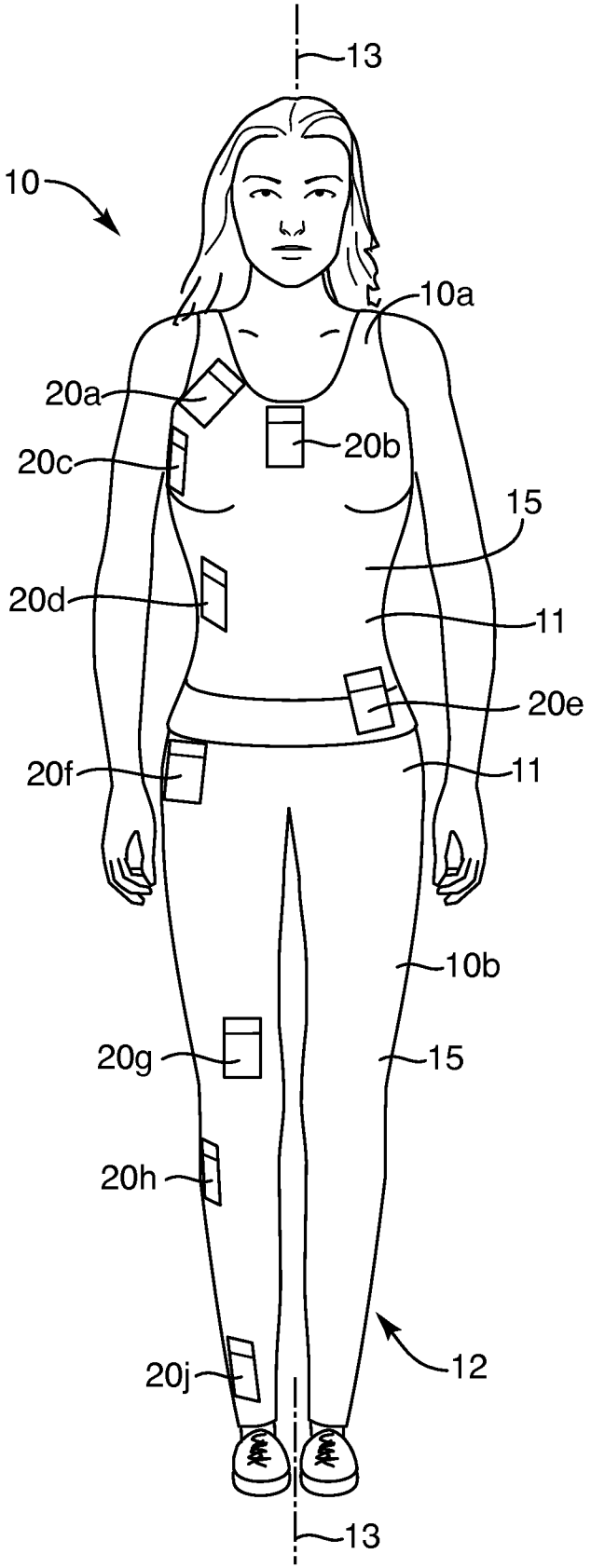
46
10b
44b
15
42c
48
46

FIG. 1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10
10a
20a
20b
20c
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20d
11
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20f
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10b
20g
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20h
12
20j
13

FIG. 2

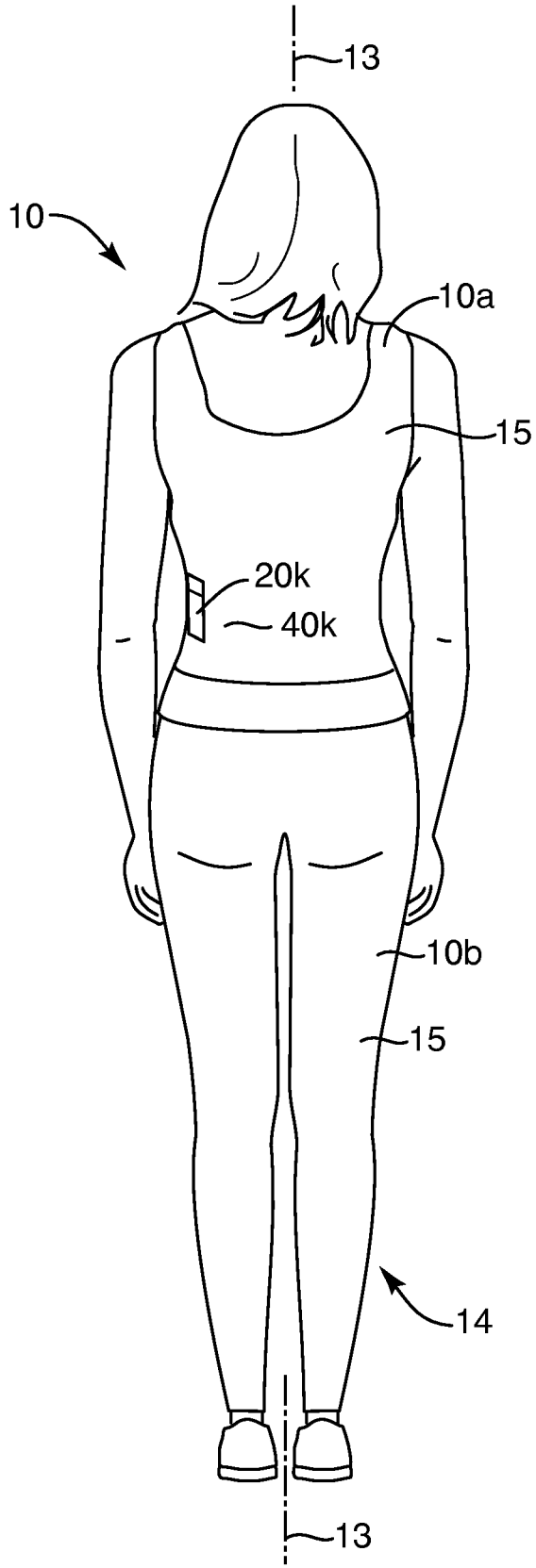
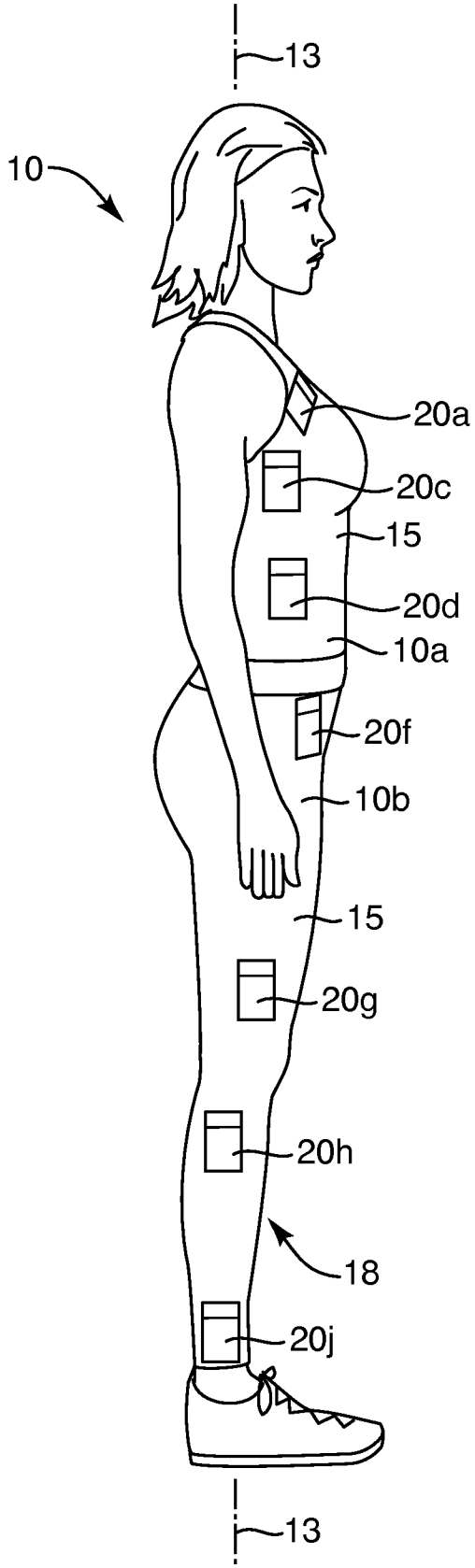

13
10
10a
15
20k
40k
10b
15
14
13

FIG. 3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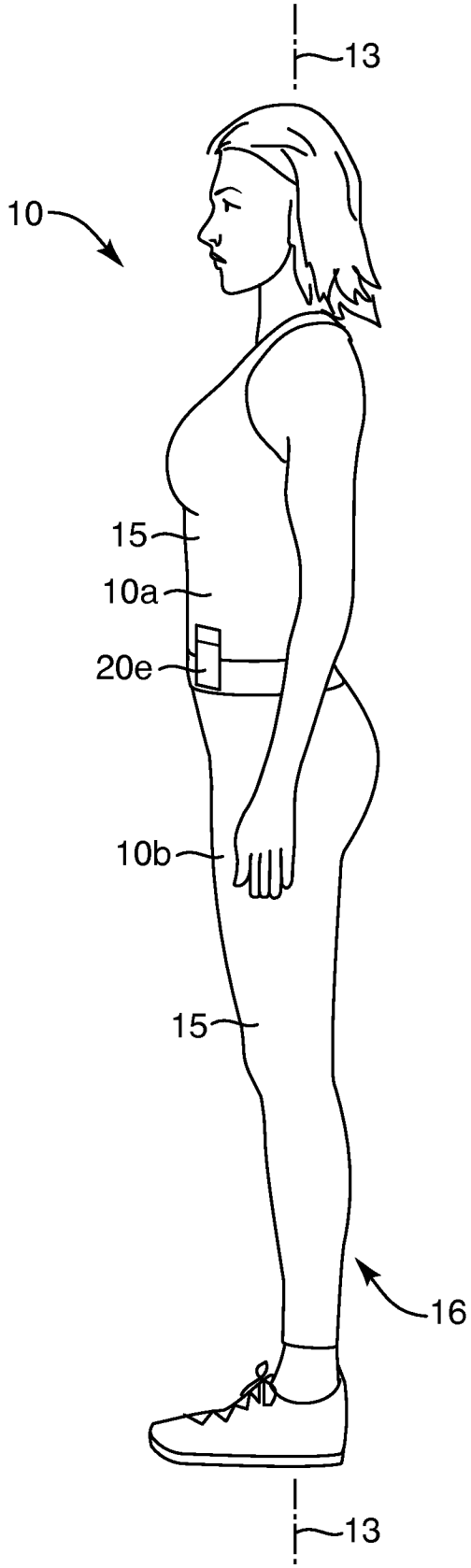
10
20a
20c
15
20d
10a
20f
10b
15
20g
20h
18
20j
13

FIG. 4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10
15
10a
20e
10b
15
16
13

FIG. 5

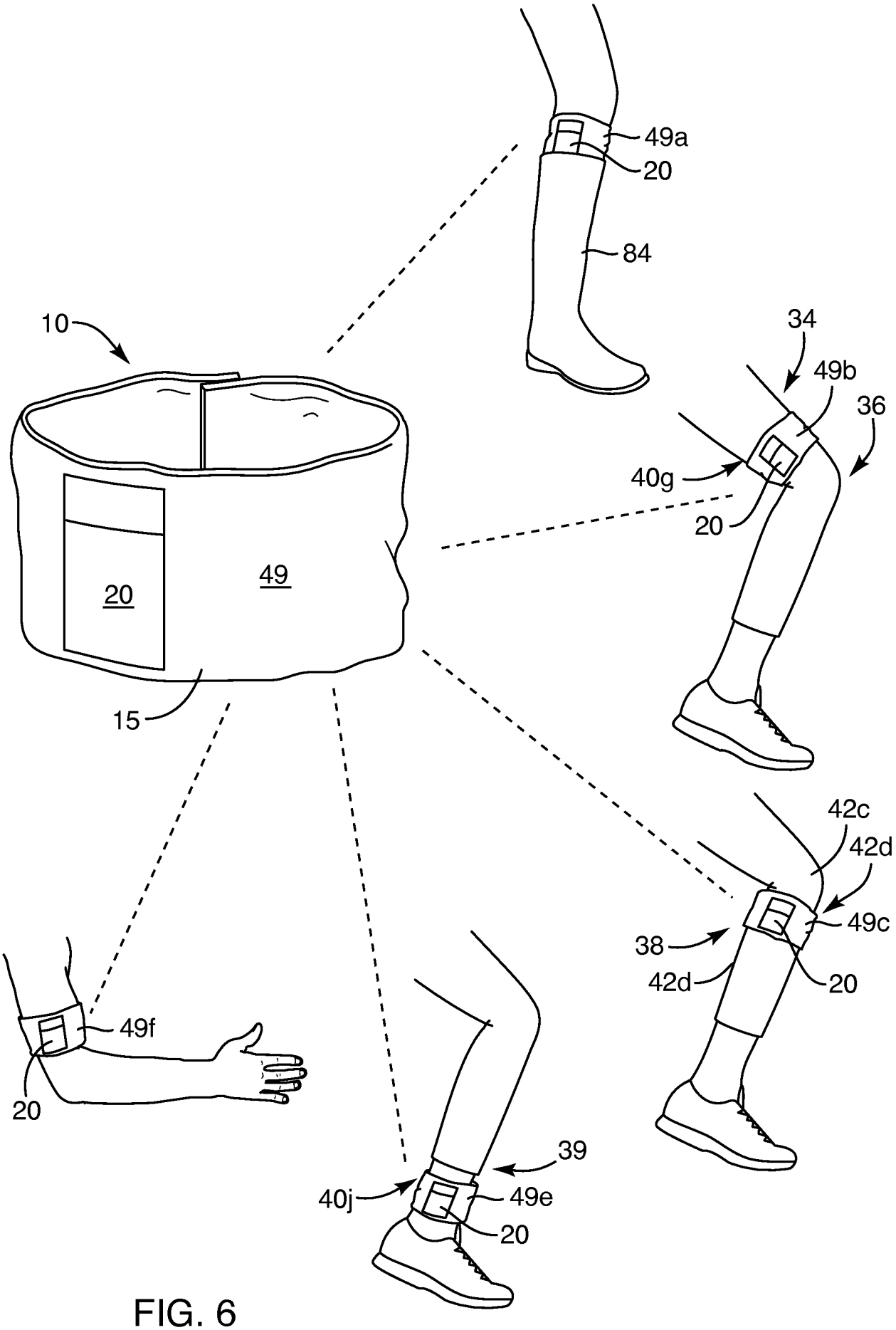

49a
20
84
10
34
49b
36
40g
20
20
49
15
42c
42d
49c
38
42d
20
49f
20
39
40j
49e
20

FIG. 6

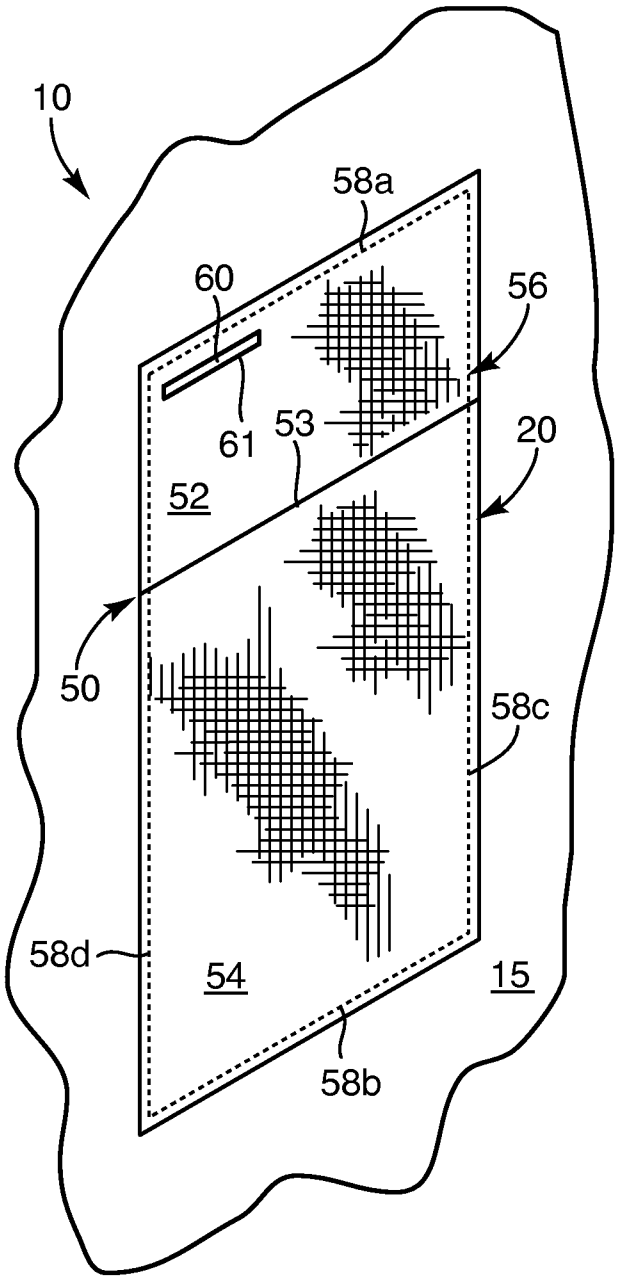

10
58a
60
56
61
53
20
52
50
58c
58d
54
15
58b

FIG. 7A

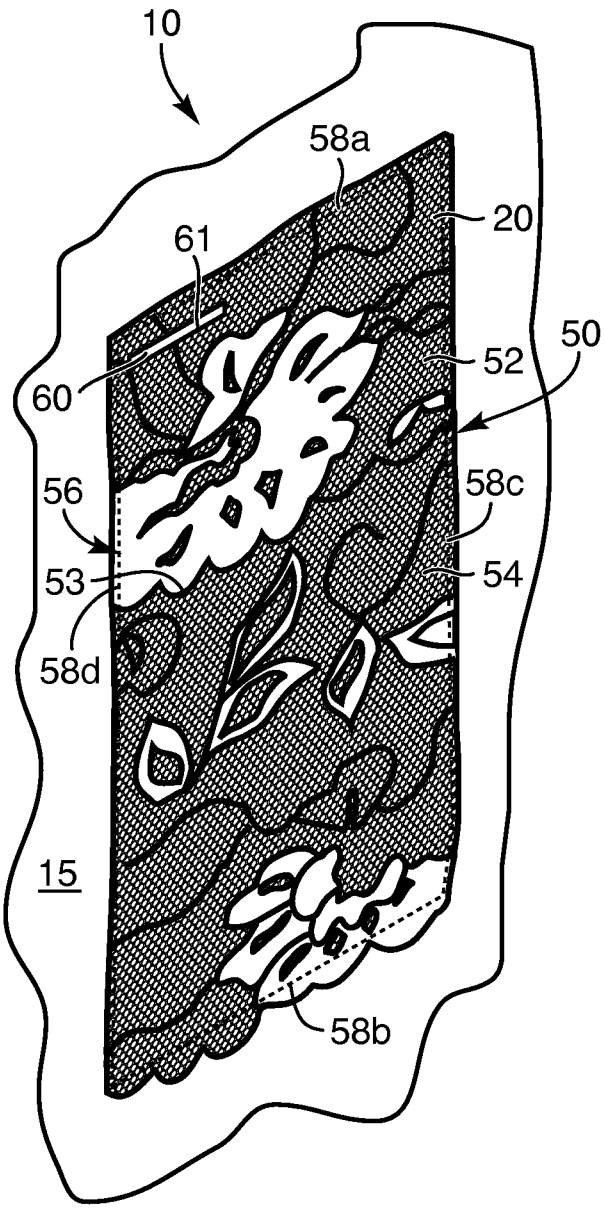

10
58a
20
61
50
52
60
56
58c
53
54
58d
15
58b

FIG. 7B

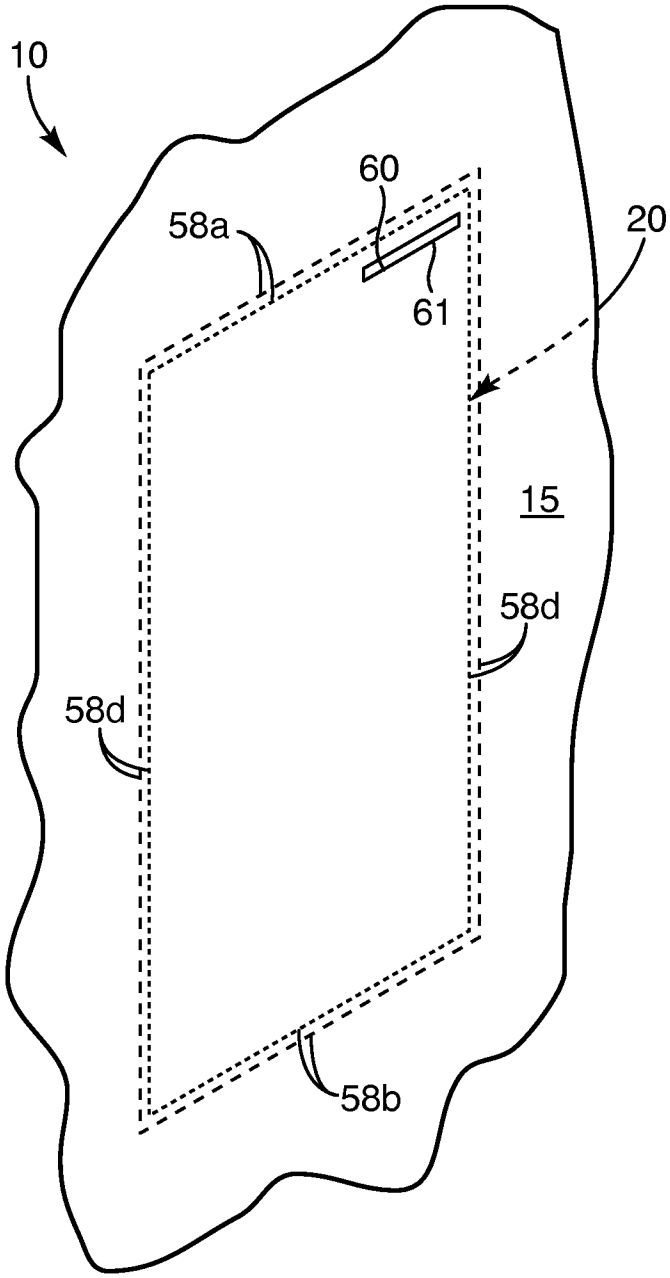


FIG. 8

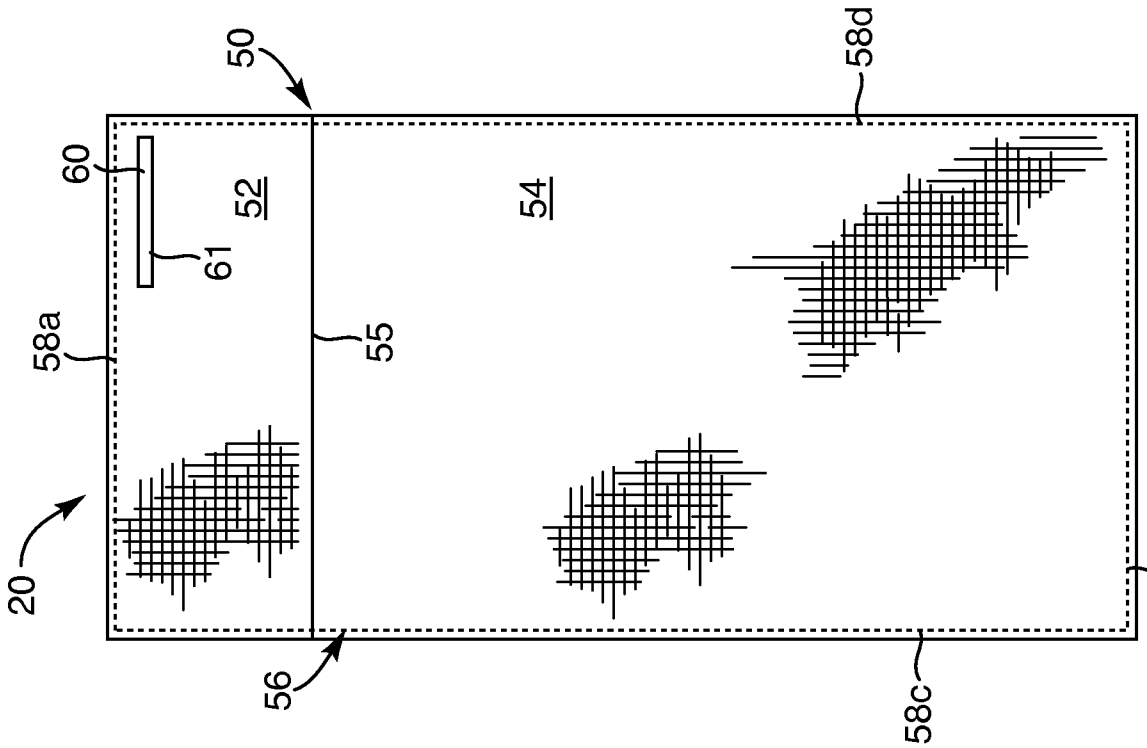

50
58d
60
52
54
61
58a
55
20
58b
56
58c

FIG. 9B

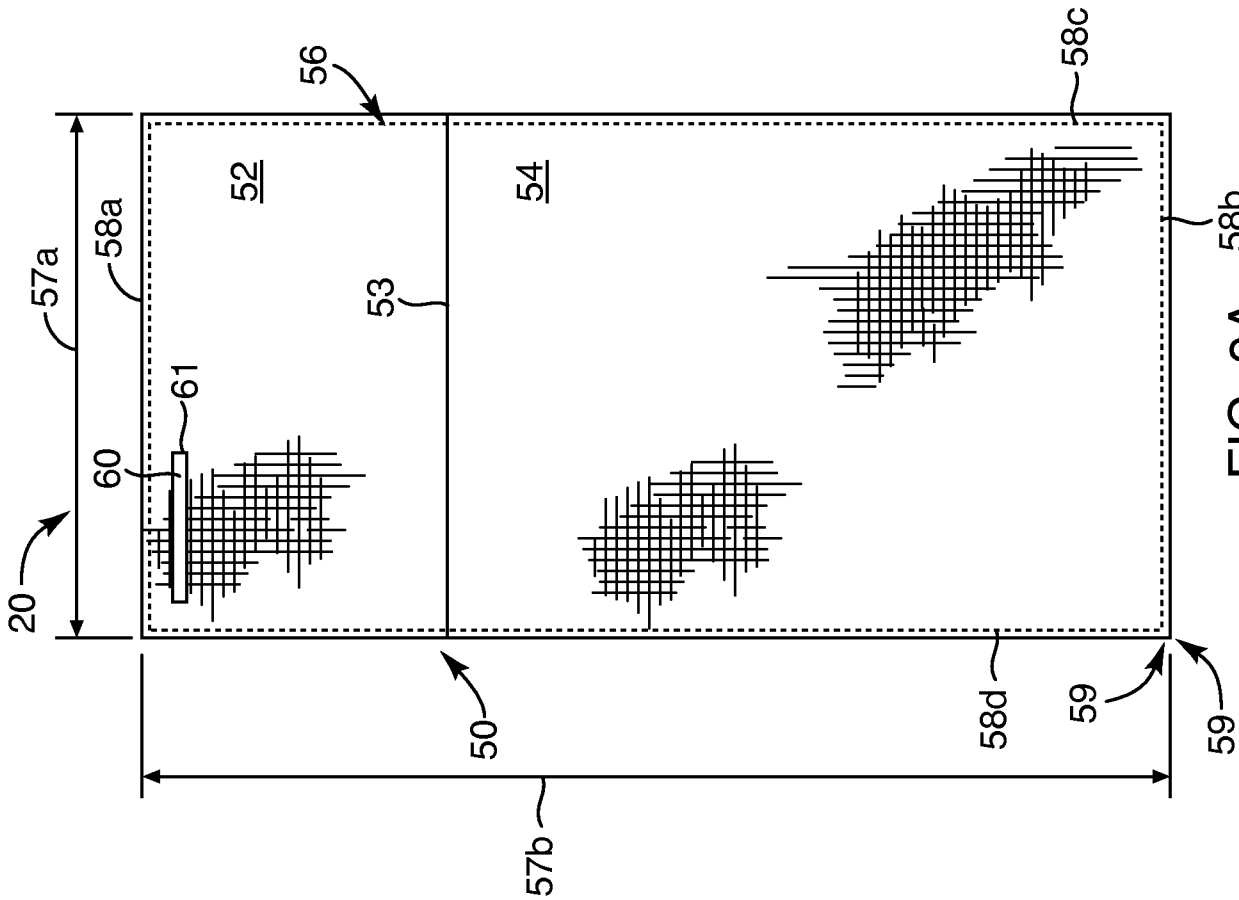

56
58c
52
54
58b
57a
58a
53
61
60
20
50
58d
59
59
57b

FIG. 9A

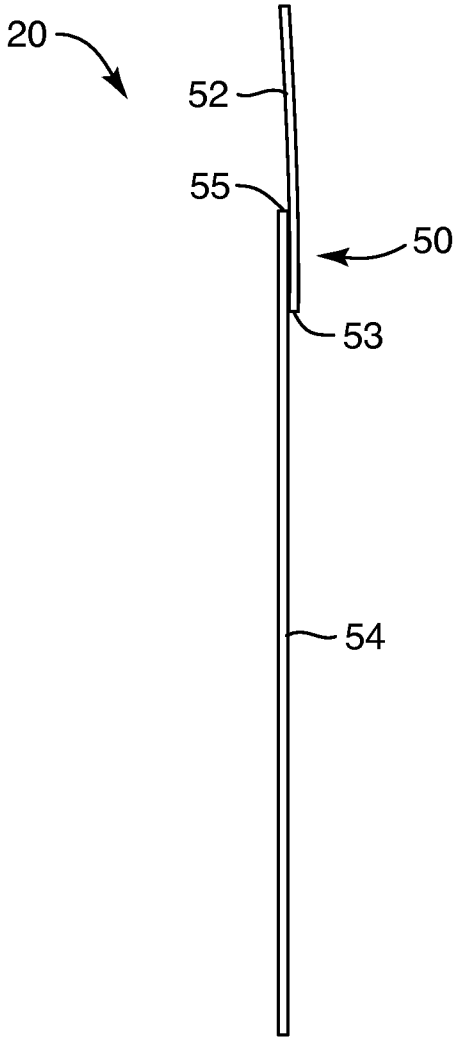


FIG. 9C

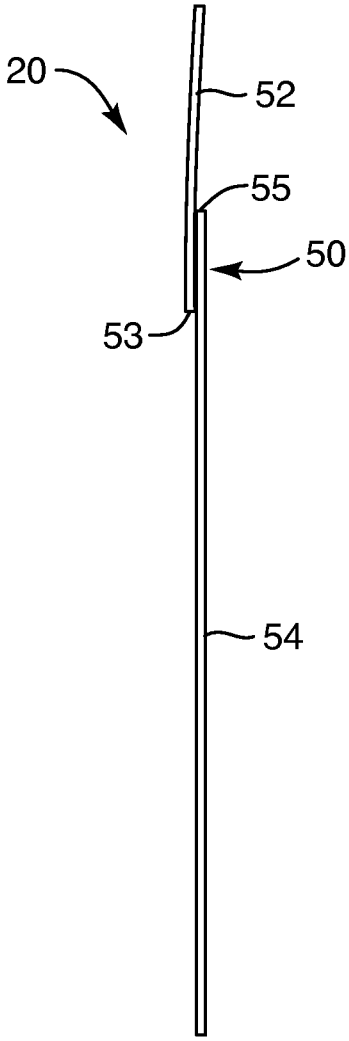


FIG. 9D

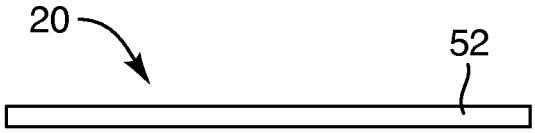


FIG. 9E

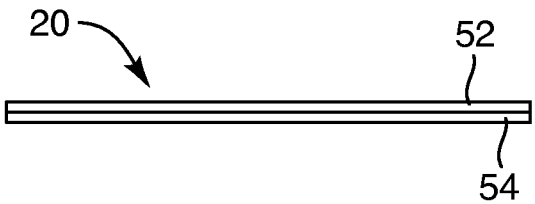


FIG. 9F

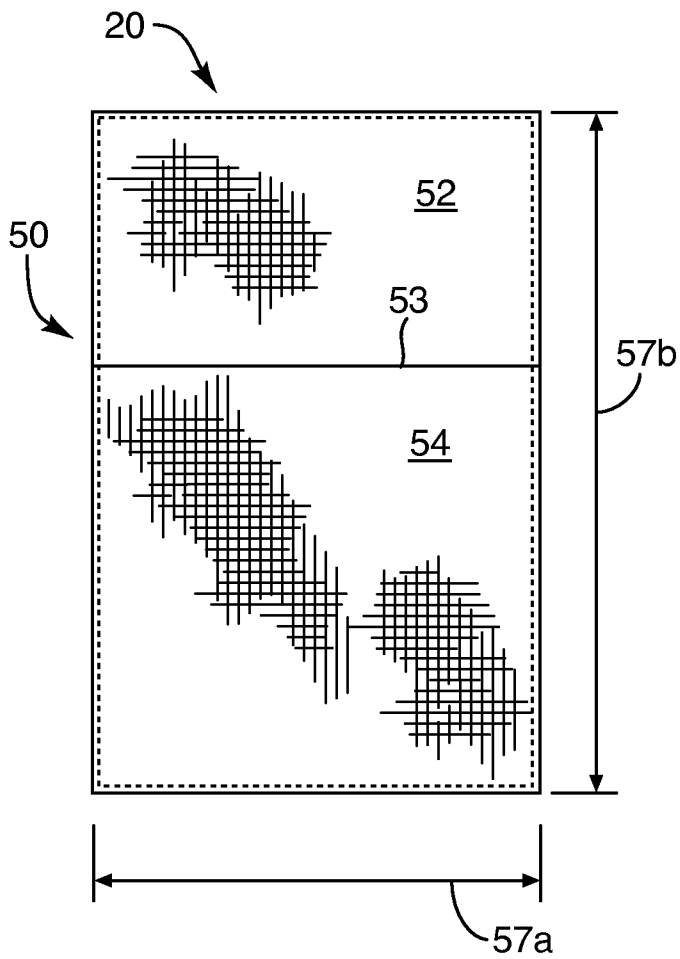


FIG. 10A

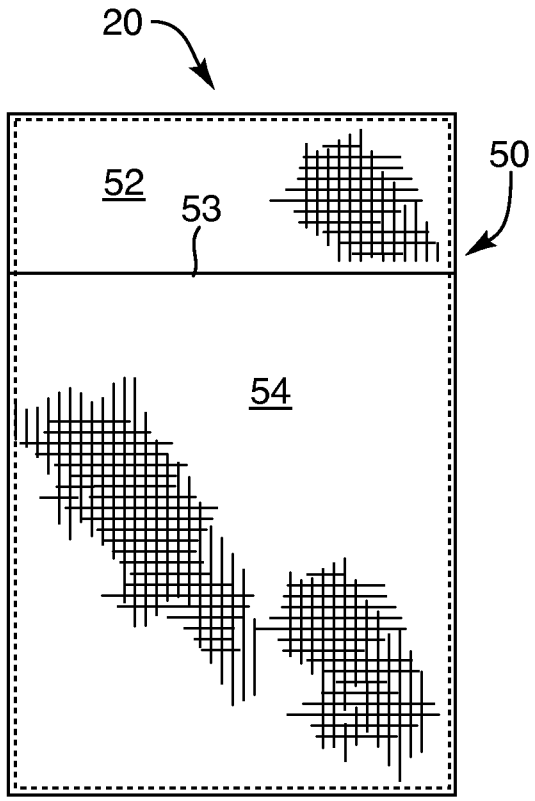


FIG. 10B

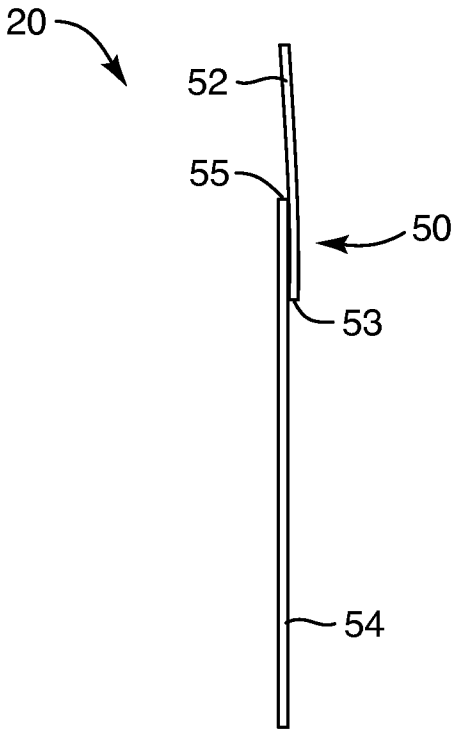


FIG. 10C

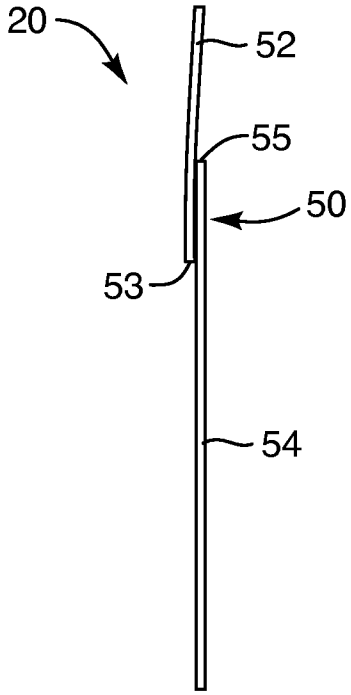


FIG. 10D

FIG. 10E

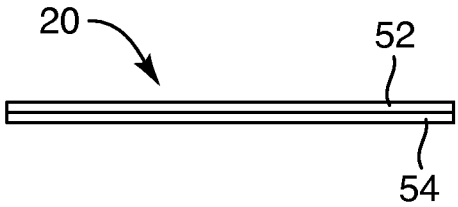


FIG. 10F

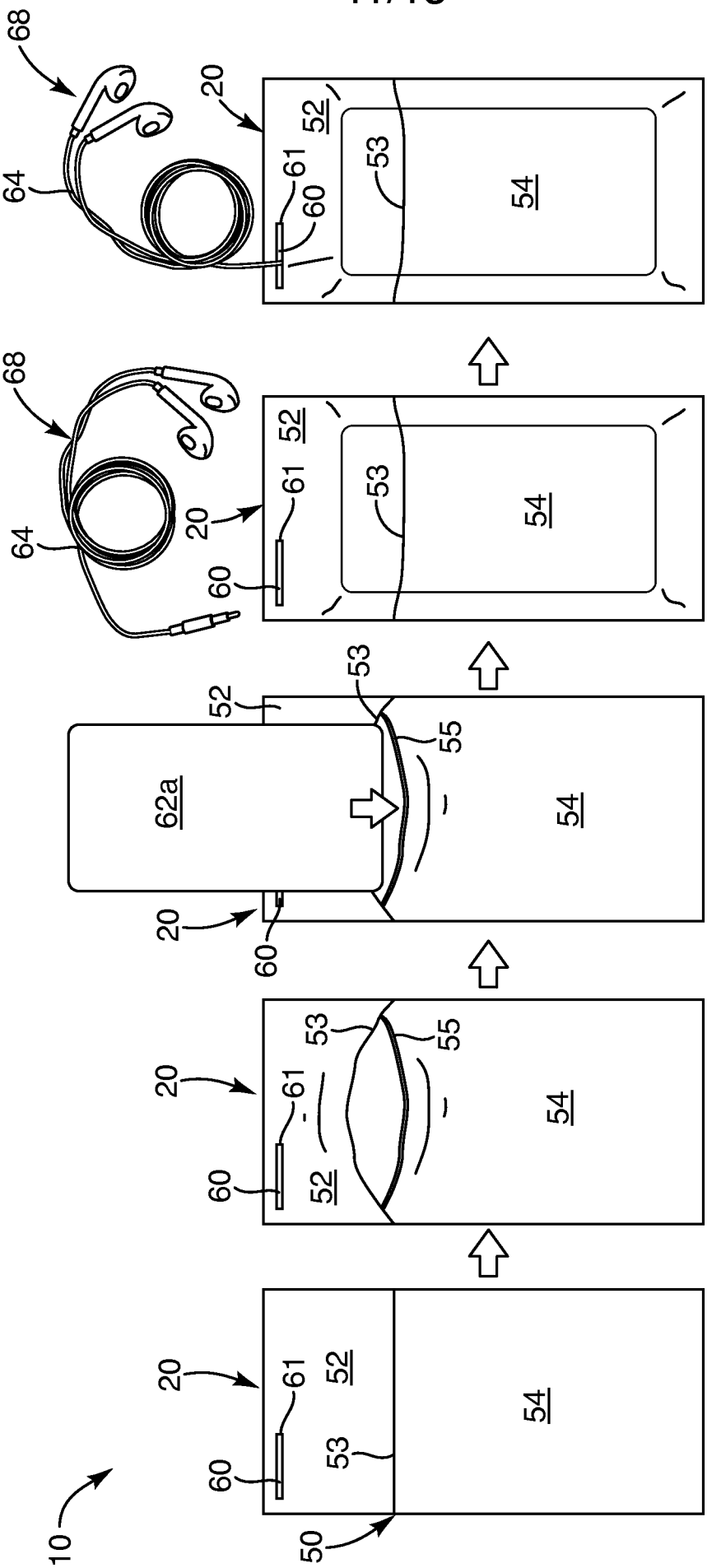
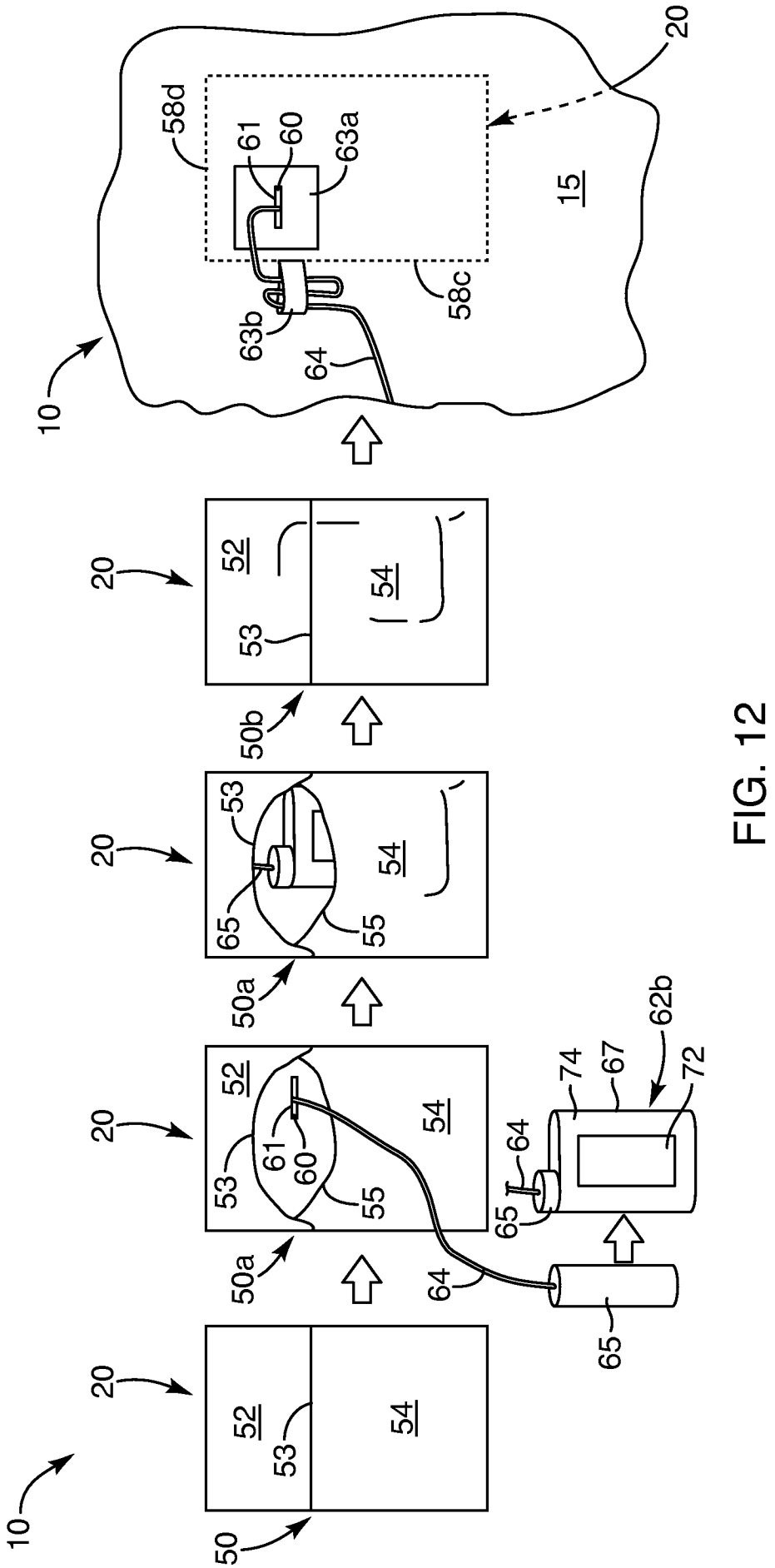


FIG. 11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50a
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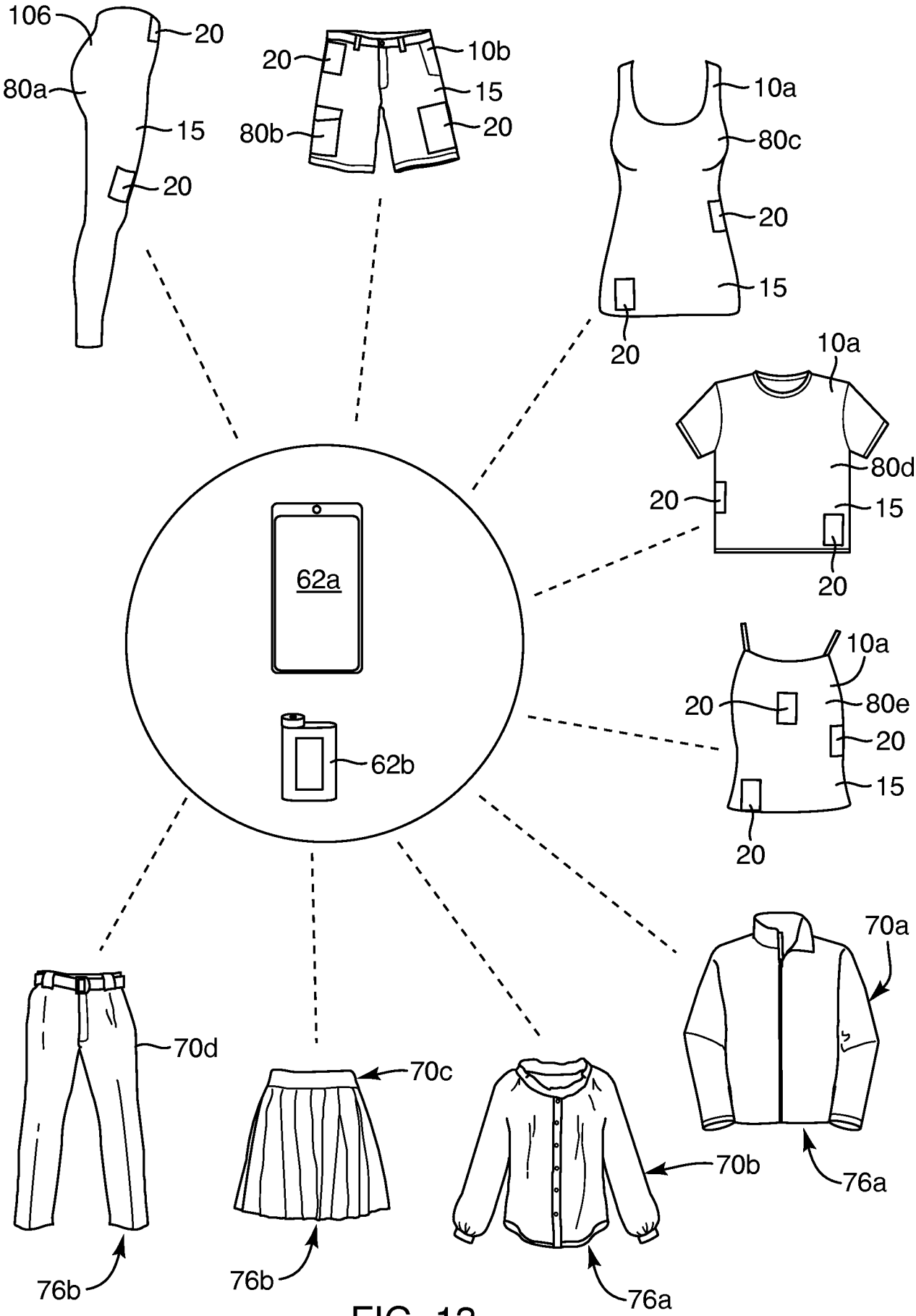
62b
74
67
72
50

FIG. 12


106
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80c
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20
62a
62b
10a
20
80e
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15
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70a
70d
70c
70b
76a
76b
76b
76a

FIG. 13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2015/053510

A. CLASSIFICATION OF SUBJECT MATTER

A41D 27/20(2006.01)i, A41D 27/02(2006.01)i, A41D 1/00(2006.01)i, A41B 9/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A41D 27/20; A41D 1/00; A41D 27/08; G11B 21/08; A41C 3/00; A41B 9/04; A41D 27/02; A41B 9/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: pocket, clothing, fabric, edge, cover (flap), overlap, rectangular, innerwear, aperture, earphone line, mouth, seam, diabetes

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2009-0094725 A1 (SMITH, STEPHEN et al.) 16 April 2009 See paragraphs [0007]-[0010] and [0014]-[0021]; claims 8-10; and Figures 1-4.	1-20
Y	JP 3130065 U (TAKAHASHI, KATZ) 15 March 2007 See paragraphs [0004]-[0010] and [0012]; and Figures 1-7.	1-20
A	US 2006-0227675 A1 (FRIED, LANCE) 12 October 2006 See paragraphs [0008]-[0012] and [0032]-[0034]; claim 1; and Figures 2-5.	1-20
A	US 2008-0032600 A1 (UPDYKE, LAUREN GRACE) 07 February 2008 See paragraphs [0023]-[0026] and [0033]-[0036]; claim 1; and Figures 1-3.	1-20
A	US 2010-0281595 A1 (GERNES, SARAH JANE) 11 November 2010 See paragraphs [0006]-[0014] and [0030]-[0033]; claim 1; and Figures 1 and 2.	1-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
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"E" earlier application or patent but published on or after the international filing date
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 December 2015 (21.12.2015)	**22 December 2015 (22.12.2015)**

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2015/053510

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