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(54) **DISCRETE FLY FOR ADAPTIVE CLOTHING**

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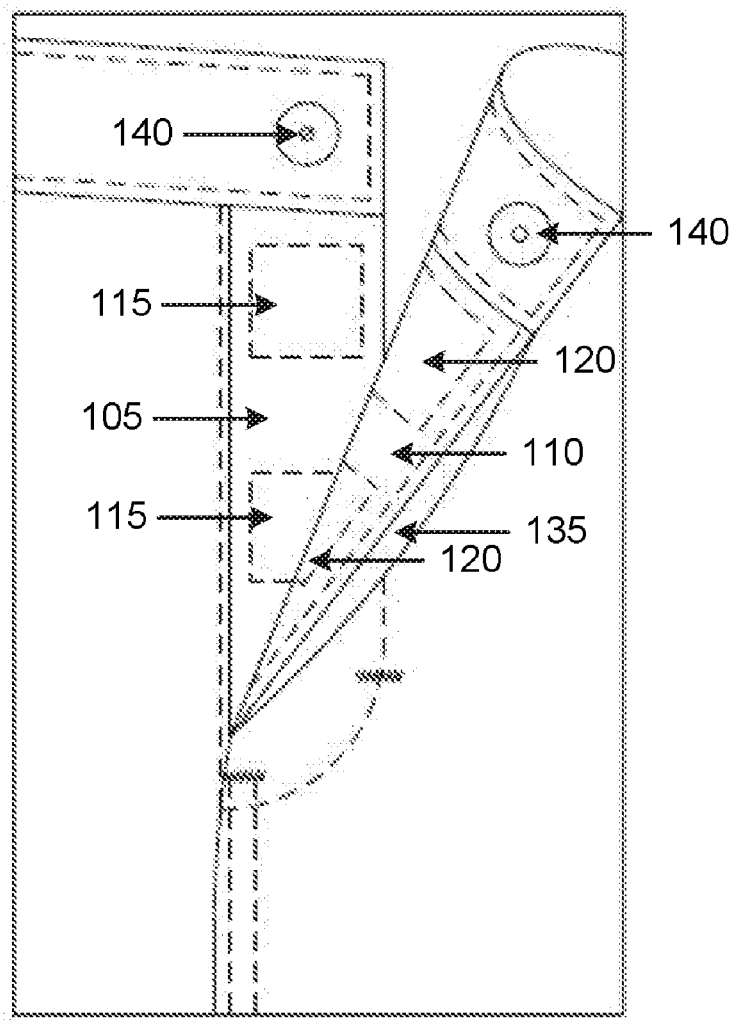
(57) **ABSTRACT**

The invention relates to a fly for fastening together a first panel and a second panel of an adaptive garment. The first panel includes one or more magnetic fasteners (or a magnetic strip) having a connecting side of a positive or negative polarity. The second panel includes a corresponding number of magnetic fasteners (or a magnetic strip) having a connecting side of an opposite polarity. When the first and second panels are closed, the connecting side of the magnetic fasteners (or magnetic strip) from the first panel is magnetically attached to the connecting side of the magnetic fasteners (or magnetic strip) from the second panel, so that the second panel covers the first panel. The fly further includes a visible third panel positioned over and concealing the second panel. An adaptive garment, such as a pair of trousers, pants or shorts, may have a similarly constructed leg opening in addition to the fly.



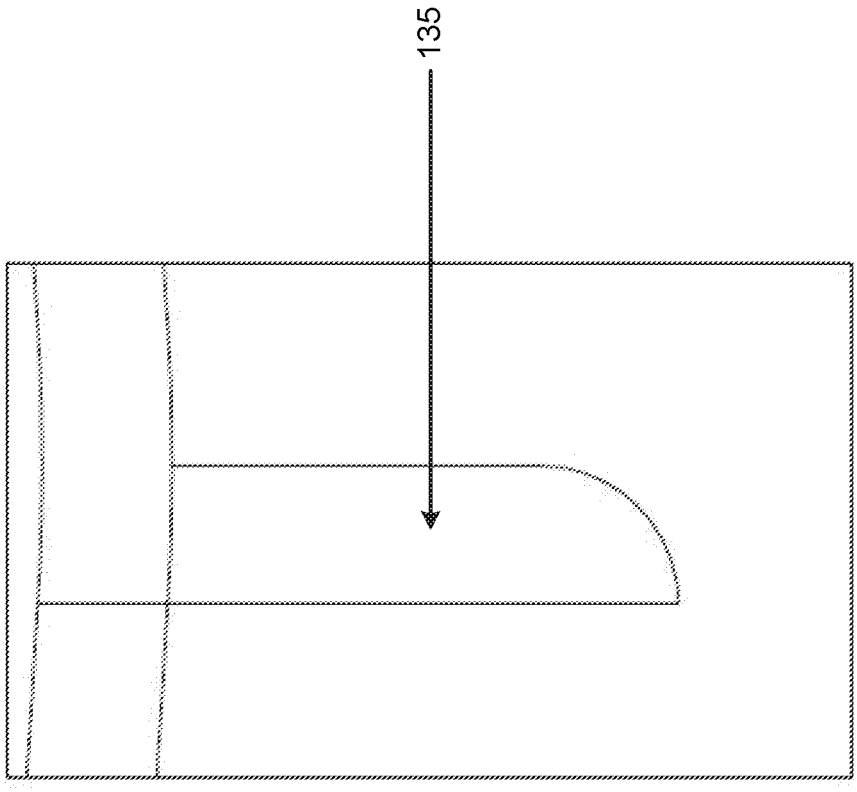


Fig. 1

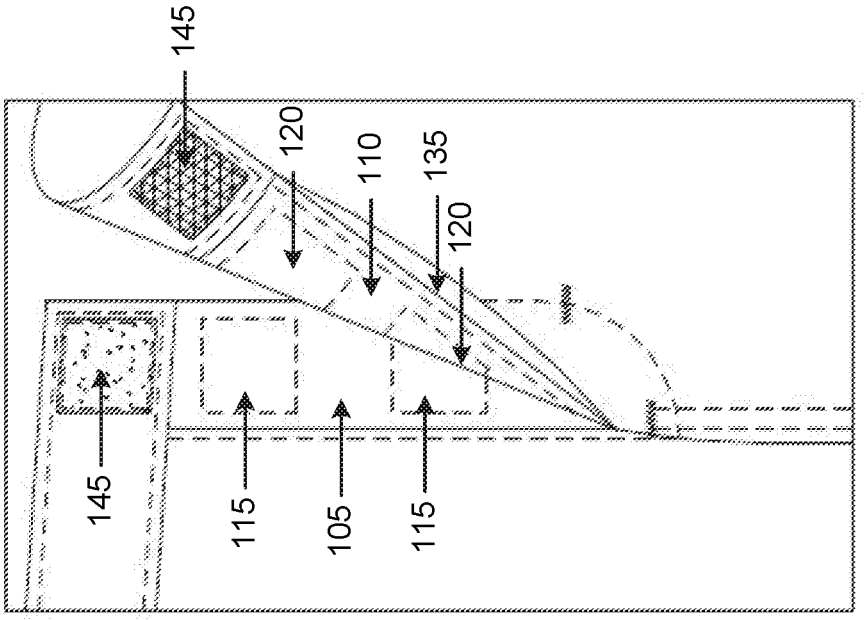

145
120
110
135
120
145
115
105
115

Fig. 2B

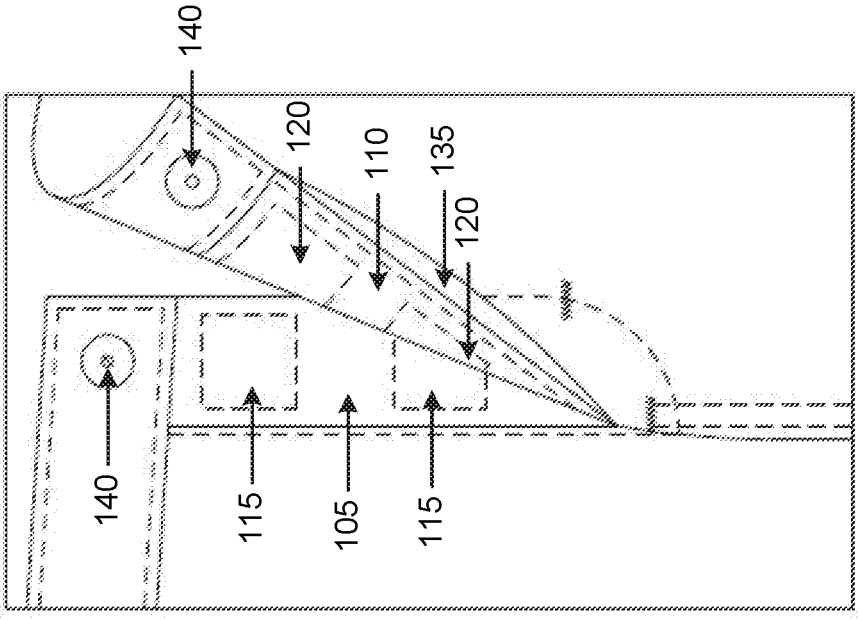

140
120
110
135
120
140
115
105
115

Fig. 2A

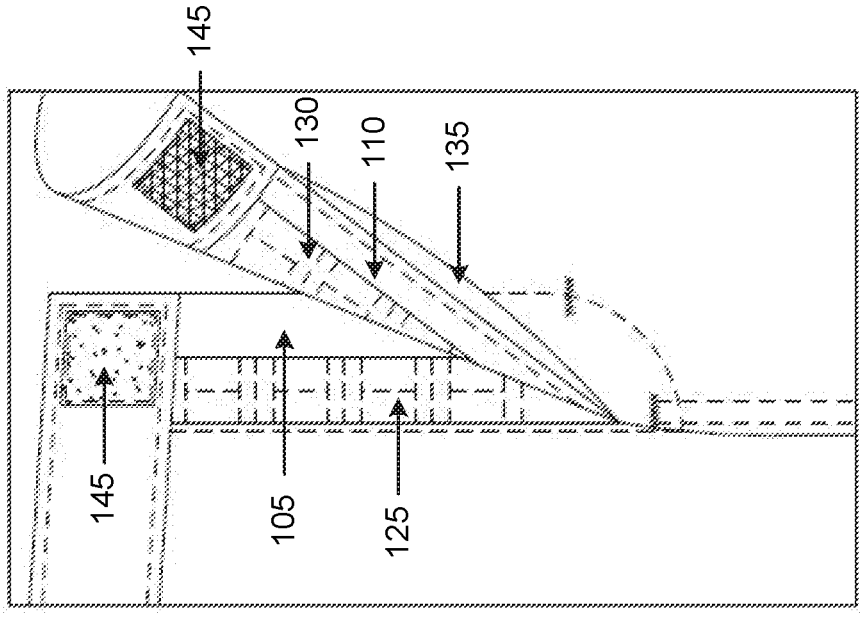


Fig. 3B

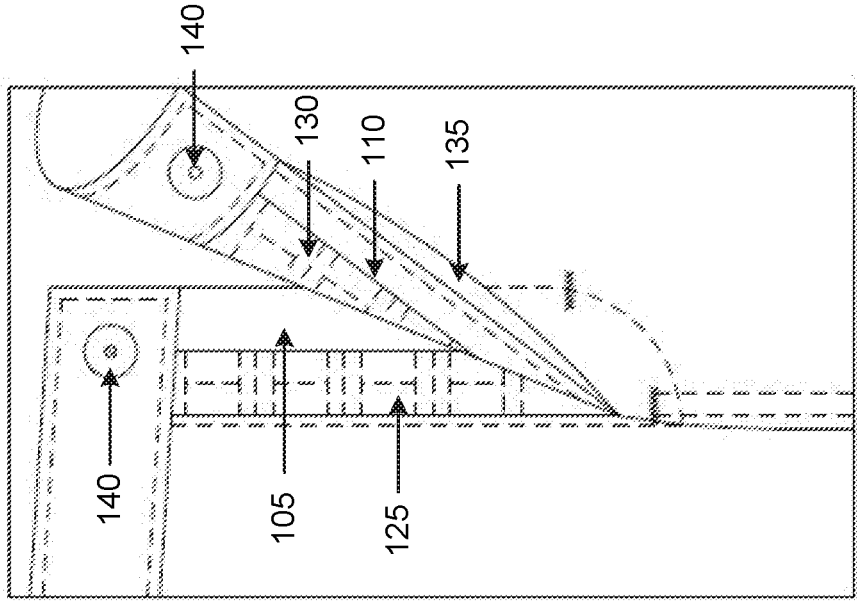


Fig. 3A

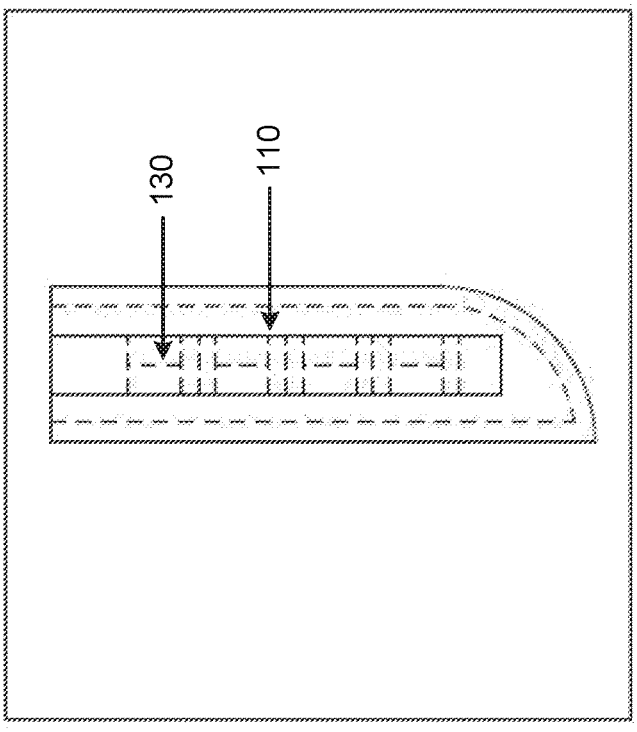


Fig. 4B

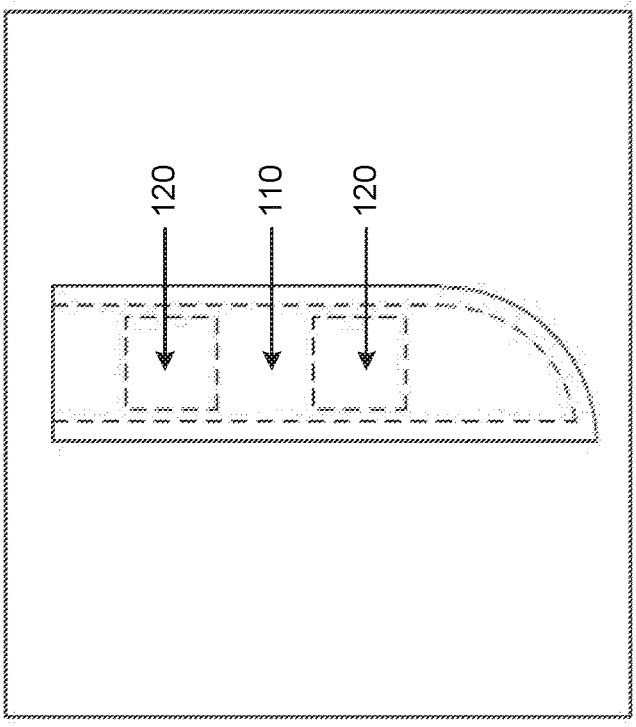


Fig. 4A

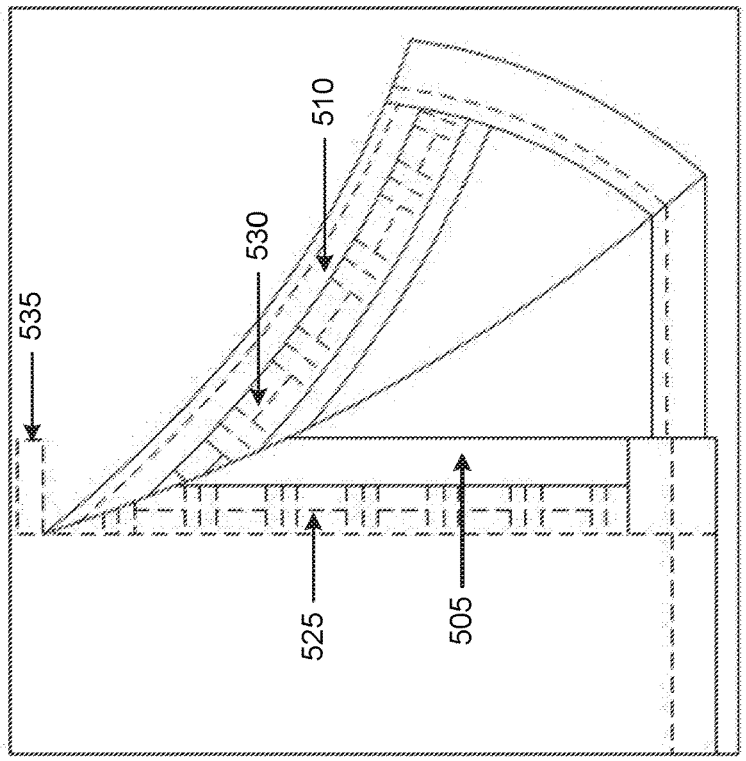


Fig. 5B

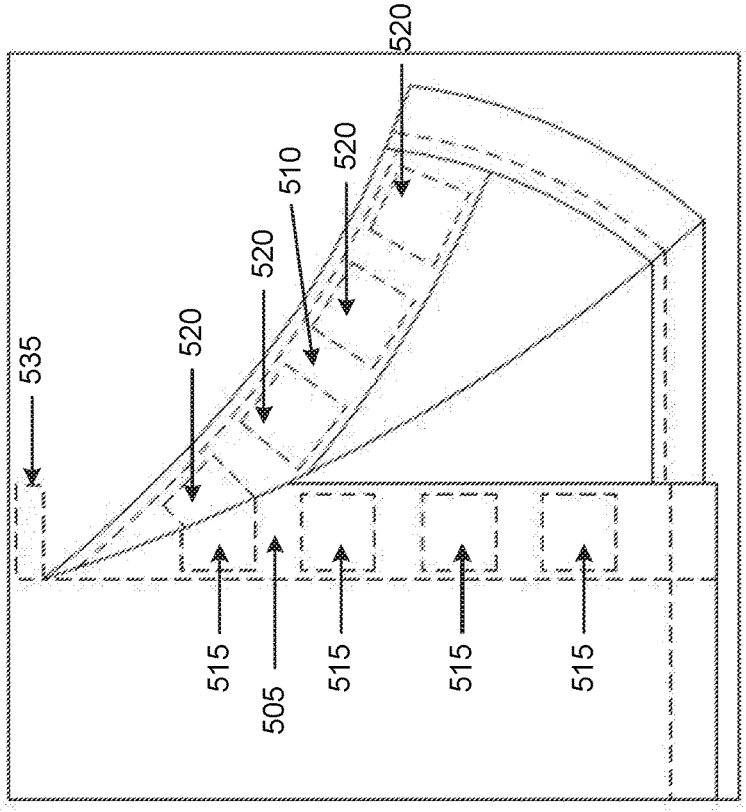


Fig. 5A

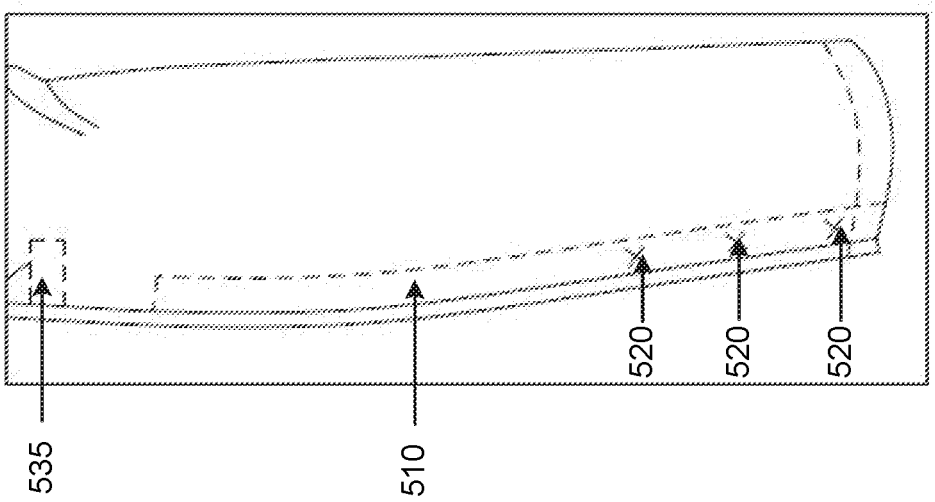


Fig. 6

DISCRETE FLY FOR ADAPTIVE CLOTHING

CROSS REFERENCE TO RELATED APPLICATION FOR WHICH A PRIORITY BENEFIT IS CLAIMED UNDER 35 U.S.C. § 119

[0001] The present patent application claims priority under 35 U.S.C. § 119(e) to U.S. Provisional Application No. 62/571,655, filed Oct. 12, 2017, the entire disclosure of which is incorporated by reference herein.

FIELD OF THE INVENTION

[0002] The present invention relates to a garment comprising a novel fly design.

BACKGROUND OF THE INVENTION

[0003] It is known that pants, trousers, shorts, skirts, skorts, capris, jumpsuits, rompers, dresses and the like may comprise a cut opening. For example, this cut opening may extend at the crotch of a pair of pants, downwards from the waist band. The cut opening usually contains a zipper or buttons to connect two panels of the garment together. Typically, these cut openings also contain a flap of fabric which conceals the zipper or buttons. This is typically known in the art as a "fly."

[0004] Recently, the apparel industry has recognized the need to develop and design adaptive clothing for persons with disabilities, limited dexterity or limited mobility, such as those who have difficulty using a conventional zipper or buttons. Accordingly, the apparel industry now uses a variety of alternative closures in place of zippers and buttons, including magnetic fasteners, snap fasteners and hook and loop fasteners, which make it easier for the disabled or their caregivers to put on and take off clothing. This in turn gives the disabled more confidence and self-esteem, and allows them to get dressed more easily and quickly. Moreover, the apparel industry recognizes that adaptive clothing should also be fashionable, so the wearer can better fit in and feel more at ease. This is especially important for disabled children, who want to be cool and stylish. Consequently, the alternative closures in the adaptive apparel should be discrete.

[0005] However, a conventional fly does a poor job of concealing alternative closures. For example, magnetic fasteners are relatively bulky as compared to a conventional zipper or buttons, and the panel that typically contains or supports them may bulge or otherwise stand out. Or the means of adhering the alternative closure to the garment, e.g., stitching, glue, tape and the like, may be visible on the panel or cause ripples or bulges. In summary, a panel that contains an alternative closure may bulge or otherwise look out of place as compared to when it overlays a conventional zipper or buttons, and the fact that the garment contains alternative closures may be visibly apparent to the wearer and others. The presence of alternative closures are thus no longer discrete, and the adaptive clothing loses its fashionability and may embarrass the wearer—or worse stigmatize the wearer—thereby defeating its original intention of giving the wearer confidence, self-esteem and style.

[0006] Accordingly, there is a need to develop a novel fly that more discretely conceals the alternative closures that are used in adaptive clothing.

SUMMARY OF THE INVENTION

[0007] One object of the invention is to provide adaptive garments which are easy to put on and take off, especially for those who have disabilities, limited dexterity or limited mobility, including but not limited to pants, trousers, shorts, dresses and skirts all having the novel fly as presently described.

[0008] Another object of the invention is to provide a fly which more discretely conceals an alternative closure such that the fly flap does not substantially bulge or look much different than a conventional fly flap hiding a conventional zipper or button.

[0009] According to another aspect of the invention, adaptive pants, trousers or shorts may include the presently described novel fly in combination with a leg seam also using one or more alternative closures, so putting on those garments may be even easier and quicker.

[0010] Further characteristics and advantages of the present invention will become apparent from the following detailed description of preferred but not exclusive embodiments of the novel fly, illustrated only by way of the following non-limiting examples.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. **1** is view of the fly in accordance with the invention in the closed position.

[0012] FIG. **2**A is view of the fly in accordance with the invention in the open position.

[0013] FIG. **2**B is view of the fly in accordance with the invention in the open position.

[0014] FIG. **3**A is view of the fly in accordance with the invention in the open position.

[0015] FIG. **3**B is view of the fly in accordance with the invention in the open position.

[0016] FIG. **4**A is an isolated view of a second panel closed over a first panel without the outermost panel.

[0017] FIG. **4**B is an isolated view of a second panel closed over a first panel without the outermost panel.

[0018] FIG. **5**A is a view of leg seam using one or more alternative closures in the open position.

[0019] FIG. **5**B is view of leg seam using one or more alternative closures in the open position.

[0020] FIG. **6** is view of the leg seam using one or more alternative closures in the closed position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] FIGS. **2**A, **2**B, **3**A and **3**B depict the fly of the present invention in the open position. As used herein, the "open position" denotes that the two panels of fabric, which are part of the cut opening in the garment, are not fastened together. This fly has a first panel (**105**) which has a first alternative closure and a second panel (**110**) which has a second alternative closure. Each of the first and the second panels may be about 2 inches to about 8 inches in length, preferably about 3 inches to about 5 inches in length.

[0022] As explained in more detail below, one type of alternative closure is formed with one or more pairs of magnetic fasteners, one of the pair having a positive polarity on the connecting side ("a positive magnetic fastener") and the other of the pair having a negative polarity on the connecting side ("a negative magnetic fastener"). Each magnetic fastener is typically encapsulated in a plastic,

rubberized or waterproofed-cloth pouch, which is sewn in, glued to or otherwise attached to a placket, flap or pocket at the edge of each panel. For example, a positive magnetic fastener is attached to the first panel and the negative magnetic fastener is attached to the second panel so their connecting sides, with opposite polarities, can face each other. When the panels are brought together, the connecting sides face each other and attract and attach to each other, thereby closing the two panels. Multiple pairs of magnetic fasteners may be used along the lengths of the first and second panels to provide full closure.

[0023] Each magnetic fastener typically comprises a magnet (e.g. round, square, annular, oval or other shape) and a back plate. The magnet may be any material which creates a magnetic field, including but not limited to composites, magnetic metallic elements, rare-earth magnets and combinations thereof. A back plate may be made of copper or zinc (or both), or other non-magnetic or weakly-magnetic metals or materials, by themselves or combinations with other metals (including ferromagnetic materials such as iron). A back plate is attached to non-connecting side of the magnet (e.g., the negative side when the connecting side is positive or the positive side when the connecting side is negative) to reduce the amount of magnetic flux emanating behind the back plate. This flux reduction helps to reduce the adaptive apparel from being magnetically attracted to other metals, especially the inside of a washer or dryer during laundering. The back plate may be attached to the magnet by glue or other adhesive, or if the back plate is ferromagnetic, will magnetically couple to the magnet.

[0024] As shown in FIGS. **2**A and **2**B, the pouches containing magnetic fasteners with connecting sides of one polarity (**115**) are attached to a placket, flap or pocket of the first panel (**105**). The pouches containing magnetic fasteners with connecting sides of the opposite polarity (**120**) are attached to a placket, flap or pocket of the second panel (**110**) in corresponding positions, so as to create position-wise pairs of magnetic fasteners with connecting sides of opposing polarity. When the panels are brought towards, the connecting sides of the magnetic fasteners (**115**) of the first panel (**105**) will face and be attracted and attach to the connecting sides of the magnetic fasteners (**120**) of the second panel (**110**), thereby closing the cut opening. The connecting sides of the magnetic fasteners attach indirectly to each other, as there is panel fabric between them.

[0025] In some embodiments, each of the first and second panels have about 1 to about 15 pairs of magnetic fasteners, preferably about 2 to about 10 pairs of magnetic fasteners, and even more preferably about 2 to about 4-8 pairs of magnetic fasteners. The number of magnetic fastener pairs used to form an alternative closure depends upon a number of factors, for example, (1) the length of the cut opening (e.g., a longer opening may result in the use of more pairs than a shorter opening); (2) the length or diameter of each magnetic fastener (e.g., longer magnetic fasteners may result in the use of fewer pairs than shorter magnetic fasteners); (3) the spacing between each magnetic fastener pair along the length of each panel (e.g., the greater the spacing between pairs may result in the use of fewer pairs); and (4) and the offset between the magnetic fastener at the top edge of each panel and at the bottom edge of each panel (e.g., the greater the offset may result in the use of fewer pairs). The length of the cut opening may depend on the type of garment (e.g., the cut opening in a dress is normally longer than that of a skirt), the size of the garment (the cut opening in a men's size pair of pants is normally longer than that of a boy's), and style factors.

[0026] Alternatively, multiple positive or negative magnetic fasteners can be encapsulated in a plastic, rubberized or waterproofed-cloth strip to form a magnetic strip, which in turn is sewn in, glued to or otherwise attached to a placket, flap or pocket along the length of each panel. For example, a magnetic strip with a positive connecting side may be attached to the first panel and a magnetic strip with a negative connecting side may be attached to the second panel (or vice versa) so their connecting sides, with opposite polarities, can face each other. When the panels are brought together, the connecting sides of the magnetic fasteners face and attract and attach to each other on a pair-wise basis, thereby closing the two panels.

[0027] As shown in FIGS. **3**A and **3**B, a first magnetic strip (**125**) containing magnetic fasteners of one polarity on the connecting side is attached to the first panel (**105**), and a second magnetic strip (**130**) containing magnetic fasteners of the opposite polarity on the connecting side is attached to the second panel (**110**). When brought towards each other, the connecting sides of the magnetic fasteners of first magnetic strip (**125**) of the first panel (**105**) will face and be attracted and attach to the connecting sides of the magnetic fasteners of the second magnetic strip (**130**) of the second panel (**110**), thereby closing the cut opening. In place of or in combination with the magnetic fasteners, the magnetic strip may use magnets, a magnetic strip or sheet, a magnetic roll, magnetic tape or other flexible magnetic products. The magnetic strip is preferably encapsulated in plastic, rubber, or waterproofed-cloth.

[0028] The pouches containing the magnetic fasteners (**115**, **120**) or the magnetic strips (**125**, **130**) may be attached to each of the first panel (**105**) and the second panel (**110**) through several ways, including but not limited to glue or another adhesive, tape, or sewing them into the apparel. For example, each of the first panel and the second panel have two flaps or a folded-over flap of fabric forming a placket, pocket or a pouch-like structure. One or more magnetic fastener pouches or the magnetic strip may be inserted into the placket, pocket or a pouch-like structure, and secured therein by glue, tape, sewing and the like.

[0029] Snap fasteners or hook and look fasteners (for example, those sold under the Velcro® brand) may be used instead of magnetic fasteners, or magnetic, snap and hook and loop fasteners may be combined to form the alternative closure. For example, magnetic fasteners may be used along most of the length of the panels, and securing closure comprising a hook and loop or snap fastener may be used to close the top of the two panels, which provides additional closing strength to the alternative closure. In particular, as shown in FIGS. **2**A and **3**A, the fly may include securing closure (**140**) comprising a snap closure. Alternatively, as shown in FIGS. **2**B and **3**B, the securing closure (**145**) comprises a hook and loop fastener.

[0030] The fly uses an outermost flap (**135**) to cover the first and second panels, thereby creating a "false fly." For example, when the second panel (**110**) overlaps and covers the first panel (**105**) and the alternative closure closes (for example, the magnetic fasteners in the two panels attach to each other), only the outermost flap (**135**) is visible. Consequently, the wearer or others will not see, for example, any bulge caused by the magnetic (or other alternative) fasteners

in the first or second panel, or the stitches, glue or tape used to attach the magnetic fastener pouches or magnetic strips (or other alternative fasteners) to the first or second panel.

[0031] In particular, FIG. **1** depicts the fly of the present invention in the closed position. As used herein, the "closed position" denotes that the panels of fabric which are part of the cut opening in the garment are fastened together by the alternative closures of the first and second panels, such that the second panel overlaps and covers the first panel. In accordance with the present invention, one viewing the fly in the closed position cannot determine that alternative closures are being used, because the outermost flap (**135**) conceals the panels with the alternative closures, thereby ensuring discreteness. In contrast thereto, FIGS. **4**A and **4**B depicts an isolated view of the fly in the closed position without the outermost flap (**135**), where someone can readily tell that an alternative closure is being used. For example, the magnetic fasteners or magnetic strips used as the alternative closures may be visually apparent by the stitching used to adhere them to the panels, or because they bulge from the panels (they tend to be bulkier than standard zippers or buttons), or because of the bulges or ripples caused by glue, tape or other adherent.

[0032] In addition to the fly described above, a pair of pants, trousers or shorts may have another opening that is positioned on the bottom of the leg portion of the garment ("leg opening"), for example, to allow a disabled person wearing a shoe, boot or brace to more easily put on and take off the garment.

[0033] In the embodiment shown in FIG. **5**A, the leg opening is unfastened and separated into a first panel (**505**) and a second panel (**510**), each panel having an alternative closure. The first panel (**505**) and the second panel (**510**) may be secured together by a box stitch (**535**). When the alternative closures of the first panel (**505**) and the second panel (**510**) are connected together, the second panel (**510**) overlaps and covers the first panel (**505**). The alternative closures are the same as those used the fly and described in detail above. For example, as shown in FIG. **5**A, the first panel (**505**) has magnetic fasteners (**515**) and the second panel (**510**) has magnetic fasteners (**520**) in corresponding positions. The magnetic fasteners operate in the same manner as described above. Preferably, depending on the length of the leg opening and other previously discussed factors, each of the first and second panels has about 1 to about 20 pairs of magnetic fasteners, preferably about 2 to about 15 pairs, and even more preferably about 4 to about 8-10 pairs.

[0034] In another embodiment, as shown in FIG. **5**B, the first panel (**505**) has a magnetic strip (**525**) and the second panel (**510**) has a magnetic strip (**530**), wherein the magnetic strips are of the constitution and operate in the same manner as those used in the fly.

[0035] The magnetic fasteners (**515**, **520**) of FIG. **5**A and the magnetic strips (**525**, **530**) of FIG. **5**B may be attached to the first and second panels in the same manner as the fly.

[0036] The leg opening, like the fly, may have outermost flap (not shown) to cover the first and second panels to assure discreteness.

[0037] The adaptive garment of the present invention includes but is not limited to pants, trousers, shorts, skirts, skorts, capris, jumpsuits, rompers, dresses and the like.

[0038] While preferred embodiments have been described, it is evident that many additional modifications, variations or alternatives are apparent to the skilled artisan. The present application intends to embrace all of such modifications, variations or alternatives which fall within the scope of the invention.

What is claimed is:

1. A fly for fastening together a first panel and a second panel of an adaptive garment comprising:

the first panel comprising at least one magnetic fastener having a connecting side of one polarity;

the second panel comprising at least one magnetic fastener having a connecting side of an opposite polarity, whereupon closure of the first and second panels, the connecting side of the at least one magnetic fastener from the first panel is magnetically attached to the connecting side of the at least one magnetic fastener from the second panel and the second panel covers the first panel; and

a visible third panel, wherein the third panel is positioned over and conceals the second panel.

2. The fly of claim **1**, wherein the third panel lacks a closure.

3. The fly of claim **1**, further comprising a closure selected from the group consisting of a snap fastener and a hook and loop fastener.

4. The fly of claim **1**, wherein each of the first and second panel has one of a one of a placket, pocket and pouch into which the magnetic fastener is inserted and attached.

5. The fly of claim **1**, wherein each of the first panel and the second panel comprise about 2 to about 10 pairs of magnetic fasteners.

6. The fly of claim **1**, wherein the adaptive garment is one of a pair of pants, trouser and shorts and further comprises a leg opening comprising:

a first panel comprising at least one magnetic fastener having a connecting side of one polarity;

the second panel comprising at least one magnetic fastener having a connecting side of an opposite polarity, whereupon closure of the first and second panels of the leg opening, the connecting side of the at least one magnetic fastener from the first panel of the leg opening is magnetically attached to the connecting side of the at least one magnetic fastener from the second panel of the leg opening, and the second panel of the leg opening covers the first panel of the leg opening.

7. The fly of claim **6**, wherein the leg opening further comprises a visible third panel positioned over and concealing the second panel of the leg opening.

8. A fly for fastening together a first panel and a second panel of an adaptive garment comprising:

the first panel comprising a first magnetic strip having a connecting side of one polarity;

the second panel comprising a second magnetic strip having a connecting side of the opposite polarity, whereupon closure of the first and second panels, the connecting side of the magnetic strip from the first panel is magnetically attached to the connecting side of the magnetic strip from the second panel and the second panel covers the first panel;

a visible third panel, wherein the third panel is positioned over and conceals the second panel.

9. The fly of claim **8**, wherein the third panel lacks a closure.

10. The fly of claim **8**, further comprising a closure selected from the group consisting of a snap fastener and a hook and loop fastener.

11. The fly of claim **8**, wherein each of the first and second panel has one of a one of a placket, pocket and pouch into which the magnetic strip is inserted and attached.

12. The fly of claim **8**, wherein each of the first magnetic strip and the second magnetic strip are selected from the group consisting of a strip of magnetic fasteners, a strip of magnets, a magnetic sheet, magnetic roll, magnetic tape, other flexible magnetic products, and combinations thereof.

13. The fly of claim **8**, wherein the adaptive garment is one of a pair of pants, trouser and shorts and further comprises a leg opening comprising:

a first panel comprising a magnetic strip having a connecting side of one polarity;

the second panel comprising a magnetic strip having a connecting side of an opposite polarity, whereupon closure of the first and second panels of the leg opening, the connecting side of the magnetic strip from the first panel of the leg opening is magnetically attached to the connecting side of the magnetic strip from the second panel of the leg opening, and the second panel of the leg opening covers the first panel of the leg opening.

14. The fly of claim **13**, wherein the leg opening further comprises a visible third panel positioned over and concealing the second panel of the leg opening.

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