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(54) **LOW PROFILE INSECT-PROOF CLOSURE FOR AN ENCASEMENT**

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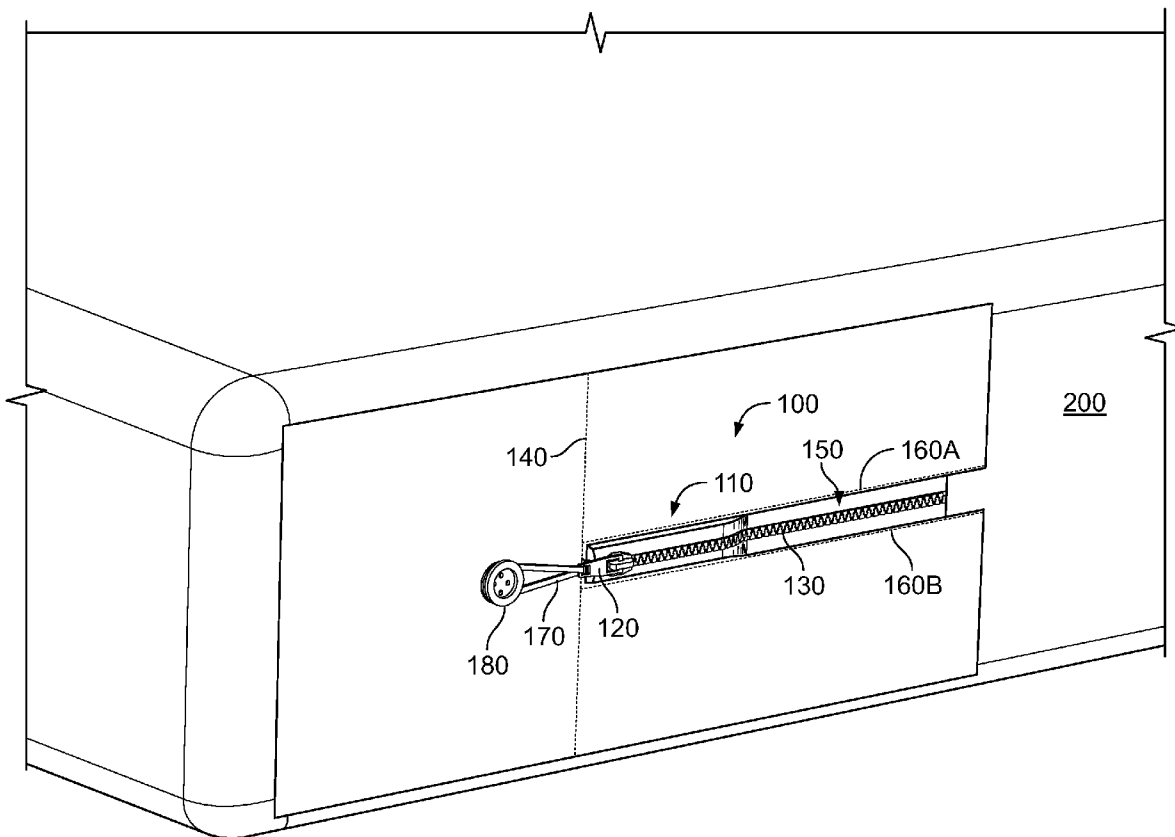
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(57) **ABSTRACT**

A low-profile insect-proof closure is provided for an encasement of insect-impervious fabric. A zipper is provided for closing an opening in the encasement. The zipper is stitched to the encasement and has a zipper head, and a zipper track on a fabric zipper belt. A fabric backing panel is stitched to the encasement behind the zipper at a closure zone of the zipper. A finger-shaped insert is provided attached to the fabric backing panel. The insert, which is made of compressible elastomer, is arranged so as to physically block or apply pressure to the zipper head to keep the zipper head in closed position when the encasement is on the mattress. The insert has a width no greater than the width of the zipper belt and a thickness less than about 10 millimeters.



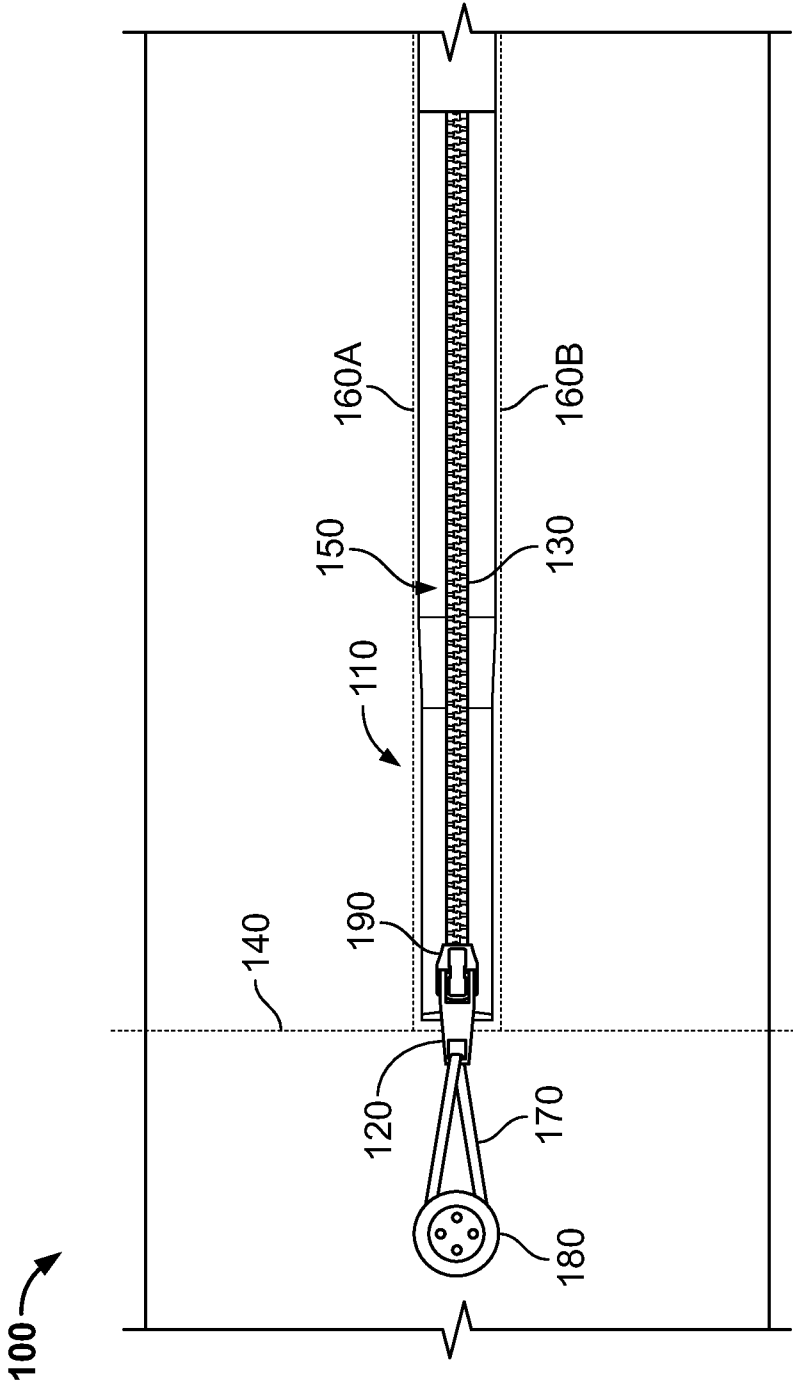


FIG. 1

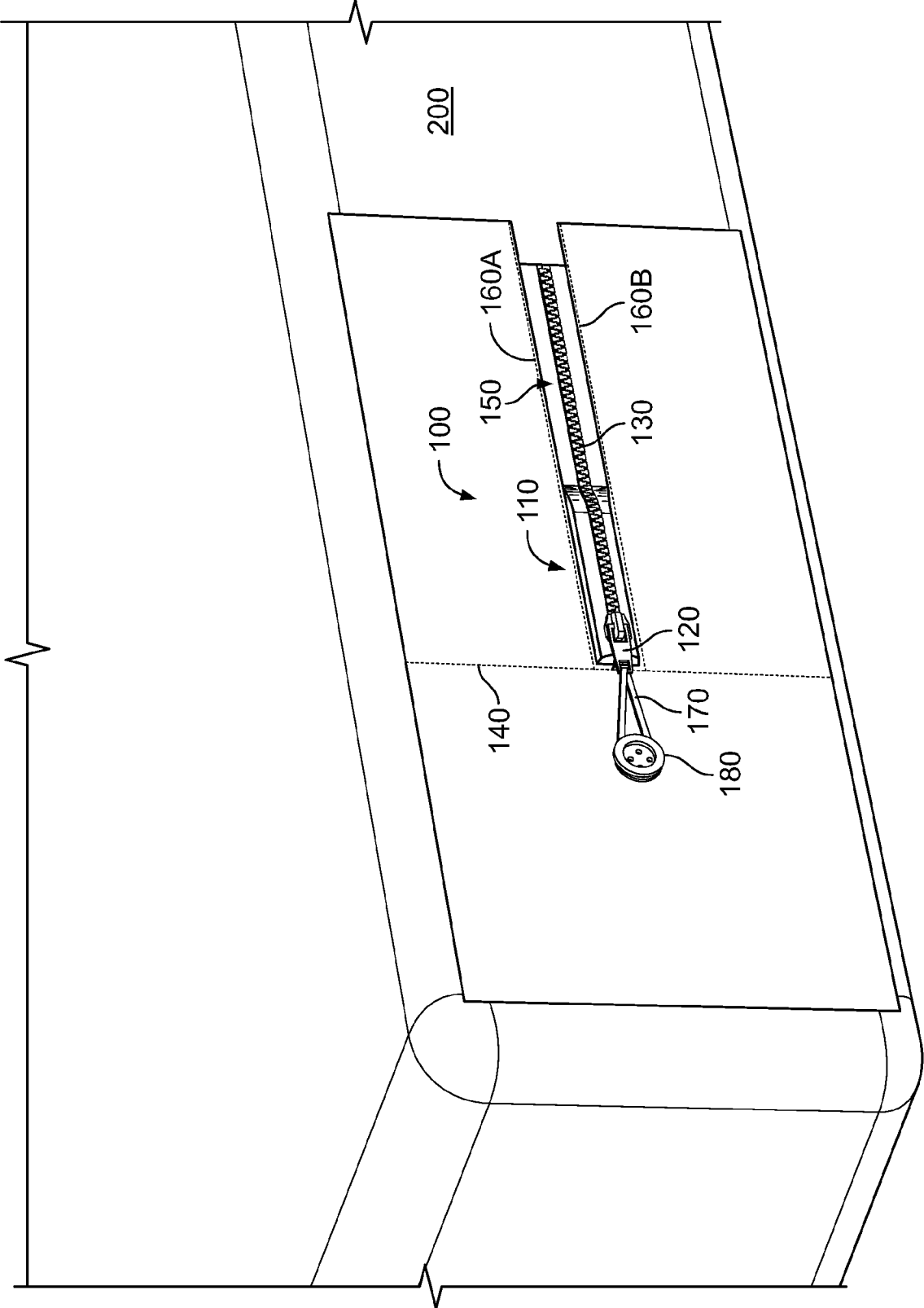


FIG. 2

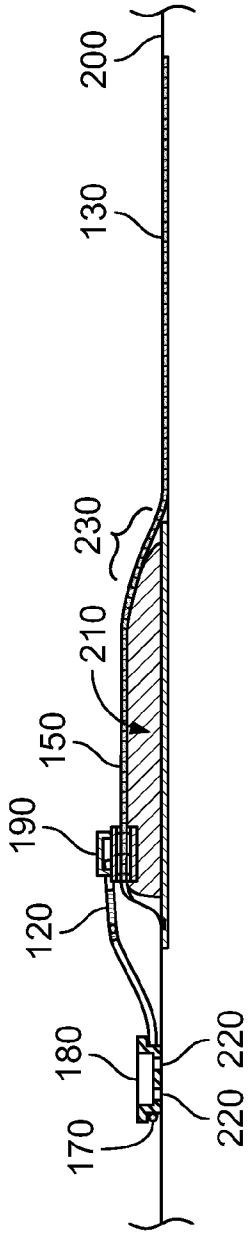


FIG. 3A

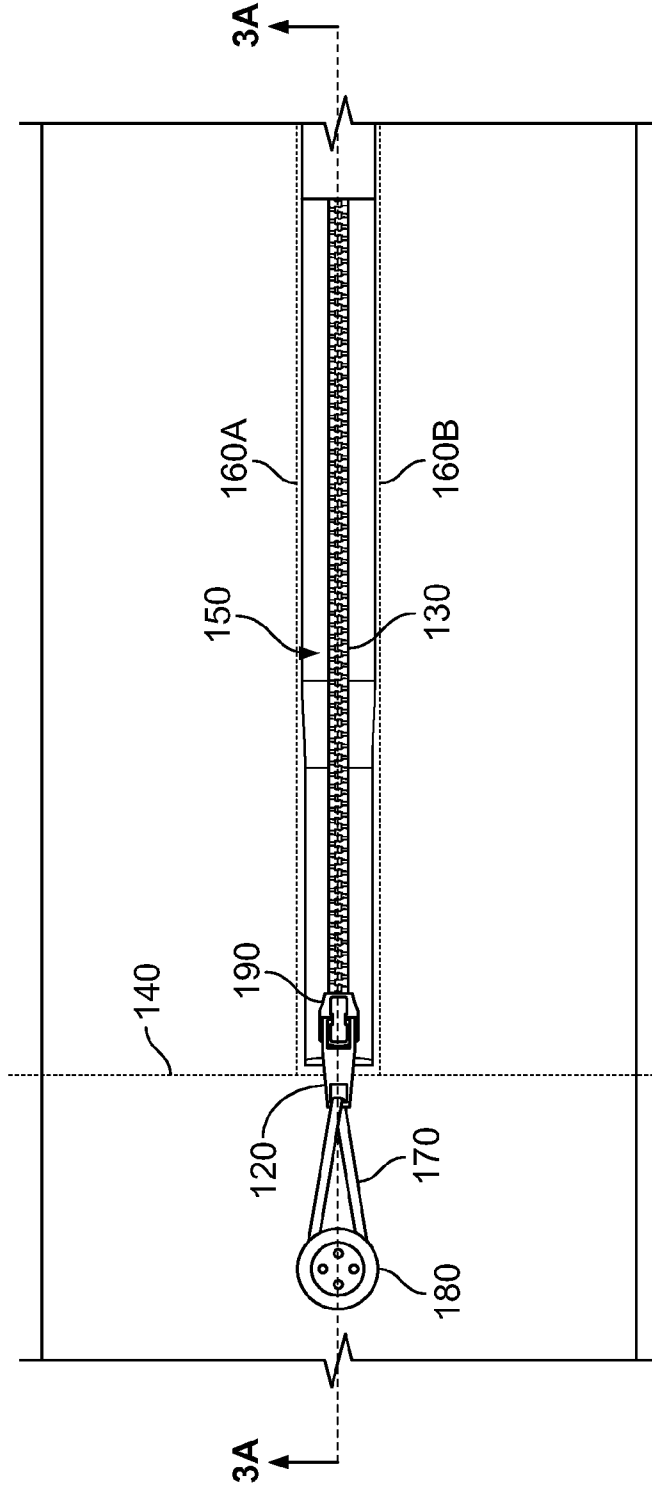


FIG. 3B

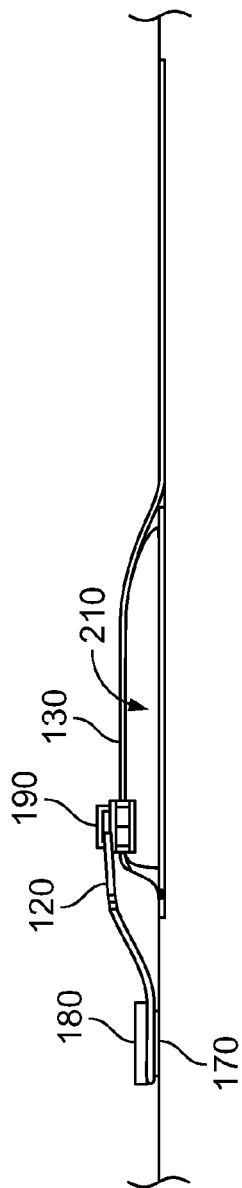


FIG. 3C

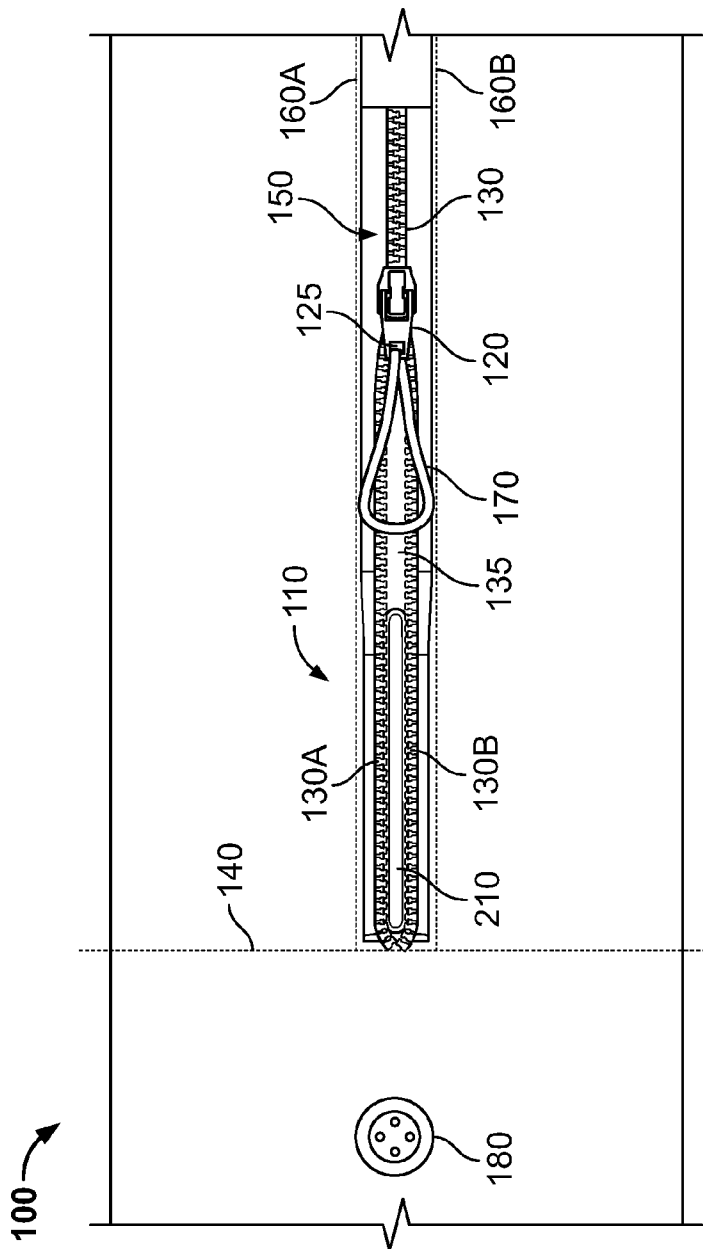


FIG. 4

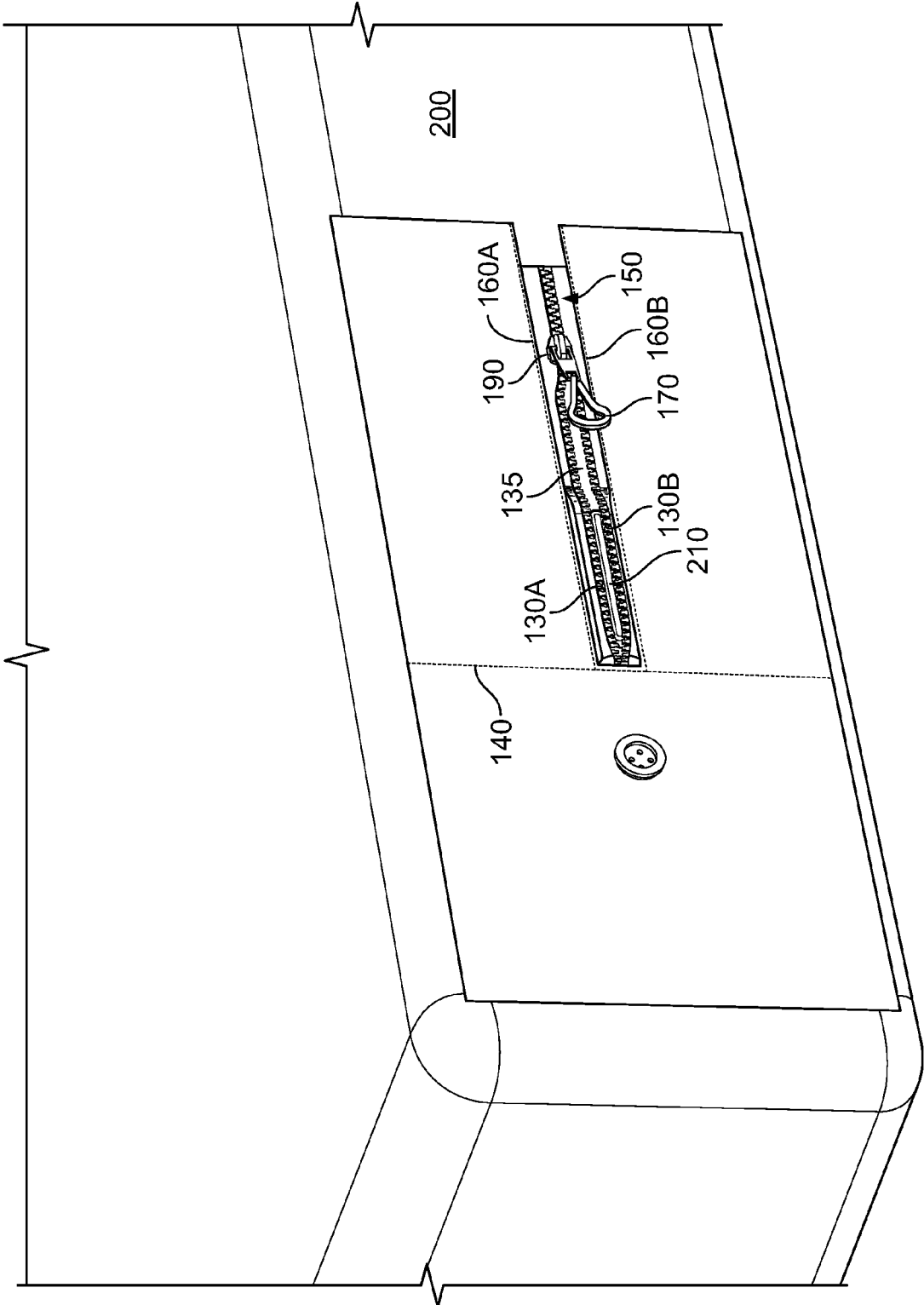


FIG. 5

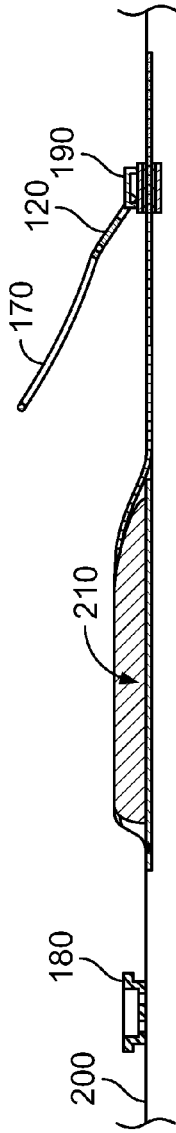


FIG. 6A

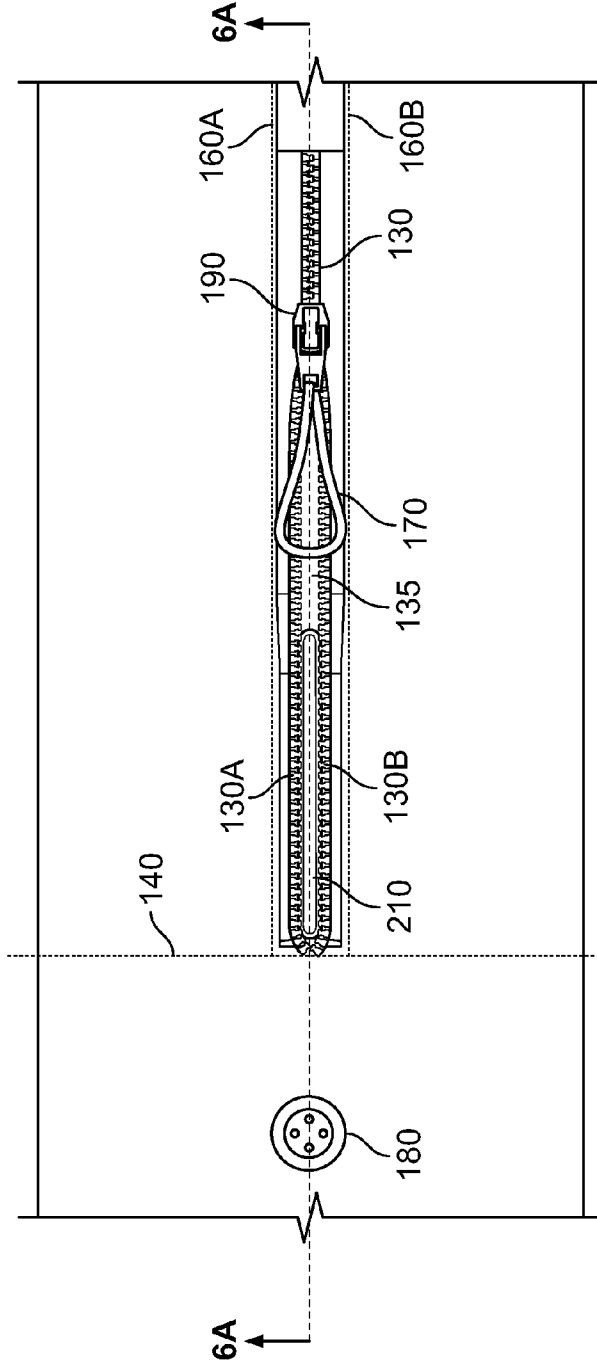


FIG. 6B

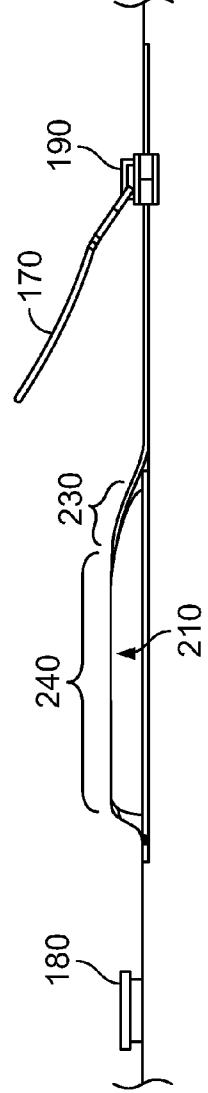


FIG. 6C

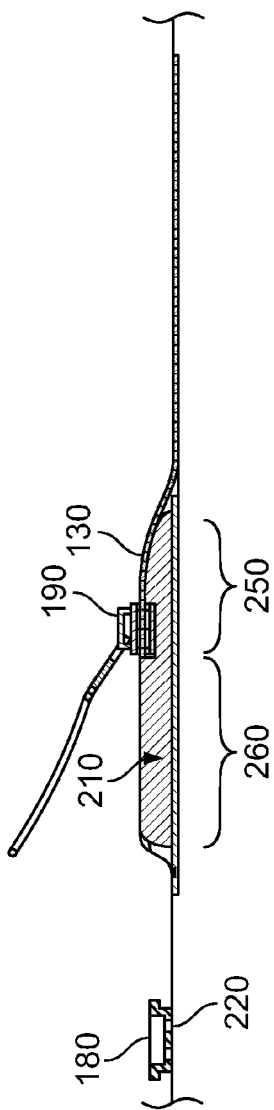


FIG. 7A

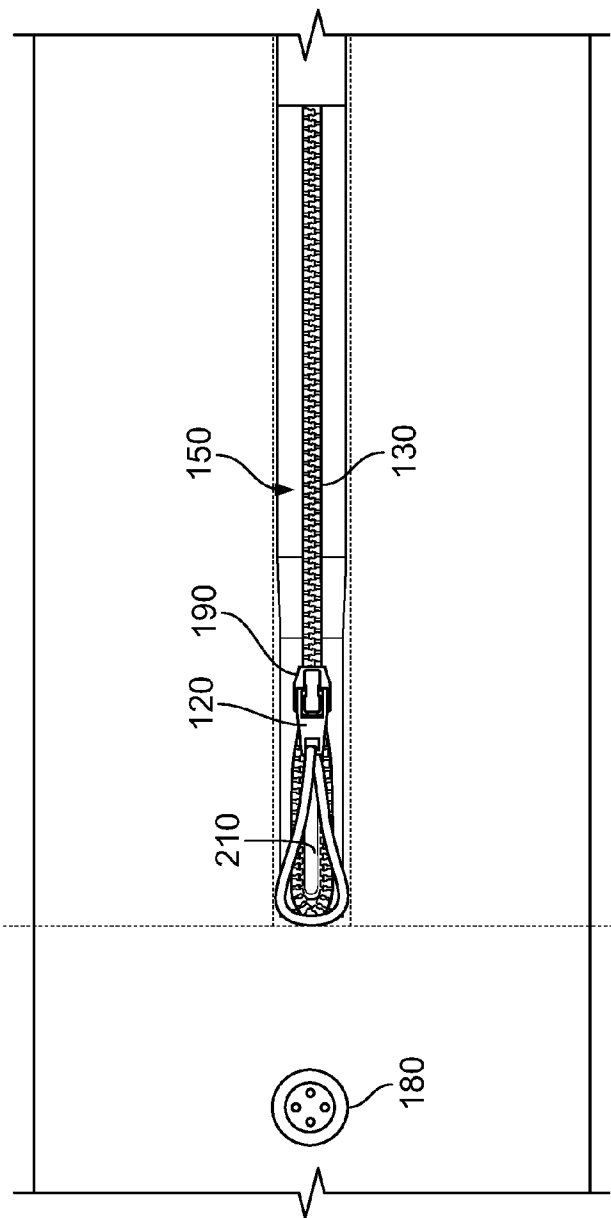


FIG. 7B

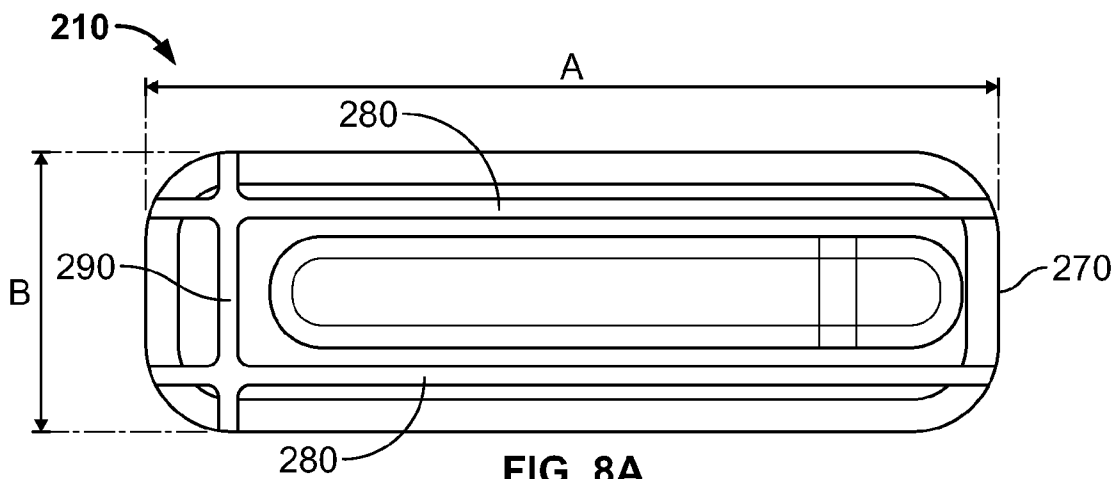


FIG. 8A

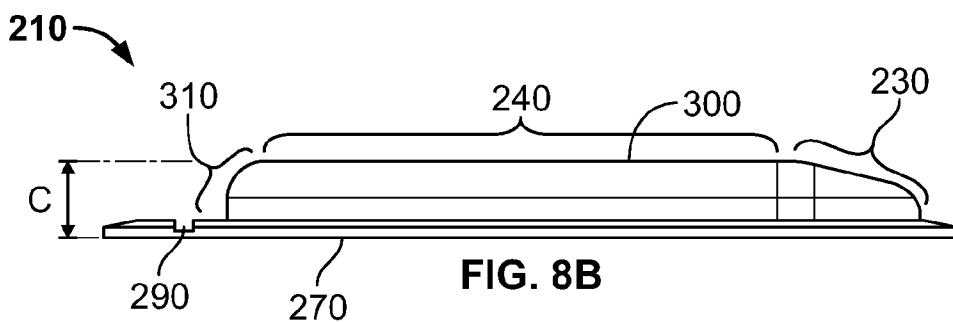


FIG. 8B

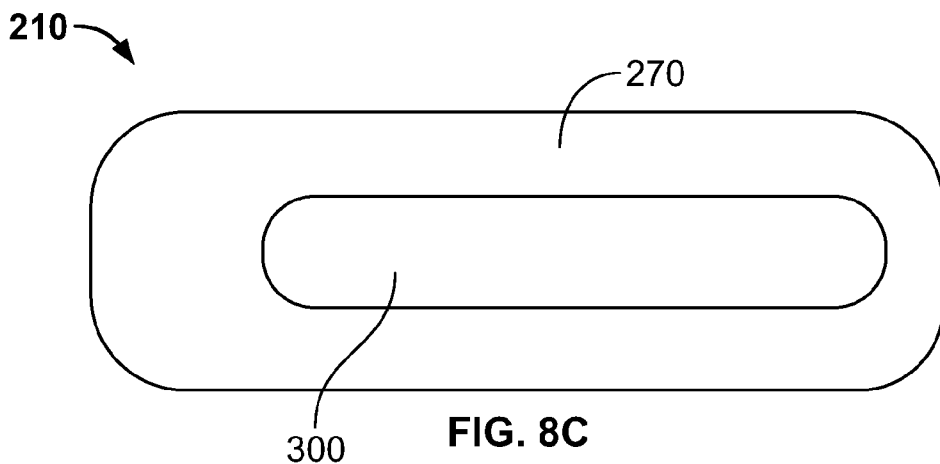


FIG. 8C

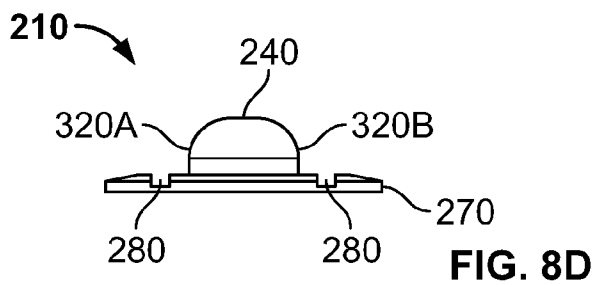


FIG. 8D

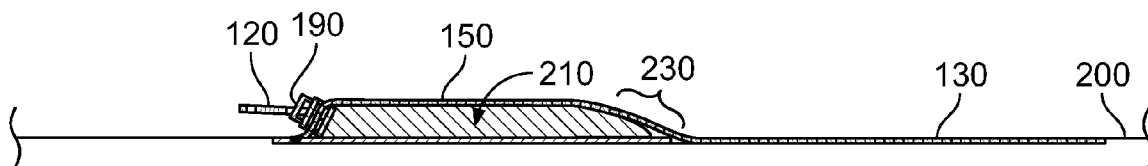


FIG. 9

LOW PROFILE INSECT-PROOF CLOSURE FOR AN ENCASEMENT

FIELD OF THE INVENTION

[0001] The invention relates to encasements and more particularly relates to insect-proof closures for encasements.

BACKGROUND OF THE INVENTION

[0002] Zippered fabric encasements are used to keep insects out of and away from furniture, mattresses, pillows and supports, luggage and a host of other articles. An encasement is essentially a sewn fabric bag that completely surrounds or “encases” an article. It is typically designed to be close-fitting with the article it surrounds, but this is not always the case. For example, an encasement for a bed may surround the bed and may provide a tent-like structure above the mattress to keep flying insects away from sleepers.

[0003] Insects are a nuisance and potential health hazard to humans and animals (e.g. mosquitoes, spiders, bedbugs). Insects may also be destructive to property (e.g. moths) and generally interfere with enjoyment of one’s home and possessions.

[0004] An encasement surrounds an article to prevent insects from entering and reproducing in/on the article. However, the weak point of an encasement is generally the zippered opening that allows the encasement to be positioned on the article. Although the zipper may be zipped closed to close the opening, a tiny gap at the final leg of the closure will generally remain (where the zipper head meets the end of the zipper tracks). This tiny gap is frequently sufficient to allow passage of a single insect (e.g. an adult bedbug is only 1.5-3 mm wide). From a single insect intruder, a colony can quickly become established and the whole point of the encasement ruined.

[0005] Further, the tiny gap in the closed zipper can easily and involuntarily become widened. Unrestrained, zippers can slip down with frictional contact. For example, on an encasement for a mattress, this can happen due to users’ sleeping patterns, changing top bedding (such as fitted sheets), or from brushing past the zipper on the side of the mattress.

[0006] It would be desirable to provide a method of locking the zipper closed, while blocking the tiny gap to prevent insects from entering the encasement. However, bulky solutions are not desirable. Encasements are generally close-fitted to the encased article. Complicated flap closures or thick quilted zones at the zipper closure are not desirable, as they diminish the sleek appearance of the encasement, impede the intended function of the zipper (by snagging, e.g.), and draw undue attention to the insect-preventive aspects of the cover.

SUMMARY OF THE INVENTION

[0007] A low-profile insect-proof closure is provided for a encasement of insect-impervious fabric. A zipper is provided for closing an opening in the encasement. The zipper is stitched to the encasement and has a zipper head, and a zipper track on a fabric zipper belt. A fabric backing panel is stitched to the encasement behind the zipper at a closure zone of the zipper. A finger-shaped insert is provided attached to the fabric backing panel. The insert, which is made of compressible elastomer, is arranged so as to physically block or apply pressure to the zipper head to keep the zipper head in closed position when the encasement is positioned on an article. The

insert has a width no greater than the width of the zipper belt and a thickness less than approximately 10 millimeters.

[0008] Various elastomeric materials are possible for the insert. One preferred material is thermoplastic rubber (TPR) (or thermoplastic elastomer (TPE)), both of which have desirable compressibility and long wear.

[0009] The zipper head may have a cord loop that is attachable to a button on the encasement to retain the zipper head in closed position. The cord loop may be of an elastic cord, such that the loop stretches to fit snugly over the button.

[0010] Various shapes of inserts are possible. Preferably, the insert has a sloped approach. The insert may have a textured or ridged upper surface. The insert may have at least one rounded edge. The insert may have a domed cross-section.

[0011] Preferably, the insert has a width less than approximately 20 millimeters. Preferably, the insert has a length less than approximately 10 centimeters.

[0012] Preferably, the insert has a non-snap surface.

[0013] Preferably, the insert is sized to fit between seams on the zipper belt.

BRIEF DESCRIPTION OF THE FIGURES

[0014] FIG. 1 is a front view of the closure (zipper closed and locked).

[0015] FIG. 2 is a front perspective view of a encasement with zipper closed and locked.

[0016] FIG. 3A is a cross-section along line A-A of FIG. 3B.

[0017] FIG. 3B is a front view of the zipper closure (closed and locked).

[0018] FIG. 3C is a side view of the zipper closure of FIG. 3B.

[0019] FIG. 4 is a front view of the closure (zipper open and unlocked).

[0020] FIG. 5 is a front perspective view of a encasement with zipper open and unlocked.

[0021] FIG. 6A is a cross-section along line A-A of FIG. 6B.

[0022] FIG. 6B is a front view of the zipper closure (open and unlocked).

[0023] FIG. 6C is a side view of FIG. 6B.

[0024] FIG. 7A is a sectional view as zipper starts to close (showing slight compression of insert projection).

[0025] FIG. 7B is a front view as zipper starts to close.

[0026] FIG. 8A is a front view of the insert.

[0027] FIG. 8B is a side view of FIG. 8A.

[0028] FIG. 8C is a bottom view of FIG. 8A.

[0029] FIG. 8D is an end view of FIG. 8A.

[0030] FIG. 9 is a sectional view of an alternative embodiment.

DETAILED DESCRIPTION

[0031] An encasement 200 is a fabric covering that surrounds an article on all sides to provide protection from insects. The encasement in this case is preferably made of an insect-impervious material, or any fabric having a sufficiently tight weave to prevent ingress of insects through the fabric. The encasement has a zippered opening. This may be disposed, for example, along one long side and one short end of the encasement (for ease of installation), or in some other configuration.

[0032] The zipper of the zippered opening is used to close the opening. This may be any type of zipper. However, fine-gauge zippers gauge are preferred, as the size and frequency of the teeth does not permit passage of insects between the closed teeth. As is known in the field of zippers, the zipper is formed of a fabric belt **150** having two portions **150A**, **150B**. Along corresponding edges of the fabric belt, corresponding mateable toothed tracks **130A**, **130B** are provided. These toothed tracks **130** are joinable by means of a sliding zipper head **190**, having a graspable zipper pull **120**.

[0033] The zipper is stitched to the encasement along seams **160A**, **160B** at or near the two edges of the zipper belt (generally opposite the toothed tracks). A terminal seam **140** is also provided where the end of the zipper meets the non-zippered body of the encasement. This seam is clearly shown in FIGS. **1** and **2**.

[0034] The closure zone **100** of the encasement is of particular interest for the present invention.

[0035] The preferred embodiment of the invention provides two means of reversibly “locking” the zipper closed in this zone. First, as shown in FIGS. **1-7B**, a button and loop lock is provided to keep the zipper head at the end of its tracks, near seam **140**. According to one embodiment, the loop **170** is an elastic cord that is attached (e.g. by being tied or itself over-looped) to an eye **125** of the zipper pull **120**. The user stretches this elastic loop over button **180** (sewn to the encasement via threads **220** just beyond the terminal seam **140**), so that the loop is taut over the button, thus retaining the zipper head **190** in its most closed position.

[0036] Second, and less visibly, a closure insert **210** is provided that helps the zipper to resist slippage and closes the tiny gap that exists in any case between the zipper head **190** and the terminal seam **140**. The insert **210** is best seen on its own in FIGS. **8A-8D**, but is also shown in side and sectional views FIGS. **3A**, **3C**, **6A**, **6C** and **7A**.

[0037] The insert is preferably made of a compressible elastomer. One particularly preferred material is thermoplastic rubber (or thermoplastic elastomer). However, other materials are also possible. The material should have a dense texture, but be easily compressible by the user, with a quick spring back to firmly press and retain the zipper head in its most closed position.

[0038] The material should also permit machine washing and drying (i.e. a high water and heat resistance).

[0039] The encasement has a fabric backing panel sewn to the encasement below the zipper in the closure zone. The insert may be sewn, fused or adhesively attached to this fabric backing panel. For example, the insert may have a finger-shaped projection (as shown in FIGS. **8A-8D**) that is disposed on a base platform **270**. The base platform may be integral with the projection or be a separate piece. The base platform **270** may have stitching channels **290**, **280** to allow it to be stitched securely onto the backing panel.

[0040] Various shapes of the insert are possible. The projection of the insert may be preferably rounded (and domed across the width of the projection). A smooth (relatively flat) top surface (plateau) **240** is possible (where the zipper head is retained in the most closed orientation), or the top surface may be ridged or textured (not shown) to provide additional gripping areas. Importantly, the insert is non-textile in nature so it does not have fibres that can snag or become entrained in the zipper head or teeth in use. The projection may have a more blunt shaped bullnose (near the terminal seam **140**) and a more tapered ramp **230** where the zipper approaches the

insert. A very simple insert might have no separate base platform, and be simply adhered or fused to the backing panel.

[0041] The position of the insert is preferably at the terminal end of the zipper tracks. The projection of the insert is narrow enough to sit between the sewn edges of the zipper belt. It has a low profile. As can be seen from the closed zipper views in FIGS. **1** and **2**, the insert is almost undetectable below the closed zipper, appearing as only a slightly raised or sloped area near the zipper head.

[0042] The dimensions of the insert are preferably in the range of about 0.2 to 2 cm wide; about 1 to 10 cm long, and about 0.2 to 1 cm thick.

[0043] The interrelationship of the zipper and the insert is best seen in FIGS. **3A**, **6A** and **7A**. As seen in FIG. **6A**, with the zipper open, the insert is in its relaxed state (at full expansion). When the zipper starts to close, the insert becomes compressed by the zipper head **190** and the closed zipper teeth behind the zipper head **130**. The difference between the compressed zone **250** and non-compressed zone **260** can be seen in FIG. **7A**. As seen in FIG. **3A**, with the zipper fully closed, the insert **210** is fully compressed. The insert tries to expand but has nowhere to go (due to the closed zipper tracks). The insert presses against the zipper head **190** in this closed position to keep it from slipping back into open position. The insert also blocks any possible gap in front of the zipper head because the bullnose front end **310** of the insert **210** will cover the gap (which is minimized in any event due to the zipper pull being locked with the locking loop/button arrangement). Thus, insects are prevented from entering the encasement through the end of the zipper in the closure zone **100**.

[0044] The zipper may also be disposed so that the zipper head can be zipped beyond the insert, as in the embodiment shown in FIG. **9**. In this arrangement, the edge **310** of the insert **210** physically blocks the zipper head from sliding (or being slid) directly backward. In order to unzip the zipper to open the encasement, the zipper head **190** must be lifted away from the insert (i.e. by pulling on the zipper pull **120**) to release the zipper head **190** from the insert edge **310**. This “lift and release” catch adds a further measure of security to the closure arrangement.

[0045] The foregoing description illustrates only certain preferred embodiments of the invention. The invention is not limited to the foregoing examples. That is, persons skilled in the art will appreciate and understand that modifications and variations are, or will be, possible to utilize and carry out the teaching of the invention described herein. Accordingly, all suitable modifications, variations and equivalents may be resorted to, and such modifications, variations and equivalents are intended to fall within the scope of the invention as described and within the scope of the claims. A broad purposive construction of the claim elements is intended. For example, one modification would be to omit the button/loop lock. Further, although a unitary insert is shown, it is also contemplated that several compressible dots or ridges or buttons of compressible material could be provided to serve a similar purpose (provided that a sufficiently insect-proof overall closure is provided).

1. A low-profile insect-proof closure for an encasement of insect-impervious fabric, the closure comprising:

- a zipper for closing an opening in the encasement, the zipper being stitched to the encasement and having a zipper head, and a zipper track on a fabric zipper belt, the

- zipper having a terminal end where the zipper track is approximately fully closed by the zipper head;
- a fabric backing panel stitched to the encasement behind the zipper within a closure zone surrounding the terminal end; and
- a finger-shaped insert made of compressible elastomer attached to the fabric backing panel and arranged within the closure zone but spaced away from the terminal end, such that the zipper head can be zipped to a position beyond the insert, wherein the insert acts to physically block the zipper head to keep the zipper head in closed position at the terminal end when the encasement is positioned on an article; the insert having a width no greater than the width of the zipper belt and a thickness less than about 10 millimeters.
2. The closure of claim 1, wherein the elastomer is thermoplastic rubber.
 3. The closure of claim 1, wherein the insert has a sloped approach.
 4. The closure of claim 1, wherein the insert has a textured or ridged upper surface.
 5. The closure of claim 1, wherein the insert has a non-sag surface.
 6. The closure of claim 1, wherein the insert has at least one rounded edge.
 7. The closure of claim 1, wherein the insert has a domed cross-section.
 8. The closure of claim 1, wherein the insert has a width less than about 20 millimeters.
 9. The closure of claim 1, wherein the insert has a length less than about 10 centimeters.
 10. The closure of claim 1, wherein the insert is sized to fit between seams on the zipper belt.
 11. The closure of claim 1, wherein the zipper head has a cord loop, and the encasement has a button behind a stitch line of the closure zone, the loop attachable to the button to retain the zipper head in closed position.
 12. The closure of claim 11, wherein the cord loop is of an elastic cord, the loop being sized to stretch to fit over the button for secure closure.

* * * * *