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(54) LIMITING ACCESS TO A STRUCTURE WHICH IS OPENED AND CLOSED USING A PLASTIC ZIPPER

(57) Access-limiting mechanism (10) limits access to a container (12). Access is controlled by moving a slider (18) back and forth along a plastic zipper (14), opening and closing the zipper. The access-limiting mechanism includes, in addition to the slider, a coupler (20). The coupler can stay fixed, immovable, at a given location, relative to the zipper; or can be moved along the zipper. As the slider moves close to the coupler, the slider and coupler are releasably coupled to each other, limiting the ability of the slider to open the zipper. Access can be further limited by adding a second control mechanism such as a cover (42), optionally a latching cover, overlying one or both of the slider and coupler. To open the container, the slider and coupler, and/or as applies the cover, are released from respective coupling or latching arrangements.

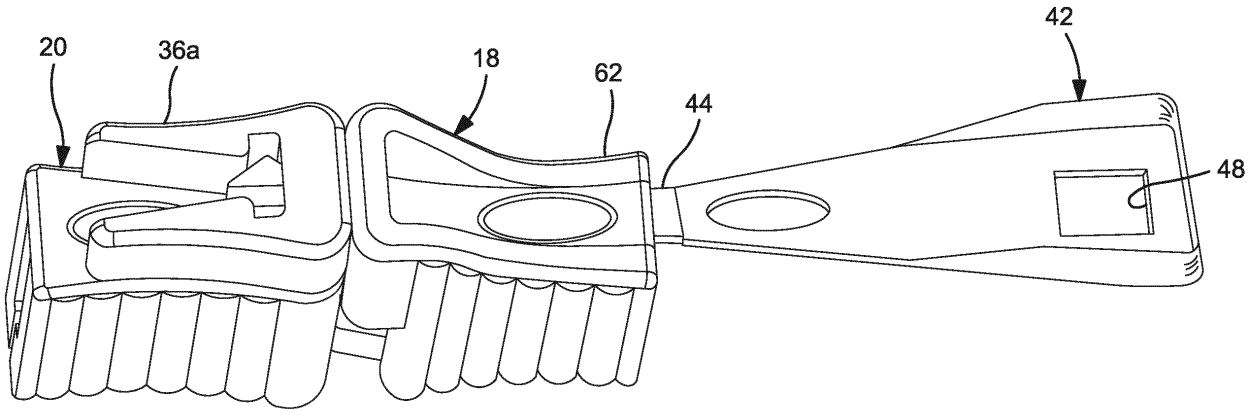

FIG. 3

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Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to US Provisional application Serial Number 62/128,719, filed March 5, 2015, US Non-provisional application Serial Number 14/732,019, filed June 5, 2015 and US Non-provisional application Serial Number 14/732,190, filed June 5, 2015, which are incorporated herein by reference in their entirety.

BACKGROUND

[0002] This invention pertains to zippers, and especially to plastic zippers which are used to control access, to open and close, e.g. plastic bags or other packaging structures, thus temporarily closing off access, and also allowing access, as appropriate, to the contents of the package. Access to contents of the bag is prevented when the zipper is closed, and access to contents of the bag is enabled when the zipper is open.

[0003] In a broad sense, the invention can pertain to any use of slider-based plastic zippers which control access to contents of a package or other container, or other controlled-access space.

[0004] In some instances, the zipper elements may be disposed inside a closed compartment of the container/bag/package, and a second closure/seal, intended to be a single-use closure/seal, is used in addition to the re-closable, re-openable closure/seal affected by the zipper, thus closing in the entirety of the zipper within the space enclosed inside the bag. In such structure, once the single-use seal/closure has been breached, opened, e.g. by the consumer of the bag contents, thus exposing the zipper, the re-closable zipper is subsequently used to provide temporary and re-closable access, namely intermittent access, to the contents of the container/package/bag while otherwise sealing the container/package/bag, for example to preserve freshness and/or quality of the product contained within the container/package/bag.

[0005] In early commercial versions of plastic bags which have zippers, which early versions are still commercially available, the zipper is defined by first and second facing interlocking rails on facing or overlapping panels of the plastic bag e.g. while the bag is being fabricated. Such interlocking rails are in facing relationship with each other, typically at the top of the bag. Typically, such interlocking rails extend the full respective dimension, for example the width or the length, of the bag. The user presses and holds the interlocking rails against each other, and advances that held pressure along the length of the interlocking rails, namely across the width, or the length, of the bag, whereby the interlocking rails are pressed into a locking engagement with each other along the length of the zipper, thus to seal closed the facing interlocking rails of the zipper at the facing panels.

[0006] Such plastic zippers have now come into commercial use in combination with a variety of products which are packaged in flexible plastic packaging, for example various types of food, whether sold through grocery stores or convenience stores or as ready-to-eat products/food sold through e.g. a restaurant, a café, or the like.

[0007] One of the challenges accompanying such early versions of plastic zippers on plastic bags is/was the need to apply the necessary amount of pressure to the pair of interlocking rails, progressively along the entirety of the full length of the zipper in order to affect closure of the zipper along the full length of the zipper. If the user does not apply the necessary level of pressure at all points along the length of the interlocking rails, some portion of the length of the zipper can be left open, unsealed, whereby the contents of the bag are not protected from leakage out of the bag, or from infiltration of unwanted materials into the bag, or from infiltration of ambient conditions into the bag, which may adversely affect the contents of the bag. Similarly, if the interlocking rails are not properly laterally aligned with each other, no amount of pressure will provide the desired closure/seal which is the purpose of having a plastic zipper.

[0008] So there are some challenges associated with using, attempting to use, zippers where achieving a sealed closure of the zipper relies on the user being able to properly align the interlocking rails, and to apply a sufficient amount of pressure along the full lengths of such properly aligned interlocking rails of the zipper.

[0009] In a later, and known, commercially-available version of such plastic bags which can be "zipped" closed, a "slider", as a second and distinct element, not part of the container/bag, itself, is mounted to, and straddles, the two sides of the bag at facing interlocking rails. As the user pulls the slider along the interlocking rails in a first direction, the slider engages both of the interlocking rails, performing the tasks of keeping the interlocking rails properly aligned with each other, and applying the appropriate interface and/or pressure between the facing interlocking rails, progressively along the length of the zipper as the slider is moved along the length of the zipper, whereby the facing interlocking rails are progressively sealed closed against each other, thus progressively sealing the bag closed at the zipper as the slider progresses along the length of the zipper. Such closure/seal prevents access to the contents of the bag so long as the zipper remains closed/sealed, as well as preventing spillage or leakage of the contents from the bag.

[0010] So a plastic zipper which uses a slider is both easier to operate, and more reliable in actually closing the full length of the zipper, than a zipper which relies on the user for interlocking rail alignment and for applying the proper amount of pressure along the full length of the zipper.

[0011] But the ease of closing the bag applies equally well to ease of opening the bag at the zipper, thus unsealing and opening the bag, by pulling the slider in the

opposing direction, whereby the slider releases, re-opens the closure/seal and the bag is opened at the zipper, allowing access to the contents of the bag. Thus, just as with the non-slider version of plastic zippers, slider-based plastic zippers provide the ability to seal the bag closed, then reopen/unseal the bag. Such bag can be sealed, and re-opened, a plurality of times using a single slider on such plastic zipper.

[0012] Whether the zipper consists only of the facing interlocking rails, or includes a slider as a separate element, either way, the process of opening the zipper and accessing the contents of the bag is easy enough that a child, or other unauthorized individual, has the ability and/or strength to open the bag and access the contents of the bag.

[0013] While the original such type of locking bags, without separate slider element, is still available, and less expensive than bags which use the separate slider, bags with a separate slider seem to be easier to use. And slider bags provide greater assurance of in fact achieving a full seal along the full length of the zipper. Depending at least in part on strength and dexterity of the user, and diligence of the user of a bag where a slider is not used, slider bags may provide greater assurance that the zipper is in fact fully closed and sealed along a continuous and full length of the zipper. Especially where the cost of the bag is trivial relative to the cost of the contemplated/expected contents of the bag, bags having the slider may be more commonly used in the commercial market than zipper bags which do not employ a plastic zipper.

[0014] As more and more types of products are being packaged in bags having closures which use a slider on a plastic zipper, there arises the challenge of how to keep the bag sealed closed, while also enabling opening of the bag for access to the bag contents by an authorized user. For example, where a hazardous or toxic product, such as, for example and without limitation, dish soap or laundry soap, or a marijuana product, or a pesticide product, or a fungicidal product, or a fertilizer product, is packaged and/or sold in such a bag, there is a need to prevent unauthorized individuals, such as a child, from accessing the hazardous or toxic product, or controlled substance.

[0015] In bags which do not use a slider, the e.g. child simply tugs, pulls on the walls of the closed/sealed bag enough that, if the child is strong enough, the child eventually gets the bag open and thus has access to such hazardous contents.

[0016] Where a slider is used, gaining access to bag contents is even easier because the slider is easier to use. All the e.g. child has to do is to apply a pull force to the slider, and continue pulling until the child gets the pull force going in the right direction to move the slider, thus to open the bag.

[0017] Thus, while a bag which does not use a slider poses a less-than-desirable barrier to a child, the typical slider poses even less of a barrier to a child's ability to access the product inside the bag. And yet it is the slider-type re-openable closure mechanism which provides the easiest access to the bag contents for an authorized user, as well as the greatest assurance that the bag has, in fact, been fully closed/sealed at the zipper.

[0018] In some embodiments, a slider-based zipper can be used on facing flexible plastic panels where the flexible plastic panels are mounted to one or more other elements of the package/container structure which are generally considered to be inflexible. For example such facing flexible plastic panels may be mounted to hard plastic, plastic or other flexible laminate, or cardboard, or corrugated board, or natural or manufactured wood products, or metal portions of a container/package, optionally functioning as flexible extensions of such elements. Such embodiments encounter the same challenges as mentioned above, relating to interlocking rail alignment, closing pressure, and preventing unauthorized access to the product contained in such package/container.

[0019] Thus it would be desirable to provide a way to limit access to the product-holding compartment of a package or other structure which is opened and closed by a plastic zipper.

[0020] It would further be desirable to provide an access-controlling mechanism, for example and without limitation, a locking mechanism, for use at the zipper on a plastic bag.

[0021] It would also be desirable to provide such access-controlling mechanism as a locking mechanism for use on a container/receptacle/package/bag which uses a plastic zipper with a slider to close, and to then re-open, such container, at will, in order to deny unauthorized access to the contents of the container such as to a child or other physically or mentally or otherwise developmentally-challenged/disabled individual, while also allowing, enabling access to authorized individuals.

[0022] Such mechanism should desirably make it difficult, preferably impossible, for a child or other physically or mentally-challenged user to open the bag or other container, thus to gain access to the contents of the bag, through the zipper, while allowing access to an authorized user.

SUMMARY

[0023] This invention provides an access-controlling, access-limiting, mechanism, namely an access-limiting structure, for limiting access to a container, a package, a bag, or other receptacle or space through an opening which is closed, and re-opened, optionally controlling access, multiple times each direction, by a plastic zipper where the zipper is opened and closed by use of a slider. Access is controlled by moving a slider back and forth along a plastic zipper, opening and closing the container. The access-limiting mechanism includes, in addition to the slider, a coupler. The coupler can stay fixed, immovable, at a given location, relative to the zipper; or can be moved along the length of the zipper. As the slider moves close to the coupler, the slider and coupler are coupled

to each other, reversibly limiting the ability of the slider to open the zipper. Access can be further limited by adding a second control mechanism such as a cover, optionally a latching cover, which reversibly overlies one or both of the slider and the coupler. To open the container, the slider and coupler and, as applies, the cover, are released from respective coupling arrangements, whereupon the slider and coupler can be moved away from each other thereby opening some or all of the length of the zipper, and correspondingly opening the container to the extent the zipper has been opened.

[0024] Sliding the slider in a first direction closes the zipper opening. Sliding the slider in the opposite direction opens the zipper opening. The invention provides, for example, an obstructing device, such as a lock, which impedes, optionally prevents, unauthorized individuals from sliding the slider away from the coupler to thus open the container and access the contents of the container.

[0025] For example and without limitation, the invention provides, as an access-controlling, access-limiting mechanism, a lock structure which locks the slider to the coupler, the coupler being mounted on a substrate, such as a plastic bag, on which the slider is operative.

[0026] The first piece of the access-limiting structure is the slider, itself, which has several of the same features as a conventional slider on a slider-based plastic zipper. The user moves the slider back and forth along the length of the zipper, thereby opening and closing the zipper as the slider is moved, and thereby opening and closing the e.g. plastic bag in accord with a given position of the slider along the length of the zipper.

[0027] The second piece of the access-limiting structure is the coupler which, in some embodiments, stays fixed, immovable, at a given location, relative to the zipper e.g. at one side of the bag and, in some embodiments, straddles the elongate interlocking rails which extend along the length of the zipper. The slider is slid back and forth on the interlocking rails along the length of the zipper, opening or closing the zipper as the slider moves each direction and correspondingly opening or closing access to the contents which may be inside such container/package/bag, depending on which direction the slider is being moved.

[0028] While the slider provides access, or not, to the bag through the zipper, the invention limits, and in some embodiments, completely controls, a potential user's ability to slide the slider. Namely, the slider and/or coupler collectively have cooperating access-controlling, at least access-limiting, elements, e.g. male and female locking elements, which provide a locking function, or other access-limiting function, for example some obstruction, which functions to limit/control a potential user's ability to move/slide the slider and coupler away from each other.

[0029] For example, access may be controlled/limited by cooperating elements on the slider and coupler, which can be locked to each other. Or access may be controlled by an obstructing element which obstructs access to a user's ability to slide the slider away from the coupler. Access may be controlled by a combination of locking elements and obstructing elements. Access may be controlled by multiple locks such that more than one access-limiting lock must be released in order to move/slide the slider and coupler away from each other. The number of access-limiting barriers, and the level of sophistication of the access-limiting barriers are designed and configured to deny, or at least limit, access to the types of unauthorized individuals who are most capable of circumventing access-limiting barriers. Typically, less capable unauthorized individuals will inherently be unable to circumvent such access-limiting barriers/elements.

[0030] In some embodiments, the engagement of the locking elements occurs automatically as part of the male and female locking elements being aligned with each other as the respective locking elements come into close proximity or engagement with each other as the slider and the coupler approach each other. When the slider is locked to the coupler, the slider cannot be freely slid away from the coupler to thereby open the zipper, whereby primary access to opening of the bag, and corresponding accessing of the contents of the bag, is prevented. Rather, first the lock must be released/unlocked/de-coupled; and subsequently the slider and coupler can be slid away from each other, along the length of the zipper to open the bag.

[0031] In some embodiments, the male locking element is on the coupler and the female locking receptacle is on the slider.

[0032] In some embodiments, a cover is mounted on one of the slider and the coupler, or optionally on another one of the package elements, such as a wall of the package. The cover can be used to cover the slider, thus obstructing access to the slider; or may be used to cover the release elements, thus to limit access to the release elements which are used to release the slider and the coupler from each other. In order to slide the slider along the length of the zipper and away from the coupler, thus to gain access to the contents of the bag, the cover must first be unlatched as applies, and moved from its covering position; and then the slider can be slid along the length of the zipper thereby to open the zipper, thus to open the container.

[0033] In some embodiments, a second locking mechanism, for example associated with the cover, provides a second locking/latching function whereby the slider and the coupler are locked to each other by both first and second locks/latches. In order to slide the slider, both the first and second locking mechanisms must first be released, whereupon the slider can be slid along the zipper and away from the coupler, thereby to open the zipper.

[0034] In some embodiments, the second locking mechanism also covers and/or obstructs access to one or more lock release elements of the first locking mechanism whereby the second locking mechanism acts both as a lock and as an obstructing element or cover; which forces a specific sequence of events wherein the second

locking mechanism must be released first in order for an individual to have access to the first locking mechanism. In such instance, a thwarted attempt to open the second locking mechanism automatically acts to prevent the opening of the first locking mechanism, even if the individual has the knowhow and physical ability to open the first locking mechanism.

[0035] In a first family of embodiments, the invention comprehends apparatus for mounting on a package having a product-receiving compartment, the package further having zipper-type structure for accessing the product-receiving compartment, the package including a first wall having a first edge, a second plastic wall having a second edge, and a zipper, the zipper having a length, and including first and second interlocking rails at respective ones of the first and second edges of the first and second plastic walls, the first and second interlocking rails having lengths. The apparatus comprises a slider having a slider body, the slider body having a slider top, and comprising a slider channel adapted to interface with the interlocking rails, the slider body being adapted to being moved back and forth along the lengths of the interlocking rails whereby interaction between the slider channel and the interlocking rails opens and closes the portions of the interlocking rails over which the slider is moved, thereby opening and closing the respective portions of the zipper; and a coupler, having a coupler body, adapted to be mounted on the package, the coupler having a coupler top, and being adapted to be releasably coupled to the slider body, so as to limit the ability of the slider to open the zipper, thus to limit access to the internal compartment through the zipper while the coupler is coupled to the slider.

[0036] In some embodiments, the apparatus further comprises a cover adapted to being mounted on the package.

[0037] In some embodiments, the slider and the coupler are coupled to each other at a coupling location, and the cover is further adapted to overlie the coupled slider and coupler at the coupling location.

[0038] In some embodiments, the cover is adapted to overlie a full length of one of the coupled slider body and coupler body.

[0039] In some embodiments, the apparatus further comprises a release structure on one of the slider and the coupler, the release structure being operable by a user to release the slider body and the coupler body from being coupled to each other, further comprising a cover adapted to be mounted on the package, optionally on one of the slider body and the coupler body, the cover obstructing access to enough of the release structure to prevent activation of the release structure, to release the slider body and the coupler body from each other while the cover is so obstructing such access, the cover being movable so as to enable access to the release structure, after which the release structure can be actuated to affect release of the slider body and the coupler body from being coupled to each other.

[0040] In some embodiments, the apparatus further comprises an engaging structure which interacts with one of the slider body and the coupler body and thereby releasably latches the cover to the one of the slider body and the coupler body at the engaging structure, such that the latching must be unlatched before the slider body and the coupler body can be released from being coupled to each other.

[0041] In some embodiments, the engaging structure comprises a snap latch, and the releasable latching comprises a snap-latching of the engaging structure to an element on the respective slider or coupler whereby the snap-latching includes building a force which is quickly released as the latching is engaged.

[0042] In some embodiments, the cover is mounted to one of the slider body and the coupler body.

[0043] In some embodiments, the cover is adapted to being mounted on the package by a plastic hinge, wherein the cover articulates about the hinge in moving into and out of an overlying relationship with at least one of the slider body and the coupler body when the slider body and said coupler body are coupled to each other.

[0044] In some embodiments, the coupler, when mounted on the package, is adapted to being held immovable in a fixed location on the package.

[0045] In some embodiments, the coupler body, when mounted on a such package, is adapted to being movable back and forth along the interlocking rails whereby interaction between the coupler and the interlocking rails opens and closes the portion of the zipper over which the coupler is moved.

[0046] In some embodiments, the apparatus further comprises a coupler lock structure on the coupler, adapted and configured to interact with at least one other element of the package, thereby to immobilize the coupler at a location along the lengths of the interlocking rails.

[0047] In some embodiments, the coupler lock structure is adapted to releasably immobilize the coupler at such location along the lengths of the interlocking rails.

[0048] In some embodiments, the apparatus comprises a restraining mechanism comprising a male element on one of the slider and the coupler, and a female receptacle on the other of the slider and the coupler.

[0049] In some embodiments, the female receptacle is embodied in the top of one of the slider body and the coupler body, and the male element extends from the other of the slider body and the coupler body.

[0050] In some embodiments, the apparatus further comprises first and second release fingers on the one of the slider and the coupler which is associated with the female receptacle, and wherein the release fingers engage and deflect the male element in affecting the slider and the coupler being released from each other.

[0051] In some embodiments, the coupling of the slider body and the coupler body to each other limits movement of the slider along the lengths of the interlocking rails.

[0052] In a second family of embodiments, the invention comprehends apparatus limiting access to a com-

partment of a package through a plastic zipper when the apparatus is mounted on such package, the apparatus comprising a slider, having a slider body, the slider body comprising a slider channel adapted to interface with first and second interlocking rails on the package, the slider body being adapted to being moved back and forth along lengths of the interlocking rails whereby interaction between the slider channel and the interlocking rails opens and closes the portion of the zipper over which the slider is moved; a coupler, having a coupler body, the coupler body comprising a coupler channel adapted to interface with the interlocking rails of the zipper, the coupler body being adapted to being moved back and forth along the length of the interlocking rails whereby interaction between the coupler channel and the interlocking rails opens and closes the portion of the zipper over which the coupler is moved; and a restraining mechanism on one of the slider body and the coupler body, the restraining mechanism being designed and configured to engage structure on the other of the slider body and the coupler body, to thereby couple the slider and the coupler to each other.

[0053] In some embodiments, the invention comprehends a package having an internal compartment for receiving product thereinto, the package comprising a first wall having a first plastic edge and a second plastic wall having a second plastic edge proximate the first plastic edge, and a zipper, the zipper having a length, and comprising first and second interlocking rails at respective ones of the first and second edges of the first and second plastic walls, wherein interlocking of the rails is actuated by a channel in an actuator which is moved along respective adjacent portions of the lengths of the rails, the zipper comprising access-limiting apparatus wherein the slider operates as a first actuator and the coupler acts as a second actuator, and wherein the slider channel and the coupler channel both, individually and simultaneously, and cooperatively, engage the interlocking rails such that the slider channel opens a length of the interlocking rails as the slider is moved in a left-to-right direction along the length of the zipper and closes a length of the interlocking rails as the slider is moved in a right-to-left direction along the length of the zipper, and the coupler channel opens a length of the interlocking rails as the coupler is moved in an opposing right-to-left direction along the length of the zipper and closes a length of the interlocking rails as the coupler is moved in a left-to-right direction along the length of the zipper, wherein any portions of the interlocking rails which are to the left of the coupler or to the right of the slider are locked together such that the respective portions of the zipper are closed, and any portions of the interlocking rails which are between the coupler and the slider are not locked together such that the respective portion of the zipper is open.

[0054] In some embodiments, the slider and the coupler can be coupled to each other by structure on at least one of the slider body or the coupler body, and wherein the so-coupled structure can be moved along the length of the zipper such that the interlocking rails remain interlocked to each other and the zipper is closed, along the respective lengths of the zipper to the left and right of the coupled slider and coupler.

[0055] In some embodiments, as the coupled slider and coupler are moved along the length of the zipper in a given direction, the one of the slider channel or the coupler channel which leads in the direction of movement progressively opens respective portions of the lengths of the interlocking rails as the respective channel engages the rails, and the one of the slider channel or the coupler channel which follows in the direction of such movement, progressively closes the respective portions of the lengths of the interlocking rails as the respective following channel engages the rails.

[0056] In a third family of embodiments, the invention comprehends apparatus limiting access to a compartment of a package through a plastic zipper when mounted on such package, the apparatus comprising a slider, having a slider body, the slider body comprising a slider channel adapted to interface with first and second interlocking rails on the package, the slider body being adapted to being moved back and forth along lengths of the interlocking rails whereby interaction between the slider channel and the interlocking rails opens and closes the portion of the zipper over which the slider is moved; a coupler, having a coupler body adapted to being attached to the package; and a restraining mechanism on one of the slider body and the coupler body, the restraining mechanism being designed and configured to automatically engage structure on the other of the slider body and the coupler body, to thereby couple the slider and the coupler to each other, as at least one of the slider and the coupler is slid along the length of the zipper such that the slider and the coupler come close enough to each other to sufficiently close the zipper as to prevent unauthorized access to solid-state contents of the package through the zipper.

[0057] In some embodiments, the apparatus further comprises a cover operative to be mounted on at least one of the slider, the coupler, or the package, thereby to be operative to cover a selected portion of at least one of the slider or the coupler when the slider and the coupler are coupled to each other, thereby to obstruct release of the restraining mechanism and to correspondingly obstruct release of the slider and the coupler from each other.

[0058] In some embodiments, the apparatus further comprises the restraining mechanism also being designed and configured such that, when the slider and the coupler are coupled to each other, the zipper is necessarily sufficiently closed to prevent spillage of solid-state package contents from the package.

[0059] In some embodiments, the apparatus further comprises a male element on one of the slider and the coupler, and a female receptacle on the other of the slider and the coupler, further comprising first and second release fingers on the one of the slider and the coupler which is associated with the female receptacle, and

wherein the release fingers engage and deflect the male element in affecting the slider and the coupler being released from each other.

[0060] In a fourth family of embodiments, the invention comprehends apparatus limiting access to a compartment of a package through a plastic zipper when mounted on the package, the apparatus comprising a slider, having a slider body, the slider body comprising a slider channel adapted to interface with first and second interlocking rails on the package, the slider body being adapted to being moved back and forth along lengths of the interlocking rails whereby interaction between the slider channel and the interlocking rails opens and closes the zipper; a coupler, having a coupler body, the coupler being adapted to being attached to the package; and a restraining mechanism on one of the slider body and the coupler body, the restraining mechanism being designed and configured to engage structure on the other of the slider body and the coupler body, thereby to couple the slider and the coupler to each other such that, in the process of the slider body and the coupler body interacting with each other to so couple the slider and the coupler to each other, an element on at least one of the slider body and the coupler body is resiliently deflected, enough that the deflection can be readily seen with a naked eye.

[0061] In some embodiments, the restraining mechanism comprises a male engagement element on one of the slider body and the coupler body and a female receptacle in the other of the slider body and the coupler body, and wherein the deflection imposes a maximum deflection stress on the deflected element, and wherein, when the male engagement element and the female receptacle have become full engaged with each other, such maximum deflection stress has been at least partially alleviated.

[0062] In some embodiments, the restraining mechanism comprises a male engagement element extending from one of the slider body and the coupler body toward the other of the slider body and the coupler body, and a female receptacle in the other of the slider body and the coupler body, the male engagement element and the female receptacle being so cooperatively configured that, in the process of the male engagement element and the female receptacle interacting to couple the slider to the coupler, structure of at least one of the male engagement element and the female receptacle is so resiliently deflected.

[0063] In a fifth family of embodiments, the invention comprehends apparatus limiting access to a compartment of a package through a plastic zipper when mounted on the package, the apparatus comprising a slider comprising a slider channel adapted to interface with first and second interlocking rails on the package, the slider being adapted to being moved back and forth along lengths of the interlocking rails whereby interaction between the slider channel and the interlocking rails opens and closes the zipper; a coupler attached to the package; a first restraining mechanism on one of the slider and the coupler, the first restraining mechanism being designed and configured to engage structure on the other of the slider and the coupler, thereby to couple the slider and the coupler to each other; and a second restraining mechanism, separate and distinct from the first restraining mechanism, on one of the slider and the coupler, the second restraining mechanism being designed and configured to engage structure of the other of the slider and the coupler, thereby to couple the slider and the coupler to each other.

[0064] In some embodiments, the second restraining mechanism couples the slider and the coupler to each other independent of the coupling affected by the first restraining mechanism.

[0065] In some embodiments, the second restraining mechanism couples the slider and the coupler to each other in cooperation with the coupling affected by the first restraining mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

[0066]

FIGURE 1 is a pictorial side view showing a portion of the length of a slider-based zipper having a male locking element on the slider, and a coupler having a female receptacle which cooperates with the male locking element to lock/couple the slider and the coupler to each other.

FIGURE 2 is a pictorial top view of the slider and coupler of FIGURE 1, locked to each other.

FIGURE 3 is a pictorial side view of the slider and coupler of FIGURES 1 and 2 locked to each other, and wherein a cover is mounted to the slider.

FIGURE 4 is a pictorial side view as in FIGURE 3, showing a cross-section of the cover raised to an orientation generally perpendicular to the top surfaces of the slider and coupler.

FIGURE 5 is a pictorial side view as in FIGURE 4, showing the slider and the coupler mounted on a plastic bag, at the zipper, with the cover covering enough of the top surface of the coupler to obstruct ready access to the release mechanism which is related to releasing the slider from the coupler.

FIGURE 6 is a pictorial side view showing a second embodiment of the slider and coupler, including locking elements, the slider including both a first locking element and a second locking element.

FIGURE 7 shows the slider and coupler as in FIGURE 6, with both the first locking element and the second locking element engaged on the coupler.

FIGURE 7a is an enlarged side view of a portion of the coupled slider and coupler of FIGURE 7.

FIGURE 8 is a pictorial side view showing a portion of the length of a slider-based zipper having a male locking element on the slider, and a coupler having a female locking element which cooperates with the male locking element to lock the slider and the coupler to each other, and wherein both the slider and

the coupler can slide along the length of the zipper. FIGURE 9 is a pictorial bottom view, with part cut away, of a coupler of the invention, illustrating a coupler lock structure for locking the coupler immovable, optionally releasably immovable, along the length of the zipper.

[0067] The invention is not limited in its application to the details of construction, or in the arrangement of the components, or in the specific methods set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments or of being practiced or carried out in other various ways. Also, it is to be understood that the terminology and phraseology employed herein is for purpose of description and illustration and should not be regarded as limiting. Like reference numerals are used to indicate like components.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

[0068] FIGURES 1 and 2 show a mechanism 10 for controlling access to a plastic bag 12. Bag 12 has a plastic zipper 14 extending across substantially the full width of the bag at the top of the bag, although only a portion of the bag is shown in FIGURE 1. Zipper 14 is defined by facing interlocking rails 14a, 14b which extend across the width of the bag. In the embodiment illustrated in FIGURES 1 and 2, access-controlling mechanism 10 is defined by a two-piece locking mechanism 16.

[0069] The first piece of locking mechanism 16 is a plastic slider 18, having a length "L" extending along the length of the zipper, and a width "W" transverse to the length of the slider. Slider 18 looks much like a conventional slider on a conventional plastic bag which has a conventional plastic zipper. A user opens and closes the zipper by moving/sliding slider 18 back and forth across the width of the bag.

[0070] The second piece of the locking mechanism is a plastic coupler 20 which, in the embodiments represented by FIGURES 1 and 2, stays fixed at a given location relative to bag 12 at one side of the bag, astraddle elongate interlocking rails 14a, 14b.

[0071] Both slider 18 and coupler 20 are made of relatively resilient plastic such as polyethylene, polypropylene, nylon, or polyvinylidene chloride (PVDC) whereby certain elements of the slider and the coupler can be designed in cross-section thickness such that parts of the respective such elements are resiliently deflectable, whereby such elements can be moved by moderate force from an unstressed/rest position to a deflected/stressed position and, upon release of such force, the respective element moves generally back toward, optionally substantially to, a previous unstressed position.

[0072] By sliding the slider in a first direction, the zipper is opened, providing access to contents of the bag. By sliding the slider in the opposite direction, the zipper is closed, thus at least temporarily closing off access to the contents of the bag. Moving the zipper to the full extent possible in either direction either completely closes off access to the bag or opens the bag to the full extent possible, depending on which direction the slider is being moved.

[0073] A first end 22 of coupler 20 faces a second end 24 of slider 18. Ends 22 and 24 have a restraining mechanism, namely cooperating lock elements 26, e.g. male 26a and female 26b lock elements, which provide a locking function to control, thus to allow or prevent, movement of slider 18 along the length of zipper 14 and away from coupler 20.

[0074] In the embodiments illustrated in FIGURES 1 and 2, slider 18 is moved toward, and brought into proximity with, coupler 20. Because both the slider and the coupler are mounted on the interlocking rails, and the respective slider and coupler are cooperatively configured, male lock element 26a on slider 18 is automatically in general alignment with female lock receptacle 26b on coupler 20 and is so designed as to automatically come into engagement with the female lock receptacle 26b on coupler 20 as at least a portion of end 24 of the slider comes into an abutting, or nearly abutting, relationship with end 22 of the coupler, thus locking the slider to the coupler as end 24 of the slider gets close to, optionally abuts, coupler 20.

[0075] In the embodiments illustrated in FIGURES 1 and 2, when the slider is locked to the coupler, the slider cannot be slid across the width of the bag to thereby open the bag because of the coupler being fixed, immovable at a given location relative to the bag, whereby primary access to opening of the bag by an unauthorized user is prevented, controlled. Thus, the addition of coupler 20, as part of locking mechanism 16, with male lock element 26a on slider 18 and female 26b lock receptacle on coupler 20, and with coupler 20 fixed in position relative to the length of the zipper, is a first embodiment of the invention, illustrated in FIGURES 1 and 2.

[0076] In the embodiment illustrated in FIGURES 1-2, male lock element 26a has first and second lock fingers 28a, 28b, spaced from each other, with facing surfaces of the lock fingers extending parallel to each other, and extending toward coupler 20. Each of lock fingers 28a, 28b has a laterally extending protrusion 30 which extends in the direction of the width "W" of the slider.

[0077] Female lock receptacle 26b on end 22 of coupler 20 is sized and configured to receive male lock element 26a as slider 18 is moved toward coupler 20, with fingers 28a, 28b experiencing a frictional, resistive engagement with the sides of female lock receptacle 26b as fingers 28a, 28b are received into the female receptacle. Thus, as the spaced male lock fingers enter receptacle 26b, leading edges 34a, 34b of lock fingers 28a, 28b engage corresponding left and right side walls of female locking receptacle 26b, imposing a resistive transverse stress on fingers 28a, 28b forcing male lock fingers 28a, 28b to resiliently deflect laterally, transversely toward each other. Typically, but not necessarily, the mag-

nitude of the deflection of the male lock fingers is enough that such deflection can be readily seen with a naked eye having 20/20 vision, until the lock fingers reach a maximum deflection stress.

[0078] As the lock fingers move further inward into receptacle 26b, protrusions 30 on the lock fingers move past inwardly-disposed ends of the sidewalls at the opening into receptacle 26b whereby the previously-imposed frictional engagement is released and the male lock fingers resiliently move back toward their unstressed, rest orientation, again extending generally parallel to each other as illustrated in FIGURE 1.

[0079] With the lock fingers so released from the previously-imposed frictional engagement, the combination of the inward movement of the lock fingers into coupler 20 and the lateral/transverse movement of the lock fingers as protrusions 30 move past the ends of the side walls at the opening into the receptacle, brings leading edges 34a, 34b of the respective lock fingers into close proximity to, optionally into abutting relationship with, release fingers 36a, 36b, which act as release structure, on coupler 20. Such abutting relationship is shown in FIGURE 2 where leading edges 34a, 34b of male lock fingers 28a, 28b are in abutting relationship with release fingers 36a, 36b.

[0080] As the leading edges of the lock fingers approach release fingers 36a, 36b of the coupler, end 24 of slider 18 approaches end 22 of coupler 20. In the relationship shown in FIGURE 2, slider 18 is locked to coupler 20 by the locking of lock fingers 28a, 28b to the coupler at locking receptacle 26b, and a first portion of end 24 of the slider is in abutting relationship with a second portion of end 22 of the coupler. With the slider 18 so locked/coupled to coupler 20, and immovable with respect to coupler 20, and with coupler 20 immovable, fixed in position, relative to bag 12, zipper 14 is closed, and access to the contents of bag 12 is denied.

[0081] The lower portion of slider 18 has the usual channel structure 40, open at the bottom of the slider, to receive, to engage, and to disengage the respective interlocking rails 14a, 14b of zipper 14 so as to facilitate/enable opening and closing of the zipper as slider 18 is moved back and forth along the length of the zipper. Such channel structures 40 are known in the art.

[0082] In the embodiments illustrated in FIGURES 1 and 2, the bottom of coupler 20 also has channel structure 40 for receiving the interlocking rails such that any portion of the interlocking rails which are inside/under the coupler, and which are not permanently sealed to each other, are being held closed, or almost closed, by the coupler. However, in embodiments where the coupler is in a fixed, immovable relationship to the zipper as in FIGURES 1 and 2, such that the coupler never moves, the channel structure 40 of the coupler need not be configured to separate/open the zipper. Nonetheless, the channel structure of the coupler may, if desired, be configured to separate/open the zipper.

[0083] Still referring to FIGURES 1 and 2, with the slider locked to the coupler, those portions of the zipper which are under both the slider and the coupler are effectively being held closed, or almost closed, by the respective channel structure 40 of the slider and the coupler, while the portions of the zipper which are to the right of the slider were closed by leftward movement of the slider as the slider was moved toward the coupler, and remain closed by the relationships of the interlocked rails with each other.

[0084] In the embodiment illustrated in FIGURES 1 and 2, zipper 14 is opened by moving the slider from left to right, namely away from the coupler, and is closed by moving the slider right to left, toward the coupler. Restated, any portion of the zipper which is to the left of the slider and to the right of the coupler is open while any portion of the zipper which is to the right of the slider is closed. So, to fully close the zipper, the slider is moved the full length of the zipper to the left, up against the coupler as illustrated in FIGURE 2. Alternatively, to fully open the zipper, the slider is moved as far as possible to the right, away from the coupler.

[0085] At the top of coupler 20, a body 33 of release element 35 is integral with, or mounted to, or otherwise attached to, coupler 20 at or near the end 22 of coupler 20 which faces slider 18. Release fingers 36a, 36b extend away from end 22 of coupler 20, across the top of coupler 20 and are movable relative to the top of coupler 20. Terminal ends 38 of the release fingers overlie a left portion of the top of coupler 20. Ends 38 of release fingers 36a, 36b can be manually squeezed toward each other. Release fingers 36a, 36b, as extending from body 33, are sufficiently rigid that e.g. squeezing movement of the release fingers toward each other at the ends 38 results in corresponding movement along the entire lengths of the release fingers, especially to the lesser cross-section portions of the release fingers at finger roots 39. Because the cross-sections of the fingers are less at roots 39 than at opposing sides of the roots, taken along the lengths of the release fingers, the lesser cross-section portions of the release fingers at roots 39 operate as pivot points about which the release fingers, to the left of the roots, move/deflect when the ends of the release fingers are squeezed toward each other. When such squeezing force is released, the release fingers resiliently return to, or approximately to, the unstressed positions which are shown in FIGURES 1 and 2.

[0086] With male lock fingers 28a, 28b fully engaged in the female lock receptacle as shown in FIGURE 2, leading edges 34a, 34b of the lock fingers engage facing surfaces of the release fingers such that, as the release fingers are squeezed toward each other, potentially against latent resilient stresses in the lock fingers, the movement of the release fingers toward each other pushes the lock fingers toward each other such that the distance between lateral protrusions 30 is reduced enough that the lateral protrusions can be retracted through the opening at female lock receptacle 26b, thereby to release the male lock fingers from the female lock receptacle.

[0087] Starting with the zipper fully closed, with the slider locked to the coupler as in FIGURE 2, when the user desires to release the slider from coupler 20, namely to open the zipper, or partially open the zipper, the user squeezes e.g. the terminal ends 38 of release fingers 36a, 36b toward each other. The squeezing of the ends 38 of the release fingers toward each other translates as a corresponding squeezing movement along the lengths of the release fingers to roots 39, and operates to squeeze male lock fingers 28a, 28b toward each other. As a result of the pivotation of the release fingers about roots 39, the angle of the force received at a leading edge 34a, 34b of the respective lock finger has both a longitudinal vector "V1" urging the lock finger, and thus the slider, away from the coupler, and a transverse vector "V2", which urges the lock fingers toward each other. Both vectors "V1" and "V2" operate at the same time in response to the forces being exerted on the lock fingers by release fingers 36a, 36b.

[0088] The transverse vector moves the lock fingers toward each other, thus enabling protrusions 30 to move outwardly past the sidewalls at the lock receptacle opening. The longitudinal vector provides the force which causes the protrusions to, in fact, move longitudinally without further urging or, in the alternative, which enables the user to easily move the slider out of engagement with the coupler along the direction, and with the assistance of, the longitudinal force vector. In either case, male lock element 26a can be retracted from female lock receptacle 26b as the ends of the release fingers are squeezed toward each other.

[0089] Once the male lock element is retracted from the female lock receptacle, the user releases release fingers 36a, 36b, whereupon the release fingers resiliently return toward their unstressed positions/orientations as shown in FIGURES 1 and 2. Similarly, once lock fingers 28a, 28b are retracted from receptacle 26b, the lock fingers resiliently return toward their unstressed orientations/positions where the facing surfaces of the lock fingers are again generally parallel with each other.

[0090] With the slider released from coupler 20, the slider can be slid along the length of zipper 14 as easily as in a zipper which does not use a coupler, thus to open the zipper and allow respective access to the contents of the bag.

[0091] Accordingly, use of coupler 20 in a fixed, unmoving position, coupled to the body of the bag, and/or to the zipper, in combination with the respective male and female lock elements, provides secure locking of the slider at one side of the bag, ensuring that the zipper remains closed, while providing for release of the lock elements using only manual effort, but effort which does require at least modest finger dexterity, optionally more dexterity than can be exercised by a young child, optionally more dexterity than can be exercised by a typical physically handicapped adult.

[0092] Thus, in its simplest embodiment, the invention contemplates a slider and a coupler, where the slider and the coupler collectively embody a two-piece locking mechanism which allows the slider and the coupler to be releasably coupled to each other, thereby to prevent unauthorized access to the contents of the bag. While a male/female lock mechanism of a particular structure is illustrated, the lock mechanism can have any design so long as the lock mechanism releasably couples the slider and the coupler to each other.

[0093] Factors considered in designing mechanism 10 for controlling, limiting, access to the contents of the package include, without limitation, value of the product to be contained in the package and corresponding potential loss to the owner, the level of danger/risk which the contents of the package pose to an unauthorized user, any legal implications, capacity of contemplated unauthorized users to circumvent and open access-controlling, access-limiting security features, the period of time and the length of time during which unauthorized users may have access to the package, the robustness of the body of the package/bag itself, the use environment, and supervisory and security measures contemplated to be used to secure the environment, to which the package will be exposed, from unauthorized users so that such unauthorized users will not have even short-term access to the bag.

[0094] In some contemplated usages, a two-piece, male-female lock mechanism, such as that illustrated in FIGURES 1 and 2, may provide enough control to deter substantially all unauthorized users. However, in other contemplated usages, an enhanced level of locking/security/deterrence is desirable in order to provide reasonable certainty that access to the contents of the package is in fact limited, controlled, to the extent contemplated as being necessary to achieve the objectives defined for the package. Such usage might be where the contemplated unauthorized user may have greater capabilities, such as, relative to some base line capabilities, relatively greater dexterity, greater intellect, and/or more persistence. Another reason for enhanced lock/security is where the product contained in the bag presents an enhanced level of risk to an unauthorized user, or where the product has enhanced value to the owner or to an authorized user.

[0095] For example, children learn about their environment, about their world, by playing with items they can touch, feel, and manipulate, by exploring the world, by testing what they can do with whatever items are available to them - for extended periods of such play time. Where such environment, namely including the contents of the respective package, may be dangerous to the child, it is desirable to put in place enough barriers that the child will not be able to access the dangerous portion of the environment, namely the contents of the package, even though the child may have extended periods of time to test and manipulate his/her discoveries. In such instances, a simple primary male/female lock system such as that illustrated in FIGURES 1 and 2 may not provide the level of security necessary to protect the child, whereby

a more sophisticated, two-stage locking mechanism, or other enhanced security system, may be desirable/justified.

[0096] A limit on reasonableness in designing the security system is that the security system typically need not provide more deterrence, to a particular group of unauthorized users, than is provided by the walls/sheets which make up the body of the package/bag, for example the product-holding receptacle, the inner chamber of the package. Thus, a lock, closure, or other deterrence which is much more difficult to circumvent than penetrating the walls of the package/bag is not an obvious lock or closure for controlling access through the zipper.

[0097] In the second embodiment, illustrated in FIGURES 3-5, a cover 42, also preferably plastic, is shown incorporated into, or mounted on, or otherwise part of, slider 18. Cover 42 is configured to be rotated about hinge 44, over the slider body and over the coupler, thereby to overlie, and cover the primary locking mechanism, namely over the male and female lock element, namely over the coupling location, specifically over abutting ends 22, 24 where the slider and coupler are coupled to each other, and over the release fingers.

[0098] In the rest position of the cover, illustrated in FIGURE 3, cover 42 extends away from slider 18, and correspondingly extends away from coupler 20.

[0099] With the cover in the covering position, shown in FIGURE 5, the cover physically interferes with a user accessing release fingers 28a, 28b. When the cover is fully seated over/on coupler 20, the cover is releasably engaged with, releasably latched/locked to, the coupler as engaging lip 46 on the cover engages with the ends of release fingers 28a, 28b. As such, cover 42 acts as a second element, namely in addition to the lock fingers, holding the slider immovably locked to the coupler. Desirably, but not necessarily, more force is required to release, unlock, unlatch the cover from the coupler than can be exerted by the contemplated unauthorized user, e.g. child, of interest.

[0100] The cover can, in the alternative, be attached by hinge 44 to the coupler rather than to the slider, and is typically molded as a unitary plastic member of the coupler or slider to which the cover is permanently attached. A plastic hinge such as that illustrated in FIGURES 3-5 is sometimes referred to, known as, a living hinge.

[0101] In other embodiments, first and second portions of the cover can be mounted to each of the slider and the coupler whereby the first and second portions collectively cover the release fingers, and collectively lock or latch to the access-limiting mechanism while overlying the release fingers or other coupling location.

[0102] In the alternative, the cover can be separately mounted to the material of the body/receptacle of the bag/package, itself, separate from any mounting of the coupler or the slider to the bag/package. Or the cover can be used as a separate element, not attached to the slider, not attached to the coupler, not attached to the package sheet material or any other part of the package. In any such event, and as with all cover configurations, in the covering orientation, the cover overlies/covers and/or obscures enough of whatever other structure a user needs to access, namely the coupling location or release elements/fingers, in order to release at least one operative locking/latching mechanism; or otherwise limits/controls access to, physically interferes with, such unauthorized access by way of an operative locking/limiting mechanism. In typical uses, the cover will overlie at least half of the length of the e.g. coupler, taken along the direction of the length of the zipper and may overlie the full length of the coupler or slider.

[0103] The embodiments illustrated in FIGURES 3, 4, and 5 also show a coupler 20 and a slider 18, including the same male/female locking mechanism as in FIGURES 1 and 2, and wherein cover 42 is coupled, mounted, or otherwise attached, at a first location on the cover, namely hinge 44, to the right end of the slider. Hinge 44 provides a flexible plastic connection to the slider, where the entire width of the hinge flexes, whereby the cover can be rotated, from its fully open position shown in FIGURE 3, counterclockwise to the vertical position shown in FIGURE 4, and thence, or continuously, to the closed position shown in FIGURE 5. Referring to FIGURES 4 and 5, in the closed position shown in FIGURE 5, engaging lip 46 at a second location on the cover, namely at the remote edge of the cover, snap-engages, snap latches, with release fingers 36a, 36b, requiring enough force to release the cover that the child or other individual of interest does not easily release the cover from the release fingers.

[0104] With the cover so engaged over the release fingers, the release fingers are at least partially obstructed from view such that the availability, usefulness of the release fingers may not be recognized. Such recognition can be further suppressed, avoided by omitting window 48 in the cover.

[0105] In any event, the access-controlling/limiting mechanism 10 illustrated in FIGURES 3-5 requires two specific action steps in order to open the zipper. The first step is to release, open cover 42, which does include a preliminary sub-step of releasing snap-locked engagement lip 46 from the release fingers. After the cover has been released and articulated away from release fingers 36a, 36b, the second step is squeezing the release fingers toward each other to thereby release lock fingers 28a, 28b from coupler 20. Finally, if the lock fingers are not automatically released from the coupler by force vector "V1", the user pulls the slider away from the coupler while squeezing the release fingers, in an action which requires simultaneous use of both hands - namely a two-handed action. Such requirement for simultaneous use of two hands, in and of itself, irrespective of the structure of the access-controlling mechanism, provides an enhanced level of access control to the process of opening the zipper.

[0106] Thus, cover 42 requires a preliminary action

step, namely that of releasing the cover, before release fingers 28a, 28b can be accessed and actuated. Thus, in this embodiment, cover 42 and release fingers 28a, 28b act as cooperating restraining mechanisms, with the common objective of restraining access to the zipper.

[0107] In the alternative, the cover can be foreshortened and narrower at its remote end such that the end of the cover engages either the inner surfaces 50 of male lock fingers 28a, 28b or the inner surfaces 52 of release fingers 36a, 36b so as to directly engage the lock fingers or the release fingers to prevent/impede either the release fingers from being squeezed toward each other or the lock fingers from being squeezed toward each other.

[0108] Still further, the end of cover 42 can engage the rear end of the opening adjacent root 39, thereby independently coupling the slider and the coupler to each other.

[0109] Those skilled in the art will now see that a wider variety of structures can be employed to impede, prevent, limit, control a potential user, who has a less-than-full use of nominally-normal adult physical or mental capabilities, from gaining access to, squeezing release fingers 36a, 36b or lock fingers 28a, 28b. Again, the objective is that the engagement of the cover, which is mounted on the slider, with either the lock fingers or the release fingers, or other structure on the coupler, is such that the child or other individual of interest is unable to expose and release the primary lock.

[0110] In any embodiment contemplating the cover, the cover can as well be mounted to the slider or to the coupler, or to one of the side walls of the bag or other substrate to which the slider controls access, so long as the cover is effective, whether by locking or otherwise, to limit, optionally to prevent, access to whatever structure is responsible for releasing the primary locking elements; or the cover can serve as a second independent restraining mechanism, whereby the primary restraining mechanism 26 and the secondary restraining mechanism, e.g. cover 42, can be released independent of each other.

[0111] Still further, the cover can be a two-part cover where both parts can be attached to the slider, both to the coupler, or one each to the coupler and the slider. A two-part such cover can employ its own secondary restraining mechanism which releasably locks the two parts to each other and/or to the slider or to the coupler, or to walls of the package/bag, when the cover overlies the release fingers or other primary release mechanism, or otherwise obstructs use of the release mechanism.

[0112] FIGURES 6 and 7 illustrate a third embodiment of access-limiting, access-controlling mechanisms 10 of the invention. Male lock element 26a on slider 18 embodies a central, longitudinally-extending shaft 54 extending from main body 62 of the slider. Lock fingers 28a, 28b extend rearwardly, back toward the main body, from the remote end of shaft 54.

[0113] As in the earlier embodiments, lock fingers 28a, 28b are compressed, moved toward each other as the male lock element 26a is advanced into the female receptacle on the coupler, and such maximum deflection/compressive stress is released once the ends of lock fingers 28a, 28b move past the side walls of female receptacle 26b on the coupler. As in the embodiments of FIGURES 3-5, cover 42 is attached to the main body 62 of slider 18 by a plastic hinge 44, sometimes referred to as a "living" hinge. As illustrated in FIGURE 7, after the male-female lock mechanism 26 has been engaged as in FIGURE 6, cover 42 is rotated/pivoted about hinge 44, and window 48 on the cover is frictionally snap-engaged over riser 56 on the coupler, reinforcing the force used in holding the slider in abutting engagement with the coupler.

[0114] While the primary male-female lock mechanism 26, illustrated in FIGURES 6 and 7, locks the slider to the coupler, such lock may, depending on the lengths of lock fingers 28a, 28b, enable limited longitudinal movement of the slider and coupler toward and away from each other. The engagement of the cover over riser 56, by contrast, requires tight/firm abutment of the end of the slider against the coupler, with the closing/locking of window 48 over riser 56 locking the slider and coupler tightly against each other.

[0115] The engagement of cover 42 on riser 56 can include snap-latching of window 48 into a suitably-positioned detent in the corresponding surface of riser 56.

[0116] Such snap latching is affected by engagement of remote side wall 64 of window 48 with protruding engaging lip 46 on riser 56. Length "L2" of cover 42 is dimensioned such that remote cover side wall 64 successfully moves past engaging lip 46 by the force being applied at riser 56 causing the slider to pivot, rotate, flex the hinge end of the cover, and thus slider body, up a few degrees about the locus of abutment 66 of the slider and coupler, so as to create a first small-angle wedge-shaped space 68a between slider 18 and coupler 20, and a second small-angle wedge-shaped space 68b between the top of the slider body and the bottom of the cover. Corresponding flexing in the side walls of the bag adjacent the slider and coupler accommodates such angular movement at the interface where the coupler and slider meet. The rounded shape of engaging lip 46 accommodates respective movement of remote edge 64 of window 48 about and downwardly past the lip as the user applies downward force on the window remote edge at riser 56. When enough force has been applied, the remote edge of the window moves past lip 46 whereupon the built-up force/stress is quickly, suddenly released as the cover window snap-engages/latches to riser 56.

[0117] With the cover so snap-latched to the riser, wedge-shaped spaces 68a, 68b remain intact, maintaining a continuing stress/force holding the slider firmly in abutting relationship with the coupler at abutment locus 66.

[0118] Starting with the closed zipper, with the slider and coupler coupled to each other, and with cover 42 locked onto coupler 20 at riser 56, as illustrated in FIG-

URE 7, to disengage the slider from the coupler, as a first step, cover 42 is released from riser 56. To release cover 42 from riser 56, the user engages end lip 70 of the cover with a finger or finger nail, and raises the end of the cover past lip 46 on the riser, thus releasing the cover from the coupler.

[0119] As a second step, once cover 42 has been released, and deployed away from the riser, lock fingers 28a, 28b are squeezed together and the slider is manipulated away from the coupler. Again, substantial manual strength and dexterity, and again typically required use of both hands - one squeezing the lock fingers toward each other, and the second hand manipulating the slider away from the coupler is required to affect this second step. Such requirement for simultaneous use of 2 hands is effective to defeat any potential user having less than normal adult strength and/or adult dexterity in both hands, from accessing the contents of the package.

[0120] As seen in FIGURES 6, 7, and 7a, release fingers 28a, 28b are angled down from female receptacle 26b and the ends of the fingers are shown substantially touching the top surface of coupler 20. In accord with the following more-detailed description, it is highly acceptable for the ends of the fingers to actually touch the top surface of the coupler. Such downward angle of the release fingers relative to the top surface of the coupler defines third wedge-shaped spaces 68c between the bottom surfaces of the release fingers and the top surface of the coupler. Such wedge-shaped spaces collectively express a tension being imposed on the abutment coupling of the coupler and the slider by the latching of cover 42 on riser 56.

[0121] In addition, the outer edges 72 of release fingers 26a, 26b are disposed inwardly of side surfaces 74 of the coupler body. Yet further, release fingers 26a, 26b, as illustrated, have a height "H" of about 1 mm to about 3 mm, optionally about 1 mm to about 2 mm, optionally about 1 mm to about 1.5 mm. Thus, the release fingers are limited in height, are touching, or substantially touching, the top surface of the coupler, are displaced inward of side surfaces 74 of the coupler body, and the effective height of the fingers above the top surface of the coupler body is no more than 3 mm, optionally no more than 2 mm, optionally about 1 mm to about 1.5 mm. The outer edges of the release fingers are displaced inwardly, toward each other, from the side surfaces of the coupler body by at least 0.5 mm, optionally at least 1 mm.

[0122] Given the above dimensions and positioning as illustrated in FIGURES 6, 7, and 7a, a user attempting to use the soft flesh of e.g. the thumb and forefinger to squeeze release fingers 28a, 28b toward each other far enough to get protrusions 30 past the side walls of female receptacle 26b, will fail. Rather, the limited height and the inward deployment of the release fingers, against the top surface of the coupler does not provide enough surface contactable with enough force by the soft tissue of a human finger, whereby use of soft finger flesh alone, to squeeze the release fingers enough to affect release of the slider from the coupler, fails to move the release fingers by the required amount to release the slider from the coupler.

[0123] Rather, some hard object, hard tool, such as a small pliers, or fingernails, are required to apply sufficient force to the release fingers to get the fingers sufficiently squeezed for the release fingers to get through female receptacle 26b.

[0124] In other embodiments, where less restriction on opening of the package is acceptable, the engagement surfaces of the release fingers which are engaged by a user's human fingers can have a greater height "H", or can be located further outwardly away from each other and outwardly relative to the outer surfaces of the sidewalls of the coupler, or both. Such modifications provide release fingers which are readily engaged by the soft flesh of an adult human user's fingers, and squeezed toward each other, enough to enable movement of the release fingers through the female receptacle, thus to release the slider from the coupler.

[0125] Once the release fingers 28a, 28b are sufficiently squeezed to clear receptacle 26b, a force is still required to move the slider longitudinally away from the coupler. But both the slider body and the coupler body are tapered, narrowing in width from abutted ends 22, 24 to the opposing remote ends. Such taper, narrowing frustrates facile gripping of the coupler and slider, particularly where substantial effort is being simultaneously exerted in squeezing release of fingers 28a, 28b.

[0126] Accordingly, the configurations and dimensioning of the various piece parts of the coupler and the slider play major roles in frustrating attempts of the unauthorized user to open the zipper.

[0127] FIGURE 8 shows an embodiment of access-controlling mechanism 10 wherein coupler 20 is not immovably fixed in position relative to the bag/zipper. Rather, the coupler can be moved left or right along the length of the zipper as suggested by the double-headed arrow 58. Correspondingly, the slider can be moved left or right along the length of the zipper as suggested by double-headed arrow 60. Such movement of the slider and coupler can take place when the slider and zipper are locked to each other, and also while the slider and coupler are not locked to each other.

[0128] In the embodiments represented by FIGURE 8, the structure of zipper channel 40 in the coupler is configured similar to the structure of the zipper channel in the slider. Namely, the structure of the coupler zipper channel is a mirror image of the channel structure in the slider whereby the coupler closes the zipper when moved from left to right while the slider closes the zipper when moved from right to left. As a result, the zipper is closed by bringing the slider and coupler together and is opened by separating the slider and coupler from each other. Those portions of the length of the zipper which are under coupler 20, and those portions of the length of the zipper which are to the left of coupler 20, are always closed. Those portions of the length of the zipper which are under

slider 18, and those portions of the zipper which are to the right of slider 18, are always closed. Accordingly, when the slider and coupler are locked to each other, the full length of the zipper is always closed, irrespective of where, along the length of the zipper, the locked slider/coupler combination is. And with the slider and coupler locked together in abutting relationship, the locked combination of slider and coupler can be moved along the length of the zipper with the full lengths of the interlocking rails of the zipper remaining effectively closed, locked to each other irrespective of where that locked combination is along the length of the zipper.

[0129] As the slider and coupler are unlocked from each other and moved away from each other, the portion of the length of the zipper which is between the slider and the coupler is opened as illustrated in FIGURE 8, by the movement of either the slider or the coupler, or both.

[0130] Restated, if/as the slider is moved to the right, that portion of the zipper which is traversed by the slider, and which is then to the left of the slider and to the right of the coupler, is opened by the movement of the slider, by virtue of the zipper-opening/closing structure in the zipper channel 40 of the slider.

[0131] Similarly, if/as the coupler is moved to the left, that portion of the zipper which is traversed by the coupler, and which is then to the right of the coupler and to the left of the slider, is opened by the movement of the coupler, by virtue of the zipper-opening/closing structure in the zipper channel 40 of the coupler.

[0132] In this embodiment, for releasing the locking elements 26, 28 from each other, typically the user needs to use two hands simultaneously on access-controlling mechanism 10. As the locking elements of the access-controlling, access limiting mechanism are released from each other, even such minimal movement of the coupler or slider as is required for such lock release, opens a short length of the zipper. Once the lock elements are released from each other, any further movement of either the slider or the coupler away from the other of the slider or the coupler opens a corresponding portion of the length of the zipper. The maximum available length of opening of the zipper occurs when both the slider and the coupler are moved as far as possible along the length of the zipper, away from each other, typically to opposing edges of the bag on which the slider and coupler are mounted.

[0133] The zipper can be subsequently re-closed by moving either the slider or the coupler, or both, toward the other of the slider or the coupler, and again securing the lock elements to each other. Such securement of the lock elements to each other is suggested in FIGURE 2.

[0134] While the coupler is shown on the left and the slider on the right in FIGURES 1-5 and 8, such positions can be reversed with no loss of functionality as suggested in FIGURES 6-7. Indeed, accomplishing such reversal of the perceived respective left/right positioning of the coupler and slider, can be effected by simply rotating the respective plastic bag 180 degrees about a vertical axis.

[0135] In yet another embodiment, the zipper can extend less than the full length, full corresponding dimension, of the package.

[0136] In another embodiment, illustrated in FIGURE 9, coupler 20 is slidable along the length of the zipper. A separate and distinct lock structure 76 is provided on the coupler for locking, optionally releasably locking, the coupler to the bag at a desired location along the length of the zipper.

[0137] Referring to lock structure 76, a slot 78 extends from the outer surface of side wall 80 of the coupler to the interior wall of zipper channel 40. A lock bolt 82 is mounted in slot 78 by a pivot pin 84 which extends through a bore 86 in the coupler. Bore 86 extends in a straight line from the bottom of coupler 20 to slot 78, and further into the coupler body above slot 78.

[0138] As an alternative to bore 86 and pivot pin 84, protuberances on the top and bottom of the lock bolt can be snap-connected into corresponding recesses/detents in the top and bottom walls of slot 78.

[0139] A control lever 88 extends from the body of lock bolt 82 and lies along, but spaced from, side wall 80 of the coupler.

[0140] In use of lock structure 76, coupler 20 is moved to the desired position along the length of the zipper. Having reached the desired position along the length of the zipper, the user lifts control lever 88 away from its rest position shown in solid lines in FIGURE 9, thus rotating the remote end 90 of the lock bolt inwardly about pivot pin 84 into channel 40 and against the side wall of the bag to which the coupler is mounted. The lifted control lever and respective rotated lock bolt, are shown in dashed outline in FIGURE 9. Such rotation of the lock bolt traps the side wall of the bag against the opposing side wall of channel 40 of the coupler. FIGURE 9 shows an optional detent 92 which can receive both the bag side walls and the remote end 90 of the lock bolt, thus locking the side walls of the bag in the detent.

[0141] If/When the user desires to move the so-locked coupler along the length of the zipper, the user returns the control lever back against the side wall of the coupler as shown in solid line in FIGURE 9. A snap latch such as protuberance 94 can be employed e.g. on the remote end of lock bolt 82, to cooperate with a respective female detent on the wall of slot 78 which faces remote end 90 when the lock bolt is in the retracted position shown in solid lines. Protuberance 94 can also engage detent 92 as lock structure 76 is holding the coupler locked against the side walls of the bag in immovable position along the length of the zipper.

[0142] This, or other, releasable coupler lock structure is effective to releasably lock the coupler in an immovable, fixed location along the length of the zipper. Namely, the coupler can be selectively locked in a desired position on the zipper, thus to limit the length of the zipper which can be traversed by the slider. Such locking typically engages the lock structure of the coupler with elements of the zipper, or to other element(s) of the packaging structure.

[0143] The coupler lock structure can be configured such that the locking can be either permanent, whereby the coupler cannot be later released and moved, or can be releasable.

[0144] Where the locking of the coupler to the zipper is releasable, the coupler is releasably locked in position at a desired location along the length of the zipper, which limits the portion of the length of the zipper which can be traversed by the slider, thus limiting the portion of the zipper which can be opened. If, when the user desires to move the slider along a greater portion of the length of the zipper, thus to open a greater portion of the length of the zipper, the coupler is unlocked and is moved to the desired location which provides greater length traverse by the slider, and the coupler is then again releasably locked in position at that location along the length of the zipper. The slider is then able to traverse a greater portion of the length of the zipper.

[0145] If, when the user desires the slider to be able to traverse a lesser portion of the length of the zipper, the coupler is unlocked from its position along the length of the zipper and is moved to the new desired position location which provides a lesser length of the zipper which can be traversed/opened by the slider.

[0146] By selecting the location along the length of the zipper at which the coupler is positioned, and fixed in location, the user can tailor the size of the opening created by the slider in dispensing the package contents from the package. By providing for the coupler to be releasably fixed, the package enables the user to determine the size of the dispensing opening according to the contents of the package, or according to the amount of product desired to be dispensed, or the rate at which product is to be dispensed. Further, where less than all of the product is dispensed from the package at a given time, thus where a first portion of the product is dispensed, and the dispensing is stopped, and a second portion of the product is to be dispensed at a later time, the provision for the coupler to be releasably fixed enables the package user to dispense the first portion of the product through a first size opening and to dispense the second portion of the product through a second different size opening.

[0147] In yet another embodiment, the female lock receptacle 26b can be designed, configured, embodied in the top, e.g. the top surface of e.g. the coupler. The male lock fingers, or other male lock structure which is locked into the female lock receptacle, extends from a hinge such as hinge 44 and can be articulated, from a rest position displaced from the interface of slider 18 and coupler 20, similar to the rest position shown for cover 42 in FIGURE 3, to an overlying position as shown in FIGURE 5 where the e.g. male lock structure on the slider interfaces with, engages with, the female lock receptacle on the coupler. Of course, receptacle 26b can be in the top surface of slider 18 and the male lock fingers articulate from coupler 20 into such recess.

[0148] In some embodiments, coupler 20 embodies a cover 42, having a hinge 44, which is articulated, pivoted as in FIGURES 4 and 5, over the release elements of the lock structure after the operative locking elements are locked together, whereby such cover operates as an obstructing element, obstructing access to the respective release elements of the locked-together, access-limiting restraining mechanism, illustrated by lock structure 26.

[0149] As in the other embodiments, each of the male and female lock elements can be used on either the slider or the coupler, so long as one of the slider and the coupler bears the male lock element and the other of the slider and the coupler bears the female lock receptacle.

[0150] While male and female lock structures have been illustrated, other types of lock structures, which need not fit the "male" or "female" designations, can be substituted on the slider and coupler, so long as the respective lock elements can be releasably secured to each other for controlling, limiting access to the contents of the package.

[0151] Where the coupler is permanently, immovably fixed in position relative to the zipper, coupler 20 need not be mounted on the interlocking rails of the zipper. Rather, the coupler can be mounted to the zipper, or on essentially any other element of the package/bag, such as to one or more of the package walls. What remains important is that respective lock element 26a or 26b which is embodied in the coupler be appropriately aligned with the corresponding lock elements 26a or 26b which is/are embodied in the slider, enough to enable the slider and the coupler to be coupled to each other.

[0152] In some embodiments, male element 26a and female receptacle 26b are omitted, and cover 42 provides the only lock structure locking the slider and coupler to each other. In such instance, engaging lip 46, or other engaging structure on the cover engages a selected structure on the one of the slider and coupler to which the cover is not hingedly mounted. Or an engaging lip, or other engaging structure, on the one of the slider and coupler to which the cover is not hingedly mounted engages a window or other cooperating structure of the cover, as illustrated in FIGURES 6, 7, and 7a. Accordingly, the coupler can be releasably coupled to the slider by only cover 42.

[0153] The subject matter of the following paragraphs that are numbered for allowing reference is part of the disclosure of the present application and may inter alia be claimed in the present application or in a divisional application derived there from.

1. Apparatus for limiting access to a compartment of a package through a plastic zipper when mounted on such package, said apparatus comprising:

   (a) a slider, having a slider body, said slider body comprising a slider channel adapted to interface with first and second interlocking rails on such package, said slider body being adapted to being moved back and forth along lengths of such

interlocking rails whereby interaction between said slider channel and such interlocking rails opens and closes such zipper;
(b) a coupler, having a coupler body, said coupler being adapted to being attached to such package;
(c) a restraining mechanism as part of one of said slider body and said coupler body, said restraining mechanism being designed and configured to engage structure on the other of said slider body and said coupler body, thereby to couple said slider and said coupler to each other;
(d) release structure adapted and configured to be activated by a user so as to disengage said slider body and said coupler body from each other; and
(e) a cover attached, at a first location on said cover, to one of said slider and said coupler, said cover being adapted to being in a covering relationship over said release structure when said slider and said coupler are coupled to each other.

2. Apparatus as in paragraph 1 wherein said cover is adapted to being in an overlying relationship over at least one of said slider body and said coupler body when said slider and said coupler are coupled to each other.

3. Apparatus as in paragraph 1 or 2, said cover comprising an interference structure which is adapted and configured to engage said release structure so as to interfere with activation of said release structure when said interference structure is so engaged with said release structure.

4. Apparatus as in paragraph 3, said interference structure further comprising a second restraining mechanism by which said cover is releasably coupled to said one of said slider and said coupler to which said cover is not attached, at a second location on said cover.

5. Apparatus as in one of paragraphs 1 to 4, said cover being adapted to overlie at least a portion of said release structure so as to interfere with a user activating said release structure and thereby releasing said slider and said coupler from each other.

6. Apparatus as in one of paragraphs 1 to 5, said cover being adapted to being moved into an overlying relationship with at least a portion of said release structure so as to interfere with a user activating said release structure and thereby releasing said slider and said coupler from each other.

7. Apparatus as in one of paragraphs 1 to 6 wherein said cover is attached to said one of said slider and said coupler by a hinge wherein a width of said hinge is resiliently flexed when said cover is moved from a rest position, which rest position is accompanied by either no flexural stress or a relatively lower flexural stress condition in said hinge, to a position overlying said release structure, which overlying position is accompanied by a relatively greater flexural stress condition in said hinge.

8. Apparatus as in one of paragraphs 1 to 7 wherein said cover is attached to said one of said slider and said coupler by a living hinge and wherein, when said slider and said coupler are engaged with each other, and when said living hinge is in a rest condition, said cover extends, from said hinge, away from the other of said slider and said coupler.

9. Apparatus as in paragraph 8 wherein said cover is brought into such covering relationship over said release structure by rotating said cover about said hinge.

10. Apparatus as in one of paragraphs 1 to 9 wherein said restraining mechanism comprises a male element on one of said slider and said coupler, and a female receptacle on the other of said slider and said coupler.

11. Apparatus as in paragraph 10 wherein said release structure comprises first and second release fingers on said one of said slider and said coupler which release fingers are deflected by a user in affecting said slider and said coupler being released from each other.

12. Apparatus as in paragraph 11, further comprising said release fingers engaging and deflecting said male element in affecting said slider and said coupler being released from each other.

13. Apparatus as in paragraph 11 or 12 wherein said release fingers are embodied in said male element.

14. Apparatus as in paragraph 11, 12 or 13 wherein said release fingers have heights "H" of no more than 3 mm.

15. Apparatus as in one of paragraphs 11 to 14 wherein said release fingers, in a rest condition, are displaced inwardly from said edges of said one or said coupler and said slider.

16. Apparatus as in one of paragraphs 1 to 15 wherein said coupler, when mounted on such package, is adapted to being held immovable in a fixed location on such package.

17. Apparatus as in one of paragraphs 1 to 16 where-

in said coupler body, when mounted on such package, is adapted to being movable back and forth along such interlocking rails whereby interaction between said coupler and such interlocking rails opens and closes the portion of such zipper over which said coupler is moved.

18. Apparatus as in one of paragraphs 1 to 17, further comprising an engaging structure which interacts with one of said slider body and said coupler body and thereby releasably latches said cover to said one of said slider body or said coupler body at said engaging structure, such that such latching must be unlatched before said slider body and said coupler body can be released from being coupled to each other.

19. Apparatus as in paragraph 18 wherein said engaging structure comprises a snap latch, and wherein such releasable latching comprises a snap-latching of said engaging structure to an element of the respective said slider or coupler.

20. A package comprising apparatus as in one of paragraphs 1 to 19.

21. Apparatus for limiting access to a compartment of a package through a plastic zipper when mounted on such package said zipper having a length, said apparatus comprising:

(a) a slider, having a slider body, said slider body comprising a slider channel adapted to interface with first and second interlocking rails on such package, said slider body being adapted to being moved back and forth along lengths of such interlocking rails whereby interaction between said slider channel and such interlocking rails opens and closes such zipper;
(b) a coupler, having a coupler body, said coupler being adapted to being attached to such package, said slider and said coupler being configured to be releasably coupled to each other so as to limit access to such compartment of such package through said zipper; and
(c) a cover attached to one of said slider and said coupler, and overlying at least half of a length, aligned with the length of said zipper, of a respective one of said slider or said coupler.

22. Apparatus as in paragraph 21 wherein said cover overlies at least a portion of said one of said slider and said coupler to which said cover is attached.

23. Apparatus as in paragraph 21 or 22, further comprising a first restraining mechanism as part of at least one of said slider body and said coupler body, said first restraining mechanism being designed and configured to engage structure on the other of said slider body and said coupler body, thereby to couple said slider and said coupler to each other.

24. Apparatus as in one of paragraphs 21 to 23, said cover being attached to said one of said slider and said coupler at a first location on said cover, said cover further comprising a restraining mechanism by which said cover is releasably coupled, at a second location on said cover, to said one of said slider and said coupler to which said cover is not attached at the first location on said cover.

25. Apparatus as in paragraph 24, further comprising a second restraining mechanism, said second restraining mechanism being designed and configured to engage structure of at least one of said slider and said coupler thereby to couple said slider and said coupler to each other.

26. Apparatus as in one of paragraphs 21 to 25 wherein said cover is attached to said one of said slider and said coupler by a hinge wherein an entirety of a width of said hinge is resiliently flexed when said cover is moved from a rest position, which rest position is accompanied by either no flexural stress or a relatively lower flexural stress condition in said hinge, to a position overlying portions of both said slider and said coupler, which overlying position is accompanied by a relatively greater flexural stress condition in said hinge.

27. Apparatus as in paragraph 26 wherein, when said slider and said coupler are engaged to each other and said living hinge is in a rest position, said cover extends, from said hinge, away from the other of said slider and said coupler.

28. Apparatus as in one of paragraphs 21 to 27 wherein said cover is attached to said one of said slider and said coupler by a living hinge.

29. Apparatus as in one of paragraphs 21 to 28 wherein said cover is attached to said one of said slider and said coupler by a hinge, and wherein said cover is brought into such overlying relationship by rotating said cover about said hinge.

30. Apparatus as in paragraph 22, said slider body and said coupler body having lengths extending in a same direction with said interlocking rails, said cover overlying the full length of the respective slider body or coupler body.

31. Apparatus as in paragraph 25 wherein said second restraining mechanism comprises a male element on one of said slider and said coupler, and a female receptacle on the other of said slider and said

coupler, said male element and said female receptacle being adapted and configured to cooperate with each other in coupling said slider and said coupler to each other.

32. Apparatus as in one of paragraphs 21 to 31 wherein said coupler, when mounted on such package is adapted to being held immovable in a fixed location on such package.

33. Apparatus as in one of paragraphs 21 to 32 wherein said coupler body, as mounted to such package, is movable back and forth along such interlocking rails whereby interaction between said coupler and such interlocking rails opens and closes the portion of such zipper over which said coupler is moved.

34. A package comprising apparatus as in one of paragraphs 21 to 33.

35. Apparatus for mounting on a package having a product-receiving compartment, such package further having a zipper for accessing such product-receiving compartment, such package including a first plastic wall having a first edge, a second plastic wall having a second edge, such zipper having a length, and including first and second interlocking rails at respective ones of the first and second edges of such first and second plastic walls, a slider, and a coupler, such first and second interlocking rails having lengths, said apparatus comprising:

(a) said slider, having a slider body, said slider body comprising a slider channel adapted to interface with such interlocking rails, said slider body being adapted to being moved back and forth along the lengths of such interlocking rails whereby interaction between said slider channel and such interlocking rails opens and closes the portions of such interlocking rails over which said slider is moved, thereby opening and closing the respective portions of the length of such zipper;
(b) said coupler, having a coupler body, and being adapted to being mounted on such package, and to be releasably coupled to said slider body, thus to limit access to such product-receiving compartment through such zipper; and
(c) a cover mounted on such package, optionally on one of said slider body or said coupler body, said cover comprising a snap-engaging latch structure which interacts with at least one of said slider body and said coupler body and thereby releasably latches said cover to said at least one of said slider body and said coupler body at said snap-engaging latch structure, such that such cover must be unlatched before said slider body and said coupler body can be released from being coupled to each other.

36. A package comprising apparatus as in paragraph 35.

[0154] Those skilled in the art will now see that certain modifications can be made to the apparatus and methods herein disclosed with respect to the illustrated embodiments, without departing from the spirit of the instant invention. And while the invention has been described above with respect to the preferred embodiments, it will be understood that the invention is adapted to numerous rearrangements, modifications, and alterations, and all such arrangements, modifications, and alterations are intended to be within the scope of the appended claims.
[0155] To the extent the following claims use means plus function language, it is not meant to include there, or in the instant specification, anything not structurally equivalent to what is shown in the embodiments disclosed in the specification.

List of reference signs

[0156]

10	access-controlling mechanism
12	plastic bag
14, 14a, 14b	zipper
16	lock mechanism
18	slider
20	coupler
22	end of coupler
24	end of slider
26, 26a, 26b	male lock element, female lock receptacle
28a, 28b	male lock fingers
30	lateral protrusions on lock fingers
32a, 32b	sidewalls of female lock receptacle 26b
33	body of release element 35
34a, 34b	leading edges of lock fingers 28
35	release element
36a, 36b	release fingers on coupler
38	ends of release fingers 36a, 36b
39	root of release finger
40	zipper channels in slider and coupler
42	cover
44	cover hinge
46	engaging lip on cover
48	window in cover
50	inner surfaces of lock fingers
52	inner surfaces of release fingers
54	shaft on male lock (FIG 6)
56	riser
58	double-headed arrow, coupler
60	double-headed arrow, slider
62	slider main body
64	remote edge of cover window 48
66	locus of abutment

68a, 68b, 68c	wedge-shaped spaces
70	cover end lip
72	outer edges of release fingers
74	side surfaces of the coupler body
76	coupler lock structure
78	slot in side wall of coupler
80	side wall of coupler
82	lock bolt
84	pivot pin
86	bore for pivot pin
88	control lever
90	remote end of lock bolt
92	detent
94	protuberance
H	height of release fingers
L	slider length
L2	length of cover
V1	longitudinal vector
V2	transverse vector
W	slider width

Claims

1. Apparatus for mounting on a package having a product-receiving compartment, such package including plastic walls defining first and second edges, and a zipper, such zipper having a length, and including first and second interlocking rails at or proximate the first and second edges of such first and second plastic walls, such first and second interlocking rails having lengths, said apparatus comprising:

(a) a slider having a slider body, said slider body having a slider top, and comprising a slider channel adapted to interface with such interlocking rails, said slider body being adapted to being moved back and forth along such lengths of such interlocking rails thereby to open and close the portions of such interlocking rails over which said slider is moved; and
(b) a coupler, having a coupler body, said coupler being adapted to be mounted on such package, said coupler having coupling structure whereby said coupler can be releasably coupled to said slider body, so as to reversibly limit the ability of said slider to open such zipper.

2. Apparatus as in Claim 1, further comprising a cover adapted to being mounted on such package, optionally on one of said slider body or said coupler body, said cover being optionally mounted on such package by a plastic hinge, and wherein said cover articulates about said hinge in moving into and out of an overlying relationship with at least one of said slider body and said coupler body when said slider body and said coupler body are coupled to each other, said cover being adapted to reversibly overlie at least one of said slider body and said coupler body, optionally at a coupling location.

3. Apparatus as in Claim 1 or 2, said coupler being adapted to be releasably coupled to said slider body at a coupling location along the lengths of such interlocking rails, said slider and said coupler having lengths extending along the lengths of such interlocking rails and being coupled to each other at a such coupling location, said cover optionally being adapted to overlie a full length of one of said slider body and said coupler body.

4. Apparatus as in any of Claims 1 to 3, further comprising an engaging structure which interacts with one of said slider body and said coupler body and thereby releasably latches said cover to said one of said slider body and said coupler body at said engaging structure, such that such latching must be unlatched before said slider body and said coupler body can be released from being coupled to each other, wherein said engaging structure optionally comprises a snap latch, wherein such releasable latching comprises a snap-latching of said engaging structure to an element on the respective said slider or coupler.

5. Apparatus as in any of Claims 1 to 4 wherein said coupler, when mounted on such package, is adapted either to being held immovable in a fixed location on such package,
or to being movable back and forth along such interlocking rails whereby interaction between said coupler and such interlocking rails opens and closes the portion of such zipper over which said coupler is moved.

6. Apparatus as in any of Claims 1 to 5, further comprising a coupler lock structure on said coupler, adapted and configured to interact with at least one other element of such package, thereby to releasably immobilize said coupler at a location along such lengths of such interlocking rails,
wherein said coupler lock structure is optionally adapted to releasably immobilize said coupler at such location along such lengths of such interlocking rails.

7. Apparatus as in any of Claims 1 to 6, further comprising a restraining mechanism comprising a male element on one of said slider and said coupler, and a female receptacle on the other of said slider and said coupler, said female receptacle optionally being embodied in the top of one of said slider body and said coupler body, said male element extending from the other of said slider body and said coupler body.

8. Apparatus as in any of Claims 1 to 7, further com-

prising first and second release fingers on one of said slider and said coupler, which release fingers are deflected by a user in affecting said slider and said coupler being released from each other, said release fingers optionally engaging and deflecting said male element in affecting said slider and said coupler being released from each other, said release fingers optionally being embodied in said male element, and optionally having heights "H" of no more than 3 mm, and optionally said release fingers, in a rest condition, being displaced inwardly from side edges of said one of said coupler and said slider.

9. Apparatus as in any of Claims 1 to 8, said apparatus limiting access to a compartment of a package through a plastic zipper when said apparatus is mounted on such package, said apparatus further comprising said coupler body comprising a coupler channel adapted to interface with such interlocking rails of such zipper, said coupler body being adapted to being moved back and forth along such length of such interlocking rails whereby interaction between said coupler channel and such interlocking rails opens and closes the portion of such zipper over which said coupler is moved, said restraining mechanism being designed and configured to engage structure on the other of said slider body and said coupler body, to thereby couple said slider and said coupler to each other.

10. Apparatus as in any of Claim 1 to 9, said restraining mechanism being designed and configured to automatically engage structure on the other of said slider body and said coupler body, to thereby couple said slider and said coupler to each other, as at least one of said slider and said coupler is slid along the length of such zipper such that said slider and said coupler come close enough to each other to sufficiently close such zipper as to prevent unauthorized access to solid-state contents of such package through such zipper.

11. Apparatus as in any of Claims 1 to 10, said cover being operative to cover a selected portion of at least one of said slider or said coupler when said slider and said coupler are coupled to each other, thereby to obstruct release of said restraining mechanism and to correspondingly obstruct release of said slider and said coupler from each other,
optionally said restraining mechanism also being designed and configured such that, when said slider and said coupler are coupled to each other, such zipper is necessarily sufficiently closed to prevent spillage of solid-state package contents from such package,
optionally further comprising a male element on one of said slider and said coupler, and a female receptacle on the other of said slider and said coupler, said first and second release fingers being disposed on said one of said slider and said coupler which is associated with said female receptacle.

12. Apparatus as in any of Claims 1 to 11 wherein, in the process of said slider body and said coupler body interacting with each other to so couple said slider and said coupler to each other, an element on at least one of said slider body and said coupler body is resiliently deflected, enough that such deflection can be readily seen with a naked eye.

13. Apparatus as in any of Claims 1 to 12 wherein said restraining mechanism comprises a male engagement element on one of said slider body and said coupler body and a female receptacle in the other of said slider body and said coupler body, and wherein such deflection imposes a maximum deflection stress on the deflected element, and wherein, when said male engagement element and said female receptacle have become full engaged with each other, such maximum deflection stress has been at least partially alleviated,
optionally wherein said coupled slider and coupler can be disengaged from each other, and wherein, in the process of becoming disengaged, an element on at least one of said slider and said coupler is resiliently deflected, enough that such deflection can be readily seen with a naked eye.

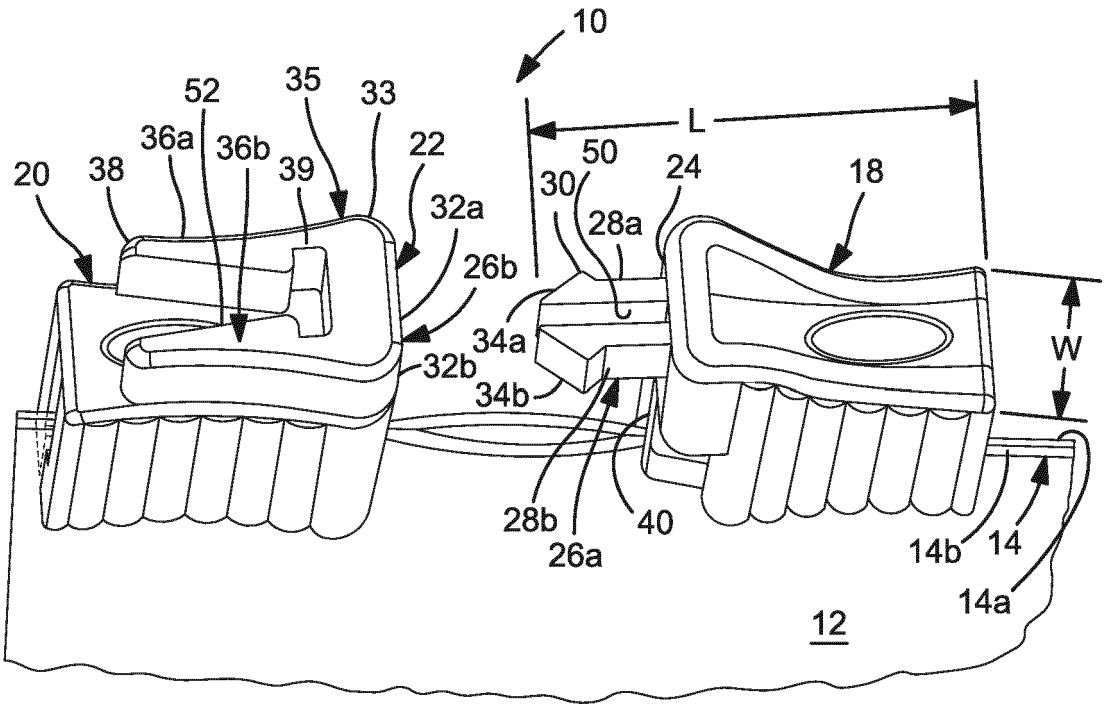
14. Apparatus as in any of Claims 1 to 13, said restraining mechanism comprising a first restraining mechanism on one of said slider and said coupler, said first restraining mechanism being designed and configured to engage structure on the other of said slider and said coupler, thereby to couple said slider and said coupler to each other, and a second restraining mechanism, separate and distinct from the first restraining mechanism, on one of said slider and said coupler, said second restraining mechanism being designed and configured to engage structure of the other of said slider and said coupler, thereby to couple said slider and said coupler to each other,
optionally wherein said second restraining mechanism couples said slider and said coupler to each other independent of the coupling affected by said first restraining mechanism,
optionally wherein said second restraining mechanism couples said slider and said coupler to each other in cooperation with the coupling affected by said first restraining mechanism.

15. A package made with access-limiting apparatus of any of Claims 1 to 14, said package optionally having an internal compartment for receiving product thereinto, said package comprising a first wall having a first plastic edge and a second plastic wall having a second plastic edge proximate the first plastic edge,

and a zipper, said zipper having a length, and comprising first and second interlocking rails at respective ones of the first and second edges of said first and second walls, wherein interlocking of said rails is actuated by a channel in an actuator which is moved along respective adjacent portions of the lengths of said rails,
wherein said slider operates as a first actuator and said coupler acts as a second actuator, and wherein said slider channel and said coupler channel both, individually and simultaneously, and cooperatively, engage said interlocking rails such that

(i) said slider channel opens a length of said interlocking rails as said slider is moved in a left-to-right direction along the length of said zipper and closes a length of said interlocking rails as said slider is moved in a right-to-left direction along the length of said zipper and
(ii) said coupler channel opens a length of said interlocking rails as said coupler is moved in a right-to-left direction along the length of said zipper and closes a length of said interlocking rails as said coupler is moved in a left-to-right direction along the length of said zipper,

wherein any portions of said interlocking rails which are to the left of said coupler or to the right of said slider are locked together such that the respective portions of said zipper are closed, and any portions of said interlocking rails which are between said coupler and said slider are not locked together such that the respective portion of said zipper is open,
optionally wherein said slider and said coupler can be coupled to each other by structure on at least one of said slider body or said coupler body, and wherein said so-coupled structure can be moved along the length of said zipper such that said interlocking rails remain interlocked to each other and said zipper is closed, along the respective lengths of said zipper to the left and right of the coupled slider and coupler,
optionally wherein, as said coupled slider and coupler are moved along the length of said zipper in a given direction, the one of said slider channel or said coupler channel which leads in the direction of movement progressively opens respective portions of the lengths of said interlocking rails as the respective said channel engages said rails, and the one of said slider channel or said coupler channel which follows in the direction of such movement, progressively closes the respective portions of the lengths of said interlocking rails as the respective said channel engages said rails.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36b
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26b
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34b
28b
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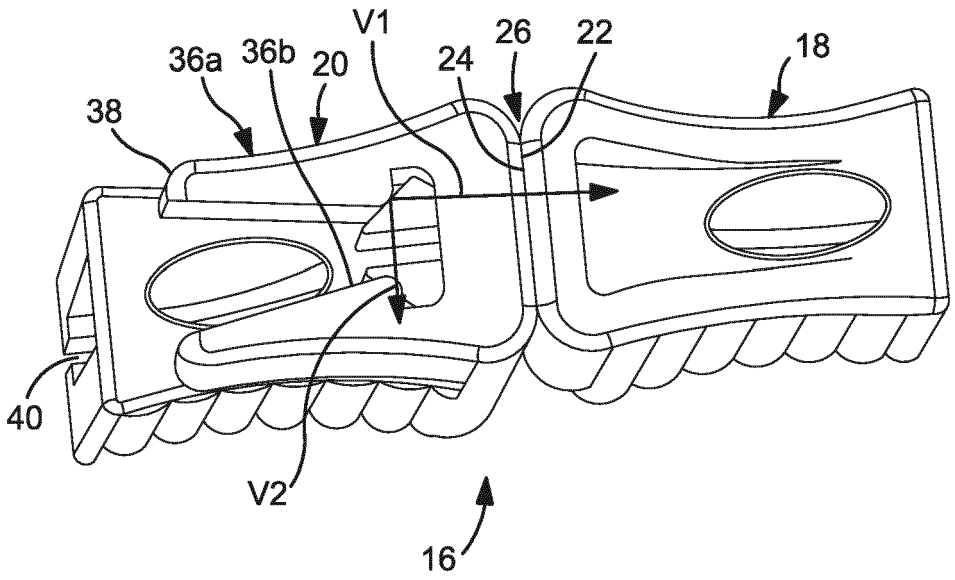
26a
14b
14
14a
12

FIG. 1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36b
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V2
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FIG. 2

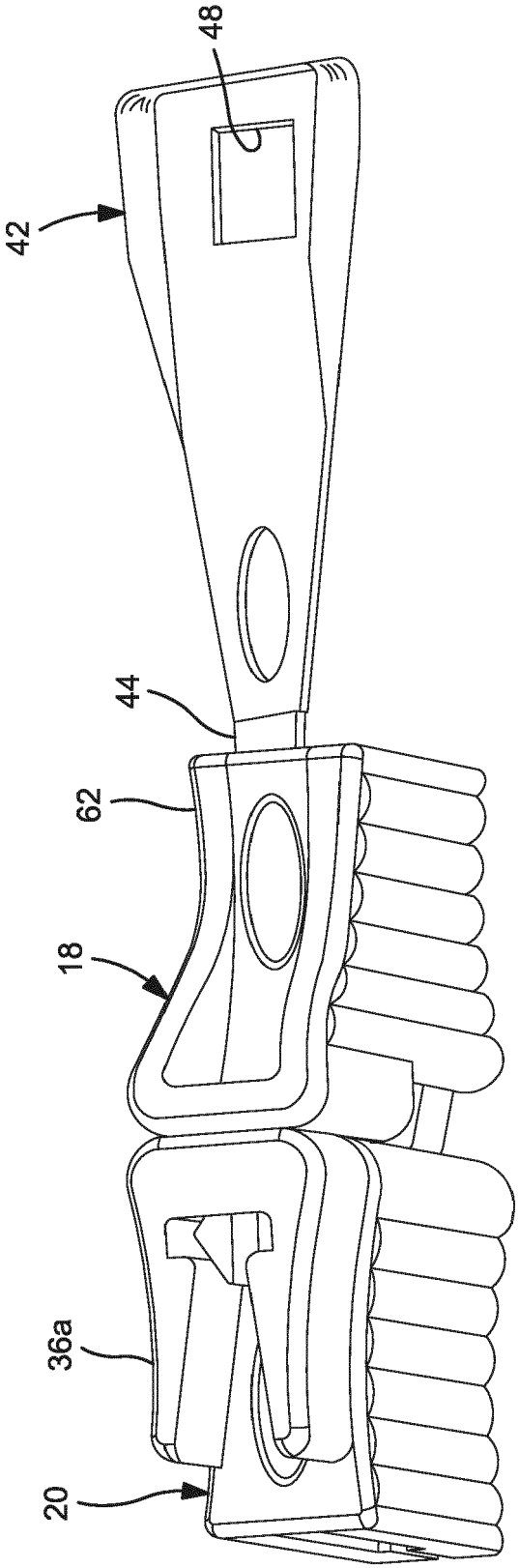


FIG. 3

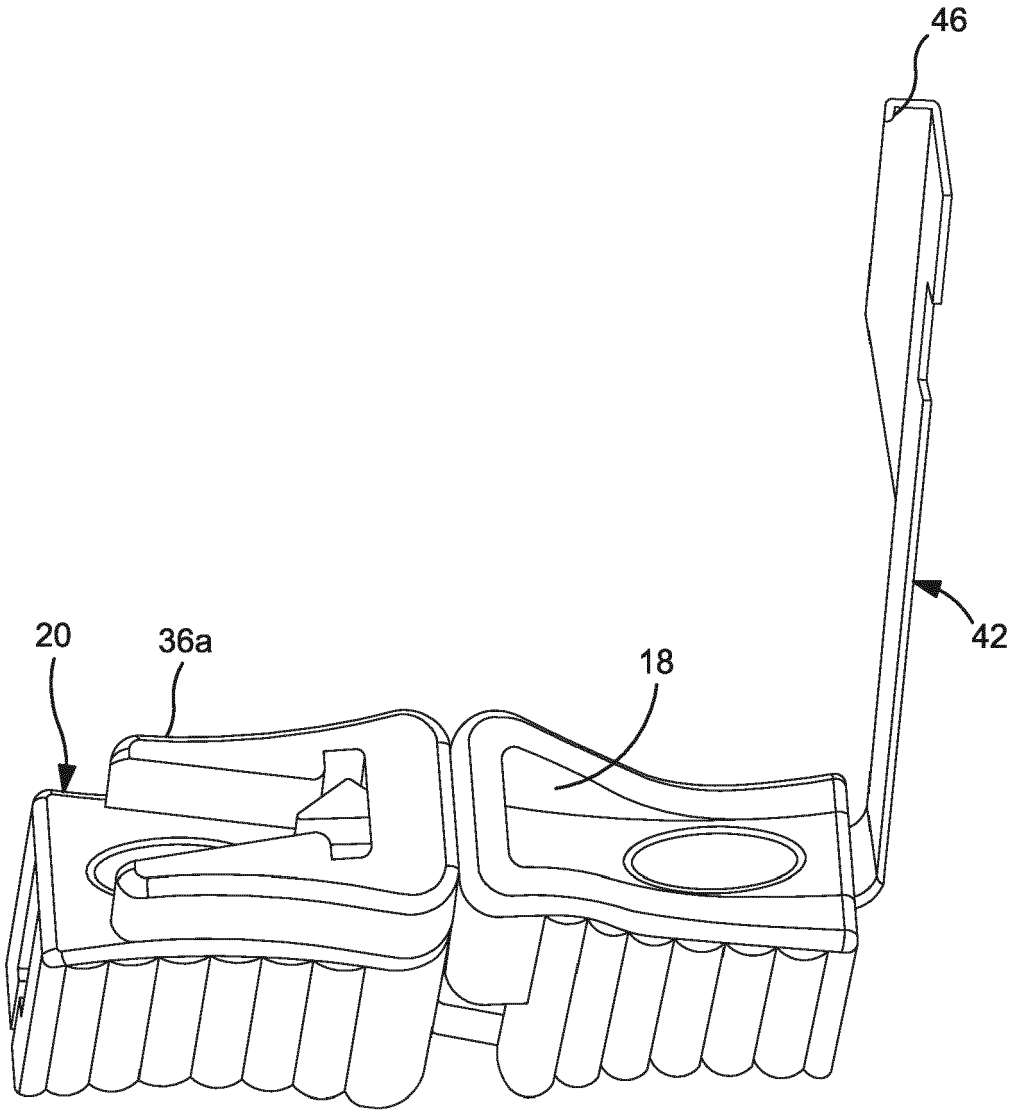


FIG. 4

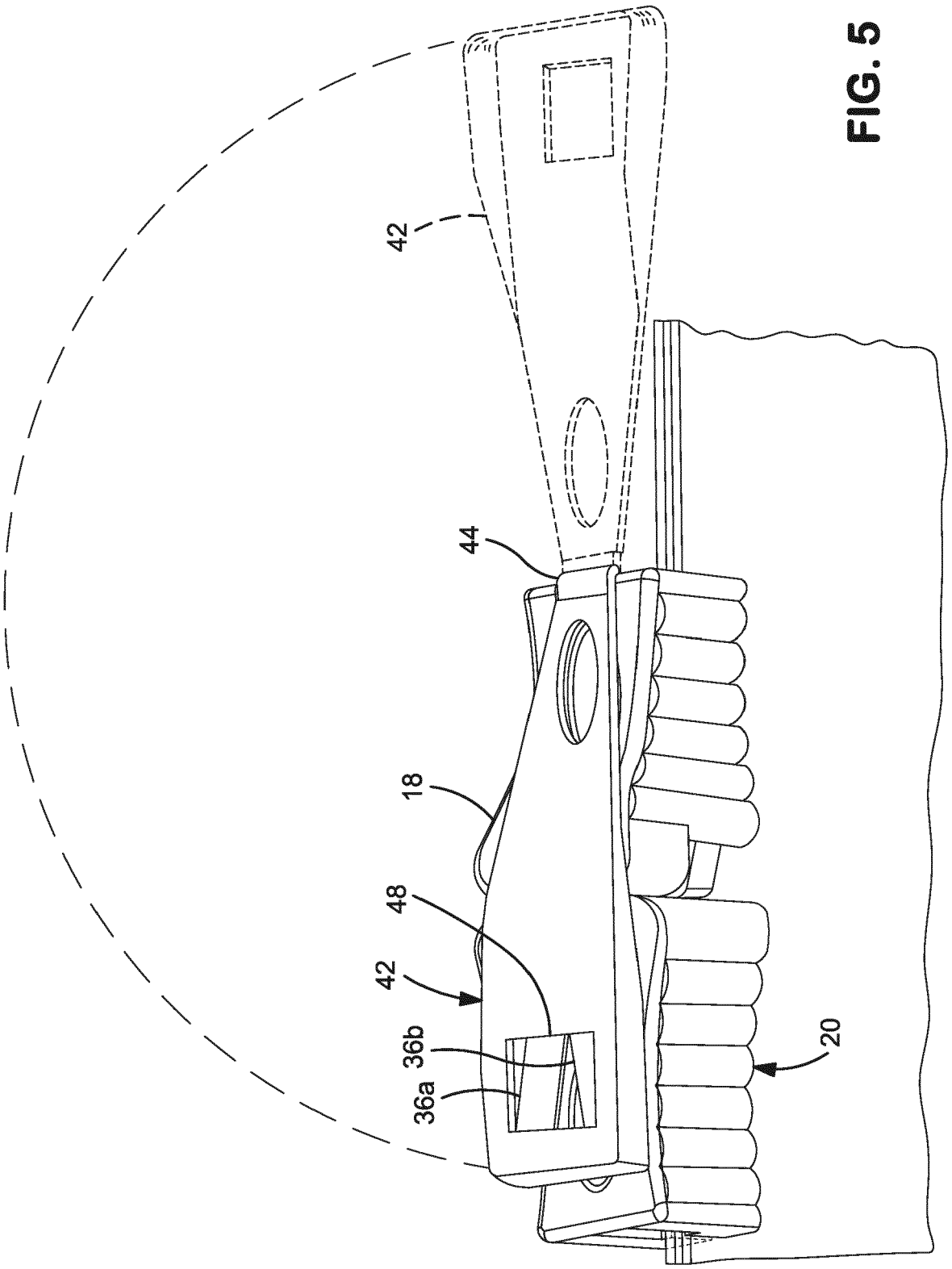


FIG. 5

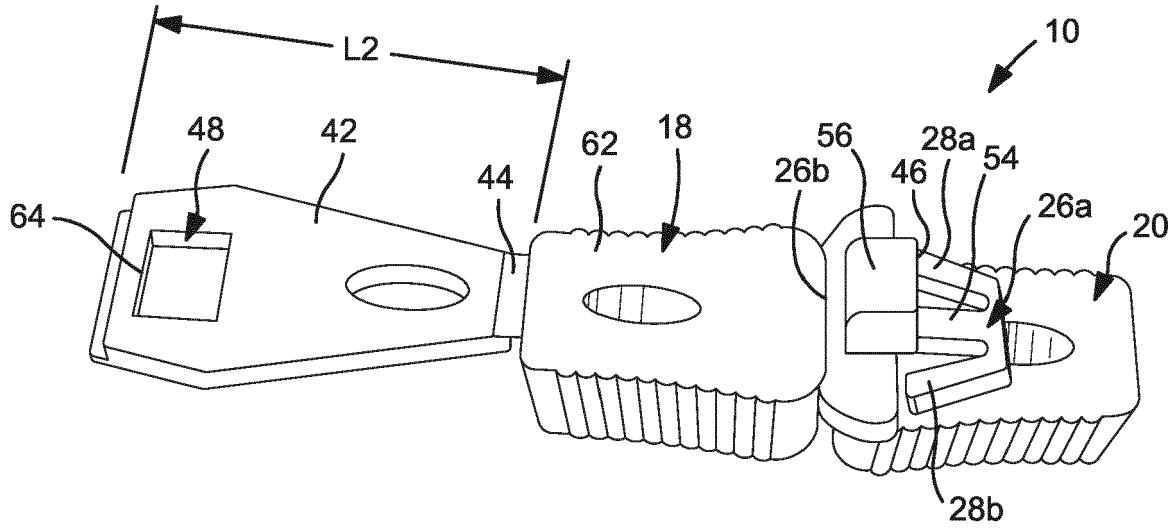


FIG. 6

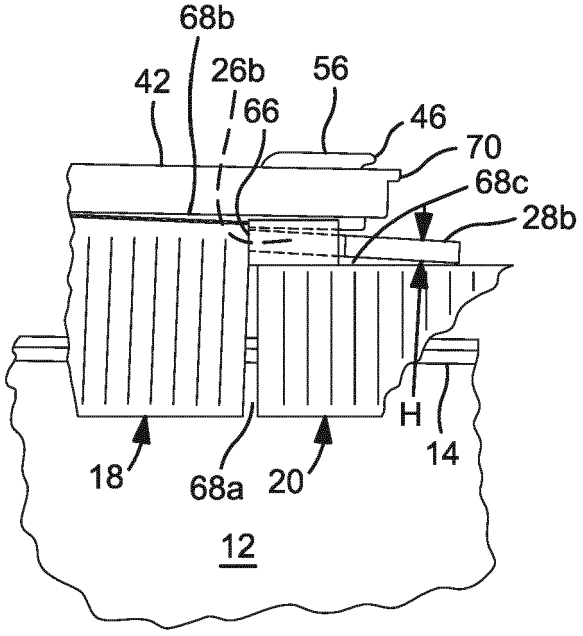


FIG. 7A

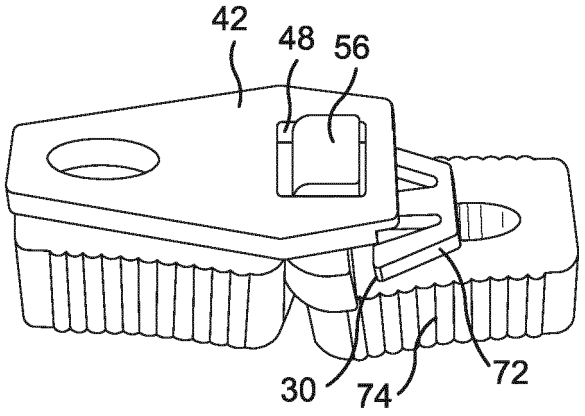
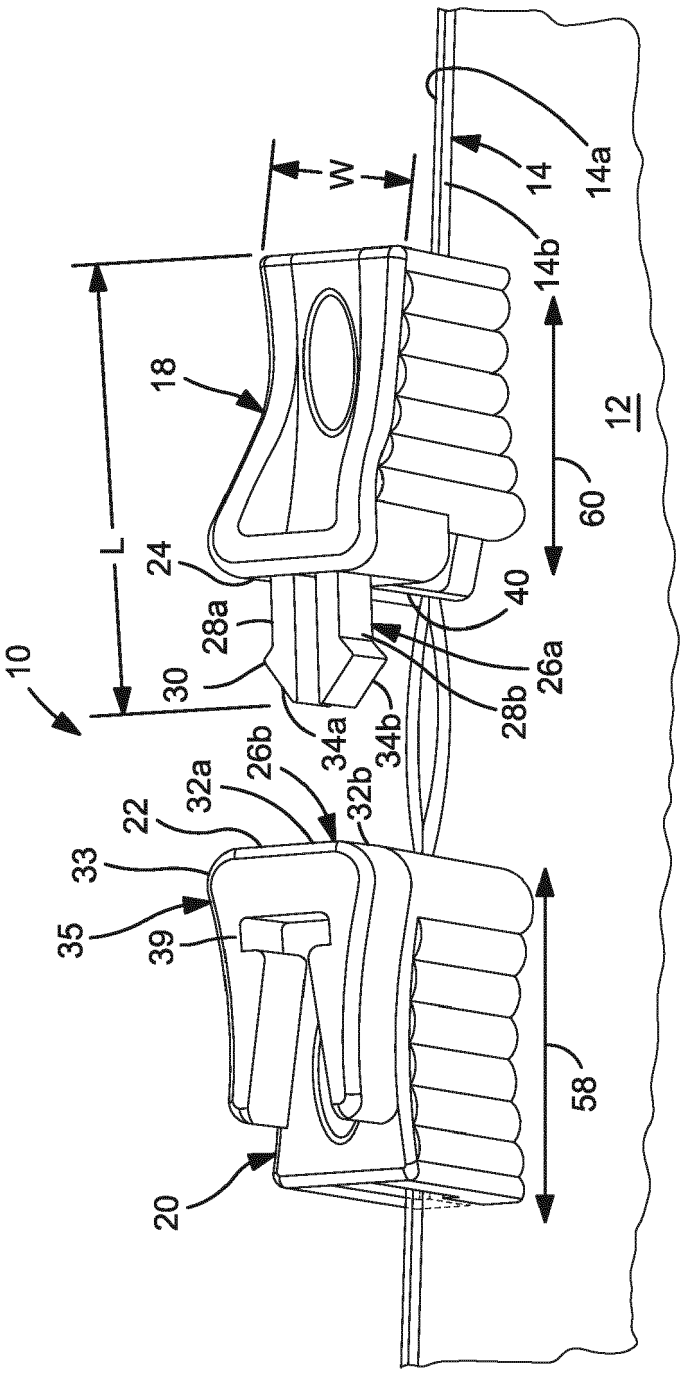


FIG. 7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14a
14b
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FIG. 8

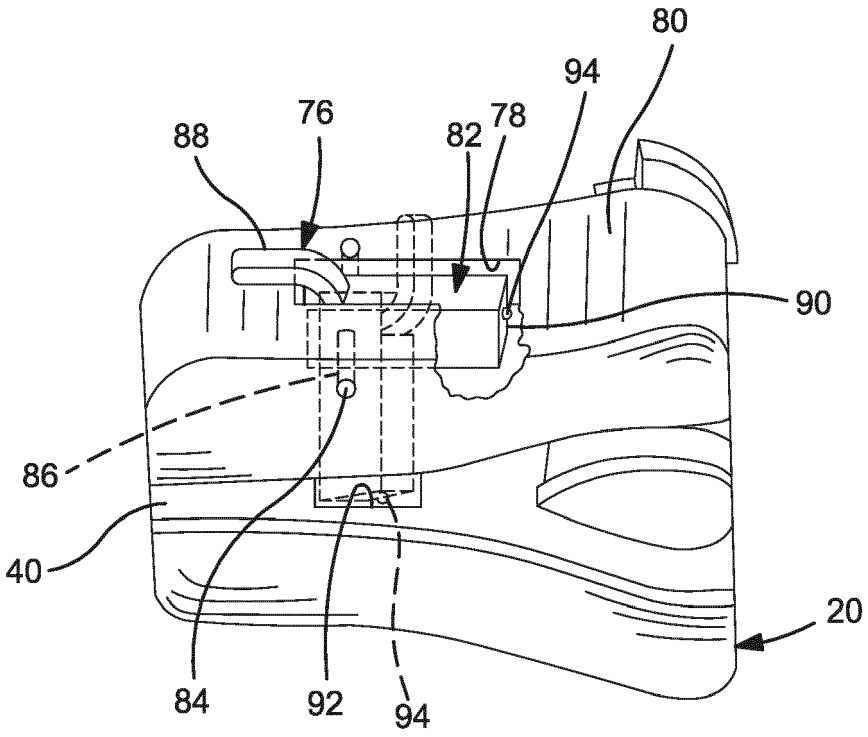

FIG. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 16 15 9011

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2011/126384 A1 (OZAKI IKUKO [JP] ET AL) 2 June 2011 (2011-06-02)	1,5, 7-10,12, 13,15	INV. B65D33/25 A44B19/26
Y	* paragraphs [0008] - [0077] * * figures 1-27 *	2-4,6, 11,14	

X	WO 02/03824 A1 (GLAD PRODUCTS CO [US]) 17 January 2002 (2002-01-17)	1,5,7,8, 12,13	
Y	* pages 1-13 * * figures 1-9 *	2-4,6, 11,14	

X	WO 2014/150576 A1 (REYNOLDS PRESTO PRODUCTS INC [US]; PETKOVSEK GREGORY L [US]; DOWLER RO) 25 September 2014 (2014-09-25)	1,5, 7-10,12, 13,15	
Y	* pages 1-26 * * figures 1-55 *	2-4,6, 11,14	

X	WO 00/67605 A1 (PACTIV CORP [US]) 16 November 2000 (2000-11-16)	1-4,6, 11,14	
Y	* pages 1-19 * * figures 8a-8d * * figures 9a-d * * figures 13a-d *	2-4,6, 11,14	TECHNICAL FIELDS SEARCHED (IPC) B65D A44B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 June 2016	Duc, Emmanuel

CATEGORY OF CITED DOCUMENTS

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29-06-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2011126384 A1	02-06-2011	CN 102427745 A	25-04-2012
		EP 2433518 A1	28-03-2012
		JP 5019401 B2	05-09-2012
		US 2011126384 A1	02-06-2011
		WO 2010134222 A1	25-11-2010
WO 0203824 A1	17-01-2002	AU 781493 B2	26-05-2005
		AU 6829901 A	21-01-2002
		CA 2384384 A1	17-01-2002
		US 6385818 B1	14-05-2002
		WO 0203824 A1	17-01-2002
WO 2014150576 A1	25-09-2014	CA 2902559 A1	25-09-2014
		EP 2969811 A1	20-01-2016
		JP 2016515018 A	26-05-2016
		TW 201507936 A	01-03-2015
		US 2014311102 A1	23-10-2014
		WO 2014150576 A1	25-09-2014
WO 0067605 A1	16-11-2000	AT 313979 T	15-01-2006
		AT 472265 T	15-07-2010
		AU 4853199 A	21-11-2000
		CA 2337127 A1	16-11-2000
		DE 69929205 T2	13-07-2006
		EP 1096868 A1	09-05-2001
		EP 1514491 A2	16-03-2005
		EP 1661479 A2	31-05-2006
		EP 2243389 A1	27-10-2010
		ES 2257060 T3	16-07-2006
		JP 5114761 B2	09-01-2013
		JP 2002543862 A	24-12-2002
		US 6286999 B1	11-09-2001
		US 6663283 B1	16-12-2003
		US 2001021280 A1	13-09-2001
		US 2001026649 A1	04-10-2001
		US 2001043762 A1	22-11-2001
		US 2002009239 A1	24-01-2002
		US 2002097924 A1	25-07-2002
		US 2003063819 A1	03-04-2003
		US 2006133700 A1	22-06-2006
		WO 0067605 A1	16-11-2000

EPO FORM P0459

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Patent documents cited in the description

- US 62128719 A **[0001]**
- US 73201915 A **[0001]**
- US 73219015 A **[0001]**