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- **Thomas, David**
Moretonhampstead, Devon TQ13 8SD (GB)
- **Tyson, Lawrence Samuel**
Sutton, Surrey SM2 6JX (GB)

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(74) Representative: **Lamb, Martin John Carstairs**
Marks & Clerk LLP
90 Long Acre
London
WC2E 9RA (GB)

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(71) Applicant: **D G Capital Limited**
Flower Lane
London NW7 2 HU (GB)

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(72) Inventors:
• **Edwards, Barnaby Bevan**
London, NW10 2RN (GB)

(54) **Zip closure system**

(57) There is provided a zip closure system comprising a zip slider (60), capable of fastening and un-fastening the teeth of a zip closure, and at least one of a second zip slider (70) and an end of a zip closure, the zip slider (60) comprising: a slider body; a handle (66) for sliding the slider body along the zip closure; and a first cooperating means (68) for releasably cooperating with a second cooperating means on the second zip slider or the end of the zip closure; the first and second cooperating means not being visible from the handle side of the closure when the slider and the second slider, or the slider and an end of the zip closure, are substantially adjacent each other such that the first and second cooperating means are operably linked.

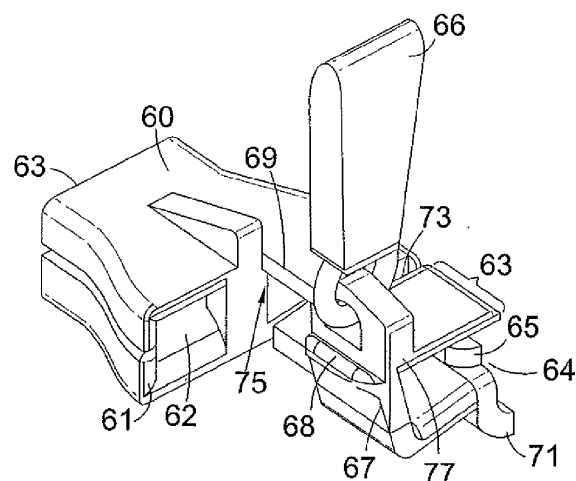


Fig. 15

Description

[0001] The present invention relates to a zip closure system and a zip slider, capable of fastening and unfastening the teeth of a zip closure, comprising a slider body and a handle for sliding the slider body along the zip closure.

Background

[0002] Zip sliders and zip closures are well known in the art, particularly for use in clothing, but also in relation to items of luggage. In the latter case, it is particularly desirable to provide a means for locking or securing the zip slider in place, so that items do not fall out of the piece of luggage or to prevent unauthorised access to the contents of the luggage, for instance in the case of a suitcase, handbag or courier bag.

[0003] Various attempts have been made in the art to provide a lockable zip closure system. For instance, DE 3246773 and US 4,062,090 describe the use of a key-actuated locking system which locks the zip slider to an end of the zip closure.

[0004] GB 1476430 and GB 2079362 disclose zip closure systems, suitable for use on courier bags, for instance, arranged such that unauthorised tampering or an attempt at access to the courier bag can be detected, or reuse of the zip closure is prevented.

[0005] However, the present inventor has realised that a disadvantage of this approach is that the locking mechanism is immediately obvious to a passer by or baggage handler, thereby attracting his attention to the potential importance of the contents of the item of luggage or courier bag. Thus, having an external lock such as this can lead to unwanted attention from an unscrupulous person.

[0006] WO 03/001940 also describes a zip slider, wherein the handle itself is connected to a key portion which can be used to lock the zip slider in place at a certain point along the zip closure. However, as before, in order to lock the slider, the handle must be removed, as it is connected to the key, so that a passer by or potential tamperer will immediately notice that something is amiss with the zip slider and, on further investigation, will be able to determine that the slider is lockable and, therefore, that the owner believes the contents to be of sufficient value to warrant the use of such a locking system.

[0007] Several self-locking zip sliders are known in the art. US 5,212,852 describes a zip slider, wherein displacing the zip handle from a vertical position to a horizontal position forces a pin to grip the teeth of the zip closure, thereby locking the slider in place. US 6,735,827 B1 describes a similar mechanism whereby displacement of the slider handle leads to direct contact between a protrusion on the handle with the teeth of the zip closure, thereby gripping the teeth of the zip closure, so that the slider is retained in place. In each instance, such a locking means provides little security against a potential thief or

tamperer, as the handle can be easily returned to the horizontal position, such that the slider can then be moved to open the zip closure. Furthermore, a further disadvantage of these types of systems is that they inevitably lead to damage to the teeth of the zip closure, either by the use of a pin being forced between the teeth or by squashing or deforming the natural orientation of the teeth.

[0008] The disadvantage of all of the above described art is that either the zip sliders themselves are considerably bulky because of the need for locking mechanisms therein or the means for locking the zip slider to the end of the zip closure also stands out. In both cases, the attention of an opportunistic thief is attracted to the zip closure with potentially negative results for the owner.

[0009] A substantial number of thefts from zip closed cases and bags occur while the case or bag is being carried by or near to the owner. In this case, the thief seeks to open the bag very quickly, before the owner comes aware that there is a problem. In another aspect, the present invention sets out to provide a design of zip closure which makes such quick theft relatively difficult.

Brief Description of the Invention

[0010] The present inventors have realised that the natural tendency when presented with a zip closure with two handles is to pull the handles apart. The inventor has realised that if the handles are configured so that they cross one another, the correct direction of separation is not intuitively obvious to a thief. Accordingly, in a first aspect, the present invention provides a zip closure system, comprising a first zip slider, capable of fastening and unfastening the teeth of a zip closure, and at least one of a second zip slider and an end of a zip closure, the first zip slider having a first handle and the second zip slider or end of a zip closure having a second handle, the handles being configured so that when the first slider is adjacent to the second slider or to the end of the zip closure, the first handle overlies the second slider or the end of the zip closure and the second handle overlies the first slider.

[0011] Where a handle overlies a slider or zip closure end which is on the opposite side to the slider operated by the handle, if a thief pulls the handle in the direction which one would normally choose, they will simply draw the sliders together, or pull them together along the closure. One has to know that the handles have to be repositioned to overlie the respective slider or the closure end before attempting to pull them apart.

[0012] The inventor has further realised that a degree of security can be provided by providing a zip closure system, with at least one zip slider operated by a handle, wherein the handle has to be moved in a direction which is not parallel to the zip closure, for example, to release it from a holding position.

[0013] However, it would be relatively easy for a thief to learn the secrets of movements required to operate

the handle. To decrease the likelihood of a thief successfully carrying out the right sequence of manipulations of the handle, the inventor has realised that a range of products can be provided which operate according to the same principles, but in which the first movement, for example left or right, varies between different products of the range. In this way, a thief has a 50% chance of selecting the correct first movement. If the incorrect first movement is chosen, the thief may not have enough time to make another try.

[0014] The second aspect of the invention provides a range of products, comprising a first design of zip closure system and a second design of zip closure system, the first and second designs of zip closure system each comprising a zip closure comprising a first zip slider, capable of fastening and unfastening the teeth of the zip closure and at least one of a second zip slider and an end of a zip closure, the first slider comprising a first handle and the second slider or end of the zip closure comprising a second handle, the first and second handles being operable, by movement in a direction which is not parallel to the zip closure direction, to lock or unlock the first slider with respect to the second slider or zip closure end, wherein the direction in which the handles are moved to lock or unlock the first slider and the second slider or zip closure end are different for the first design of zip closure and for the second design of zip closure.

[0015] The present inventor has further realised that it would be advantageous for the handle to be held in a fixed position when the zip closure is closed. The fixed position may be chosen so that it makes opening the closure easy for the operator or difficult for the thief. The present inventor has further realised that an excellent way to hold the handle in position is to use a magnet.

[0016] Accordingly, in a third aspect of the invention, there is provided a zip closure system comprising a first zip slider, capable of fastening and unfastening the teeth of the zip closure and at least one of a second zip slider and an end of a zip closure, the zip slider having a handle, the first handle comprising at least one magnetic part for holding the handle adjacent a second magnetic part of the zip closure system.

[0017] The third aspect of the invention also provides zip slider, capable of fastening and unfastening the teeth of a zip closure, comprising a slider body, a handle for sliding the slider body along the zip closure, the handle comprising at least one magnetic part for holding the slider with respect to a second magnetic part provided in a zip closure.

[0018] It is a further object to the present invention to overcome the use of bulky locking means or zip fasteners that grab the attention of unscrupulous third parties.

[0019] Surprisingly, the invention has discovered that it is possible to provide a zip slider that does not attract the attention of such persons. Accordingly, in a fourth aspect, the present invention provides a zip closure system comprising a zip slider, capable of fastening and unfastening the teeth of a zip closure, and at least one of a

second zip slider and an end of a zip closure, the zip slider comprising;

- a slider body;
- a handle for sliding the slider body along the zip closure; and
- a first cooperating means for releasably cooperating with a second cooperating means on the second zip slider or the end of the zip closure;
- the first and second cooperating means not being visible from the handle side of the closure when the slider and the second slider, or the slider and an end of the zip closure, are substantially adjacent each other such that the first and second cooperating means are operably linked.

[0020] The fourth aspect of the present invention also provides a zip slider, capable of fastening and unfastening the teeth of a zip closure, comprising a slider body, a handle for sliding the slider body along the zip closure, and a first cooperating means for releasably cooperating with a second cooperating means on a second zip slider or an end of the zip closure, the first and second cooperating means not being visible from the zip handle side of the closure when the slider and the second slider, or the slider and an end of the zip closure, are substantially adjacent each other such that the first and second cooperating means are operably linked

[0021] An advantage of this arrangement is that it is not immediately obvious to an onlooker that the zip slider is releasably cooperating with a second zip slider or an end of the zip closure. Thus, his attention is not unnecessarily drawn to the zip closure.

[0022] Also provided is an item of luggage, including a suitcase, handbag or courier bag, comprising such a system or a zip slider according to the first, second, third or fourth aspect of the invention. Preferably, there is no visible indication from outside the item of luggage that the zip is secured or locked.

[0023] Preferred and optional features of the present invention will be further described below.

Detailed Description of the Invention

Zip Closures

[0024] The zip closure preferably comprises two sets of teeth that may be fastened and un-fastened by the zip slider.

[0025] Zip closures or fasteners are well known in the art and comprise two sets of substantially parallel mutually cooperative teeth that can be fastened together by a slider of suitable design.

[0026] The zip closure preferably has a zip closure end. The zip closure end is the structure either at which the two unfastened sides of the zip closure are placed together and fastening is initiated or an end where the zip slider comes to a halt as the teeth of the zip closure

cease or are blocked by a suitable retainer which prevents the zip slider from completely disengaging with the zip closure.

[0027] The zip closure, zip closure end and the first and (where present) second zip slider and the handles may each be formed of any suitable material as will be known to the person skilled in the art. They may be made of synthetic material, such as thermoplastic, or metal or composite material.

[0028] The zip closure direction is defined as a notional line along which the teeth of the zip closure engage.

Securing Means

[0029] The zip slider may further comprise a securing means for releasably securing the zip slider to the zip closure, preferably to the teeth of the zip closure or, even more preferably, to material immediately adjacent the teeth of the zip closure, particularly when such material is a flexible fabric as commonly found on zip closures.

[0030] It is also preferred that securing means be present on the second zip slider (if present), either in addition to a first securing means on the first zip slider or as an alternative thereto. Indeed, it is also envisaged that the securing means be actuated when the first cooperating means on the zip slider is operably linked to the second cooperating means on the second zip slider, such that when the two zip sliders are adjacent to each other so that the first and second cooperating means are operably linked, the securing means acts to retain both zip sliders in place.

[0031] In this case, the securing means is also preferably not visible from the handle side of the closure when the two zip sliders are substantially adjacent each other.

[0032] A particular advantage of the features described above is that, should an unscrupulous person attempt to open the zip closure, the presence of the securing means in the first embodiment, and the cooperation between the zip slider and immovable end of the zip closure in the second embodiment, although not visible to the unscrupulous person, will result in the zip slider being held in place. Accordingly, the impression given to the unscrupulous person is that the zip slider has become jammed and cannot, therefore, be quickly or easily opened. As such, the unscrupulous person is prevented from opening the zip closure to thereby access the contents of the item of luggage, for instance, particularly as such person would often be under time pressure to open the zip closure as quickly as possible.

[0033] Where present, the securing means may be as known in the art. Preferably, the securing means may comprise a pin as described in US 5,212,852 where, provided in one leg of the zip slider is a pin that is mounted in the leg in such a way that it is displaceable at right angles to the slider. Preferably, a spindle is provided for shifting the pin between two end positions, a first end position where the pin extends into the teeth or surrounding fabric of the zip closure, and a second end position

where the pin releases the teeth or surrounding fabric. The pin may be actuated by the handle of the zip as described in US 5,212,852 or may be actuated by means of a switch, preferably disguised so as not to attract attention to itself. Preferably, the pin is actuated by cooperation between the first and second cooperating means, such that when the first and second cooperating means are operably linked, the pin is in the first position, thereby extending into the teeth or surrounding fabric of the zip closure.

[0034] Although a key may be used to actuate the securing means, as described in the prior art discussed previously, this is not particularly preferred, as the presence of a key hole or the absence of the handle, should the handle be connected to a key, will attract unnecessary attention, which is undesirable.

First Aspect of the Invention

[0035] In the first aspect of the invention, there is a first slider having a first handle and a second slider or a zip closure end having a second handle, the handles being configured so that, when the sliders are adjacent one another, the first handle overlies the second slider or the zip closure end and the second handle overlies the first slider. In this way, a casual observer seeking to open the zip closure will tend to pull one handle. All this will do is draw the respective slider more firmly into engagement with the other slider.

[0036] A zip closure according to the first aspect of the invention may be also according to the fourth aspect of the invention. In this case, the cooperating means may comprise stop surfaces formed on the end of the first slider and on the end of a second slider. Alternatively, the cooperating means may comprise stop surfaces formed on the first handle and on second handle.

[0037] Preferably, holding means are provided for holding the handles so that the first handle overlies the second slider and the second handle overlies the first slider. The holding means may comprise a first holding surface on the first handle and a second holding surface on the second handle, the first and second surfaces abutting one another in the closed position. Preferably, the first and second holding surfaces are normal to the line of the closure. Preferably, the first and second handles are configured so that they can be separated from one another by moving in a direction at an angle to the first and second holding surfaces, for example by relative rotation. Preferably, there are further holding surfaces which are configured to lie next to one another when the handles are in the position overlying the respective slider or zip closure end.

[0038] According to the first aspect of the invention, the first slider and the second slider or zip closure end may be conventional zip sliders or a conventional zip closure end. They may comprise additional abutment parts for holding the sliders and zip closure end at a selected distance from one another.

[0039] In one preferred embodiment of the invention, the first slider may comprise a first projection, projecting in the direction of the zip closure and the second slider or zip closure end may comprise a second projection extending in the direction of the zip closure and for lying adjacent the first projection when the first slider is in position adjacent the second slider or zip closure end. The first projection may comprise a third projection, projecting in a direction at an angle to the direction of the zip closure (preferably normal to it), into a recess of form corresponding to the third projection, to further lock the sliders together. Similarly, the second projection may comprise a fourth projection extending in a direction at an angle (preferably generally normal to it) to the zip closure direction for engaging in a second recess of shape corresponding to the fourth projection.

[0040] In a particularly preferred embodiment, the first handle is mounted on a pivot which is located on a part corresponding to the third projection. Preferably, the second handle is mounted on a pivot which is located on a part corresponding to the fourth projection. Preferably, the pivots are aligned when the first zip slider is adjacent the second zip slider or zip closure end. In this way, the appearance of the closure corresponds to a conventional zip closure. It would be very difficult for a thief to realise that the handle pivots are effectively swapped over in position.

[0041] The holding surfaces may be biased into contact, for example by a resilient structure or by magnets as described above.

[0042] According to the first aspect of the invention, in order to open the zip closure, the first handle and the second handle may each be configured so that they can be separated by moving in a direction which is not parallel to the zip closure direction.

[0043] Preferably, the first handle and the second handle can be moved with respect to one another in a direction which is generally at a right angle to the zip closure direction. Preferably, the first handle and the second handle can be moved from the position in which they overlie the second slider or zip closure end and first slider respectively into a position in which the first handle can be used to draw the first slider away from the second slider and the second handle, if connected to a second slider, can be used to draw the second slider away from the first slider.

[0044] The first handle and second handle each preferably comprise a crossing portion, each crossing portion extending in the direction of the respective handle, the crossing portions lying next to one another when the handles are in position overlying the respective slider or zip closure end.

[0045] Preferably, the crossing portions are contoured to fit next to one another smoothly. In this way, it can be difficult for a casual observer to realise how the handles are configured. If the casual observer is presented with a smooth surface it will be difficult to realise that the handles are not conventional handles which can be pulled

in the normal direction.

Second Aspect of the Invention

[0046] The second aspect of the invention provides a method of reducing the likelihood of a successful operation of the zip closure by a thief. For example, the handles may be separable by rotating them in a generally clockwise direction. Even if the thief knows that the handles have to be rotated to separate them, there may be no means of knowing whether it is clockwise or anticlockwise. The thief will simply have to guess which one to try first. There may not be enough time to try the second direction if the manipulation fails. Preferably, the first and second handles have to be moved through at least two movement segments.

[0047] A zip closure system according to the first aspect of the invention may also be according to the second aspect of the invention. In particular, the handles according to the first aspect of the invention may have to be moved in a direction which is not parallel to the zip closure direction in order to separate them. For example, in a first design, the first handle may need to be moved to the left of the zip closure (when looking at the zip closure from above with the zip closure extending in a direction away from the user) and the second handle may need to be moved to the right. According to the second aspect of invention, in a second design which is manufactured according to exactly the same principles, the first handle will need to be moved right and the second handle left.

Third Aspect of the Invention

[0048] According to the third aspect of the invention, a handle is magnetised in order to hold it in a predetermined position.

[0049] Preferably, the predetermined position is one which tends to indicate to a thief that the handle is to be pulled in a certain direction which will not open the zip closure system. The third aspect of the invention may be combined with the first or second aspect of the invention. For example, at least the first handle and preferably the second handle of the first aspect of the invention may comprise a magnetic part for holding the first or second handle in a position overlying the respective slider or end of the zip closure.

[0050] The magnetic part may comprise a magnet which is included within the handle or it may comprise a part of the handle itself, the handle being made at least partly of a magnetic or magnetisable material.

[0051] The second magnetic part to which the first magnetic part is attracted may form part of the zip closure (for example if the teeth are made of a magnetic or magnetisable material, such as steel), the first slider, the second slider or zip closure end or a corresponding part of the second or first handle as appropriate.

Fourth Aspect of the Invention

[0052] In the fourth aspect of the invention, the zip slider may cooperate with a zip closure end, such that when the zip slider and the end are substantially adjacent to each other, the first and second cooperating means, on the zip slider and the end respectively, are operably linked. Although an additional securing means (discussed further below) can be present in the zip slider, this is not particularly preferred, as the end of the zip closure provides a sufficiently stationary point.

[0053] In the fourth aspect of the invention, the zip slider may alternatively cooperate with a second zip slider such that when the two sliders are substantially adjacent, the first and second cooperating means are operably linked. In this instance, should the owner or a third party attempt to open the zip closure by sliding one of the zip sliders away from the other along the plane of the zip closure, then the cooperating means will prevent this such that both sliders are drawn together in the same direction along the plane of the zip closure.

Location of the Cooperating Means of the fourth Aspect of the invention

[0054] As will be explained further below, the cooperating means may be located above the plane of the zip closure, in the plane of the zip closure or below the plane of the zip closure.

[0055] The plane of the zip closure is the plane in which both sets of teeth lie when they are engaged. The line of the zip closure is the line along which the teeth lie when they are engaged, and is contained in the plane of the zip closure. The location 'above the plane of the zip closure' is the location from which the user views the zip closure in use and is typically the same side as the side on which the handle is located.

[0056] The first and second cooperating means may be orientated below the plane of the zip closure, i.e. on the opposite side of the zip closure from the handle for sliding the slider body along the zip closure. Thus, as they are below the plane of the zip closure, the first and second cooperating means are not visible from above, i.e. outside the item of luggage, when the zip slider is substantially adjacent to the second zip slider or to the end of the zip closure. In this case, the first and second cooperating means are preferably located inside an item of luggage.

[0057] However, it is also envisaged that the first and second cooperating means may be orientated in the plane of the zip closure, provided that they are not visible from the handle side of the zip closure. In this case, the first and second cooperating means will be preferably formed in a first slider body and in a second slider body or in a zip closure end. This arrangement has the advantage that the cooperating means do not project into the interior of an item of luggage whereby they may catch on the contents of the luggage.

[0058] If the first and second cooperating means are located above the plane of the zip closure, they are preferably not recognisable as cooperating means to a casual observer. For example, they may each form part of a handle.

Cooperating Means Design

[0059] The cooperating means are configured so that they can releasably cooperate with one another.

[0060] The first cooperating means may engage the second cooperating means positively or frictionally. One of the cooperating means may comprise a first formation which engages with a second formation on the second cooperating means to prevent separation of the first and second cooperating means.

[0061] The first and second formations may be held in engagement by resilient means which bias them into the position in which they can engage. Resilient means such as springs or resilient blades may be used. Alternatively, the natural resilience of the zip closure material may be used as exemplified further below.

[0062] Preferably, the first slider body and the second slider body or zip closure end are magnetised with opposed magnetic polarities, so that they are attracted to one another. This can be achieved by making the slider bodies wholly or partly of magnetic material or by including magnets in their structures. This can help the first slider body hold itself in a desired locking configuration with respect to the second slider body or zip closure end, resisting any tendency for the parts to separate from one another in use.

[0063] The first cooperating means may be engaged with the second cooperating means for example by pushing one cooperating means into the other. Alternatively, they may be engaged by moving the first and second cooperating means with respect to one another through a plurality of movement segments, each movement segment being different to successive or preceding movement segments for example in direction. This allows engagement by manipulation of the first and second cooperating means with respect to one another in a manner which can be learnt by the user.

[0064] The first cooperating means and the second cooperating means may each comprise a plurality of cooperating structures, which may be mounted adjacent one another or separately from one another. For example, a first cooperating structure may be provided on the first cooperating means for engaging a second cooperating structure formed on the second cooperating means, to resist separation of the cooperating means in one direction, and a third cooperating structure may be provided on the first cooperating means for engaging a fourth cooperating structure formed on the second cooperating means, to resist separation on.

[0065] The zip closure system may comprise a first slider body having a first handle and a second slider body having a second handle, the first handle comprising first

cooperating means and the second handle having second cooperating means for releasably cooperating with the first cooperating means.

[0066] The first and second cooperating means may each comprise a section formed within the length of the first or second handle respectively.

Preferred embodiments of cooperating means

[0067] In a preferred embodiment of the invention, one of the cooperating means comprises a protruding member, whilst the other cooperating means comprises a receiving means capable of receiving the protruding member in a releasably cooperating manner. Preferably, the releasable cooperation of the protruding member and the receiving means is releasably lockable by a locking means capable of locking the protruding member and the receiving means together.

[0068] Where the zip slider cooperates with a second zip slider, it is preferred that the releasable cooperation of the protruding member and the receiving means is such that the receiving means exerts sufficient force on the protruding member that, when in cooperation therewith, the force required to release the protruding member from the receiving means is greater than the force required, when applied to one of the sliders' handles, to slide the cooperating first and second sliders along the zip closure.

[0069] Similarly, where the zip slider cooperates with an end of the zip closure, the releasable cooperation of the protruding member and the receiving means is such that the receiving means exerts sufficient force on the protruding member that, when in cooperation therewith, the force required to release the protruding member from the receiving means is greater than the force required, when applied to the slider handle, to slide the zip slider along the zip closure when the zip slider is free, i.e. not in cooperation with the end of the zip closure.

[0070] Preferably, the force required to disengage the protruding member from the receiving means is at least twice that required to simply move the slider along the zip when the slider is free, i.e. not in cooperation with the zip end closure. Preferably, such force can be five or ten times greater or even more, as will become apparent to the skilled person, depending on the nature of the zip and the intended use therefor.

[0071] Preferably, the first and second cooperating means comprise male and female parts, preferably a ball and socket arrangement. Preferably, the end of the protruding member comprises a substantially spherical portion. Alternatively, the end of the protruding member may comprise a substantially arrow shaped portion. The point of the arrow is the first to enter the receiving means when the first and second cooperating means are moved together, such that when the remaining body of the arrow portion comes into contact with the receiving means, the receiving means is able to grip or contact the back of the arrow portion. Accordingly, the receiving means thereby

resists removal of said arrow portion and, therefore, the protruding member, from the receiving means. It will be understood that an arrow portion does not necessarily have to be exactly or even substantially triangular in cross-section, but can be in the form of a tapered sphere or demi-sphere as shown, for instance, in the accompanying drawings.

[0072] Preferably, the receiving means comprises a sprung clasp suitable for receiving and retaining, under bias, a ball joint on the protruding member.

[0073] In another embodiment, the receiving means comprises a socket capable of receiving the protruding member, wherein the protruding member or socket further comprises at least one, preferably 2 to 5, gripping members.

[0074] The gripping members are, preferably, movable against a biasing means, preferably with a component of motion that is substantially perpendicular to the direction of movement of the protruding member into and out of the receiving means. The gripping members are movable against the biasing means and arranged such that the gripping members are able to exert a force against the protruding member, if the gripping means are positioned on the receiving means, or are able to exert a force against the receiving means, if the gripping means are positioned on the protruding member. This force aids in the retention of the protruding member within the receiving means, until it is removed, as discussed elsewhere.

[0075] In this embodiment, it is preferred that the receiving means or protruding member comprises an appropriate number of structures or recesses, preferably at least one, preferably 2-5, recesses or structure, or at least one, preferably 2-5, continuous recesses or structures, to cooperate with the gripping members. Therefore, when the protruding member cooperates with the receiving means, the gripping members contact or grip the sides of the recesses or structures.

[0076] Therefore, the gripping members, preferably actuated by biasing means, thereby act to bias against disengagement or withdrawal of the protruding means from the receiving means.

[0077] Therefore, in one embodiment, when the protruding member cooperates with the receiving means, the gripping members in the protruding member grip the sides of the recesses or structures in the receiving means, thereby acting to bias against disengagement or withdrawal of the protruding means from the receiving means.

[0078] In an alternative embodiment, when the protruding member cooperates with the receiving means, the gripping members in, for instance, the receiving means grip the sides of the recesses in the protruding member, thereby acting to bias against disengagement or withdrawal of the protruding means from the receiving means.

[0079] Preferably, the gripping members are spring-loaded ball bearings.

[0080] The biasing means is, preferably, a spring or a

resiliently-deformable member.

[0081] It is generally preferred that the protruding member is part of a zip slider and the receiving means is part of the second zip slider or zip end as this aids cooperation of the protruding member with the receiving means. However, it is also envisaged that the reverse arrangement can be used, such that the protruding member is part of the second zip slider or zip end and the receiving means is part of the zip slider.

[0082] It is also preferred that the receiving means comprise a locking member, preferably a locating pin, that is capable of interacting with a recess or structure on the protruding member, such that when the locking member is in a first position it cannot cooperate with the recess on the protruding member, but when in a second position, the locking member does cooperate with the recess on the protruding member, thereby locking the protruding member in place. Preferably, the locking member is moved from the first to the second position and back again by operation of a slider handle.

[0083] In the embodiment where two zip sliders are envisaged, the slider handle is preferably on the second zip slider.

[0084] The locking member is preferably operated by moving the handle from a position substantially parallel to the plane of the zip closure to an inclined position, preferably around 45 to 90 degrees, from the plane of the zip closure. Alternatively, the locking member is preferably operated by moving the handle from an inclined position, preferably around 45 to 90 degrees, from the plane of the zip closure, to a position substantially parallel to the plane of the zip closure.

[0085] It is also preferred that the locking member is operated by the user pulling the zip handle upwards, away from the plane of the zip closure.

[0086] In the embodiment where the zip slider cooperates with a zip end, the locking member can be a switch or a lever, preferably a spring loaded lever that forms part of the zip end closure, and is, most preferably, not visible from the handle side of the zip closure, in other words that it is not visible from the outside of the zip closure.

[0087] Preferably, the receiving means may comprise a clip or catch that cooperates with a recess on the protruding member, the clip or catch being under the control of a locking member, as described above.

[0088] Preferably, the locking member may comprise an elastically deformable latch or a latch under bias. Preferably, the protruding member, on engagement of the first and second cooperating means, is able to push past the latch but cannot be disengaged without the latch being deformed or moved against its bias, for instance by application of force to the handle of the zip slider by a user, as discussed above.

[0089] In a further embodiment, it is preferred that the zip slider cooperates with a second zip slider which is further adapted, by means described herein, to also cooperate with the end of the zip closure. It is particularly

preferred that the second zip slider, when in cooperation with the zip slider, also cooperates in a releasably lockable manner with the end of the zip closure, thus holding the zip slider and the second zip slider in place. The means by which the second zip slider is adapted to cooperate with the end of the zip closure may be as described herein, particularly in relation to cooperation of the zip slider with the second zip slider or in relation to cooperation of the zip slider with the end of the zip closure, such as by use of receiving means and protruding members.

[0090] Accordingly, it is preferred that the zip slider cooperates with a second zip slider, the second zip slider cooperating with an end of the zip closure. Preferably, the zip slider, the second zip slider and the end of the zip closure comprise protruding members and receiving means, as discussed above. Preferably, the protruding members and receiving means are releasably lockable, as discussed above, and are actuated when the first cooperating means on the zip slider is operably linked to the second cooperating means on the second zip slider and the second cooperating means on the second zip slider is operably linked to a third cooperating means on the end of the zip closure, such that when the two zip sliders and the end of the zip closure are adjacent to each other so that the cooperating means are operably linked, the protruding members and receiving means act to retain both zip sliders in place.

[0091] It is also preferred that the second zip slider cooperates releasably lockably with the end of the zip closure, the second zip slider and the end of the zip closure comprising further cooperating means.

[0092] Suitable manufacturing methods for zip sliders and zip closure systems according to the present invention will be known to the skilled person. However, it is envisaged that the zip slider can be manufactured from a suitable metal or alloy, such as iron or steel, or from a plastic or composite material. Similarly, the zip closure system can be manufactured from these materials and may also comprise portions of fabric for connecting the teeth to an item of luggage or clothing, as will be apparent to the person skilled in the art.

[0093] In another preferred embodiment, the zip closure system comprises a first slider body and a second slider body or a zip closure end, the first slider body comprising a first projection and the second slider body or the zip closure end comprising a second projection, the first and second projections lying adjacent to one another when the first slider body is engaged with the second slider body or with the zip closure end, first cooperating means being provided on the first projection and second cooperating means being provided on the second projection for engaging the first cooperating means.

[0094] Preferably the first and second projections each comprise a projection surface which is not at a right angle to the line of the zip closure, the projection surfaces lying adjacent to one another when the first and second cooperating means are engaged. Preferably the first and sec-

ond projection surfaces are substantially parallel to the direction of the zip closure. Preferably, the first and second cooperating means are formed in the respective projection surfaces. Preferably, the first and second cooperating means comprise first and second locking surfaces configured to prevent relative movement in the direction of the zip closure system. Preferably, the first and second locking surfaces are engageable by moving the first slider body with respect to the second slider body or to the zip closure end in a direction at an angle to the direction of the zip closure.

[0095] Due to the structure of zip closures, comprising a series of individual teeth, usually held together by fabric, there is a certain amount of flexibility in directions at an angle to the line of the zip closure. However, this is not a natural direction for a user to move the slider body in. The present invention exploits this by requiring the user to move the first slider body with respect to the second slider body or zip closure end in a direction at an angle to the line of the zip closure to engage the surfaces.

[0096] For example, it may require to be pushed down (that is, in a direction substantially at a right angle to the plane containing the two lines of zip teeth, in a direction away from the user).

[0097] Preferably, at least the first slider body has a handle. If the first slider body is engageable with a second slider body, the second slider body preferably has a handle as well. Preferably, the handle on the first slider body and preferably on the second slider body is mounted on a structure which is positioned adjacent the respective projection surface. In this way, when the first slider body is engaged with the second slider body or the zip closure end, the appearance is of a conventional slider with a handle mounted on a structure in the middle of the slider. It is not apparent from the outside that the handle is in fact lying over the junction between two projections. This further makes it difficult for a thief to realise that any kind of lock is present, or how to operate the lock.

[0098] Preferably the first slider body comprises a hook or groove and the zip closure end or second slider body comprises a corresponding groove or hook. Preferably each of the first slider body and second slider body or zip closure end comprises a hook and a groove for engaging a corresponding groove and hook in the other.

[0099] This embodiment of the fourth aspect of the invention may also be according to the first, second, and third aspects of the invention. In particular, the first and second handles may be configured to overlie the second slider or zip closure end and first slider, respectively, according to the first aspect of the invention. The direction in which the handles have to be moved to separate them may be one of two of different directions, depending upon which design from a range of designs is selected.

[0100] The handles may comprise magnets for holding them in position.

[0101] The present invention will now be described by reference to the accompanying non-limiting Figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0102]

- 5 Figure 1 is a schematic view of a first embodiment of the fourth aspect of the invention.
 Figure 2 shows a schematic view of a second embodiment of the fourth aspect of the invention.
 Figure 3 shows a schematic view of a third embodiment of the invention.
 Figure 4 shows a schematic view of a fourth embodiment of the fourth aspect of the invention.
 Figure 5 shows a schematic view of a fifth embodiment of the fourth aspect of the invention.
 Figure 6 shows a schematic view of a sixth embodiment of the fourth aspect of the invention.
 Figure 7 shows a schematic view of a seventh embodiment of the fourth aspect of the invention.
 Figure 8 is a schematic isometric view of a first embodiment according to the first, second third and fourth aspect of the invention.
 Figure 9 is a schematic cross sectional view through figure 8 along line IX-IX.
 Figure 10 is a schematic cross sectional view through figure 8 along line X-X.
 Figure 11 is a schematic cross sectional view through figure 8 along line XI- XI.
 Figure 12a is a schematic view corresponding to figure 10, with the handles partially separated as a first step in opening.
 Figure 12b is a schematic view corresponding to figure 9 with the handles partially separated as a first step in opening.
 Figure 13 shows a schematic view of the sliders with the handles rotated apart in a second step in opening.
 Figure 14 shows a schematic view of the sliders with the handles completely separated for opening.
 Figure 15 is a sketch isometric view of a slider according to a second embodiment of the invention.
 Figure 16 shows two sliders according to the embodiment of Fig. 15, being rotated with respect to one another for separation.
 Figure 17 shows a top view of the slider of figure 15.
 Figure 18 shows a top view of two sliders according to figure 15, engaged.
 Figure 19 shows a view of the handle of a slider of a third embodiment according to the first, second third and fourth aspect of the invention, from the right hand side.
 Figure 20 shows a view of the handle of the third embodiment from the left side.
 Figure 21 shows a view of the handle of the third embodiment from below.
 Figure 22 shows a view of the handle of the third embodiment from above.
 Figure 23 shows a view of the handle from the end which will, in use, face the other handle.

Figure 24 is a view of the handle of the third embodiment, from the puller end.

DETAILED DESCRIPTION OF THE DRAWINGS

[0103] Figures 1 to 7 shows various embodiments of the fourth aspect of the invention. Figure 1 shows a zip slider and second zip slider being moved from a separated or disengaged position to an adjacent position such that the first and second cooperating means are operably linked, and then disengaged so that the zip sliders are again separated. In Figure 1D, a protruding means is shown operably linking with a receiving means.

[0104] A similar arrangement is shown in Figure 2.

[0105] In Figure 3, the protruding means is shown as a ball joint and the receiving means is shown as a sprung clasp.

[0106] Figure 4 shows the protruding means comprising two spring loaded ball bearings, the ball bearings interacting with recesses in the receiving means. The protruding means is shown to comprise a ball joint with a recess, in Figure 5, the ball joint cooperating with a clasp and the recess on the ball joint cooperating with a locating pin.

[0107] Figure 6 shows the receiving means comprising two spring loaded ball bearings that cooperate with recesses on the protruding means.

[0108] Figure 7 shows the receiving means as a catch or clip, cooperating with the protruding means which comprises a locating pin.

[0109] In Figure 1, a zip slider 1, comprising a slider body 2 and a handle 3 and a first cooperating means 5, the cooperating means further comprising a protruding member 11, is brought to be adjacent to a second zip slider 7, by sliding the second slider 7 towards the first zip slider 1 along the zip closure 4 (not shown). By doing so, the protruding means 11 pushes past latch 14 and thereby cooperates with the receiving means 12, as shown in Figure 1D.

[0110] In Figure 1E, the zip slider 1 and the second zip slider 7 are moved apart, such that the first and second cooperating means are no longer operably linked as shown in Figure 1F.

[0111] The zip slider 1 has a protruding ball under the main body of the zip. The second zip slider 7 has an integral hinged catch, cast within the main zip body and an injection moulded socket riveted to its underside. As the first and second zip sliders are moved together, the tapered protruding ball 26 is guided into the socket 27 of the receiving means 12. The hinge latch 14 on the second zip slider 7 is pushed upwards to accept the tapered ball 26, as shown in Figure 1B and in greater detail in Figure 1C.

[0112] When the two zip sliders are substantially adjacent to each other, as shown in Figure 1D, the latch 14 then flexes back to its original position, locking the tapered ball 26 within the socket 27, thereby operably linking the zip slider 1 together with the second zip slider 7.

[0113] To release the zip slider 1 from operable linkage with the second zip slider, the user has to apply an upward force to the handle 3 of the second zip slider 7, whilst applying a downward force to the main body 2 of the second zip slider 7, as shown by arrows A and B respectively. As a result of the application of these forces, the upper part of the hinge catch 14 releases the ball 26 of zip slider 1. At the same time, zip slider 1 must be pulled away from the second zip slider 7, as shown in Figure 1E.

[0114] Once the first cooperating means 5 comprising the protruding member 11, in turn comprising the tapered ball 26, is no longer operably linked to the receiving means 12, comprising the socket 27 and the latch 14, of the second zip slider 7, the first zip slider 1 and the second zip slider 7 may be moved further in opposite directions along the plane of the zip closure 4 (not shown) thereby allowing the user access to the bag or item of luggage.

[0115] Figure 2 shows an isometric view of the arrangement shown in Figure 1. Figure 2A shows a die-cast metal zip with an integral natural hinge latch. Figure 2C shows an over-moulded plastic natural hinge attached to a die-cast zip body. Both latches are provided on a tongue extending from the zip slider body and flanked by slots.

[0116] Figure 3 shows a protruding member 11 consisting of a sphere or ball joint 28 shaped to cooperate with a receiving means 6 comprising a sprung clasp 19. Also shown is the zip closure 4 comprising teeth 29. The sprung clasp 19 is resiliently deformable such that it exerts sufficient bias on the back of ball joint 28 of the protruding member 11 that, when in cooperation therewith, the force required to release the protruding member 11 from the receiving means 6 is greater than the force required, when applied to one of the handles 3 to slide the cooperating first and second zip sliders (1, 7) along the zip closure 4.

[0117] Figure 4 shows a receiving means 12 comprising a socket 27 adapted to cooperate with a protruding member 5 comprising spring loaded ball bearings 20. The spring loaded ball bearings cooperate with recesses 21 on the receiving means, when the protruding member 11 and the receiving means 12 are operably linked, i.e. when the zip slider 1 and the second zip slider 7 are substantially adjacent to each other. The biasing force exerted by the spring loaded ball bearings, when cooperating with the recesses 21, exerts the sufficient force discussed above. However, it is to be understood that the force exerted by the spring loaded ball bearings 20, when in cooperation with the recesses 21, is not so great that the zip slider 1 cannot be disengaged from the second zip slider 7 as required by the user.

[0118] In Figure 5, the protruding member 5 consists of a ball joint 28 with a recess 30. The ball joint 28 cooperates with the clasp 19 on the second zip slider 7, whilst the recess 30 cooperates with the locking member 13, comprising the locating pin 22, when the locating pin is in its second, locked position. This can be seen in Figure 5B. The locking member 13 and the locating pin 22 are

biased such that the locating pin 22 is forced downwards in its resting position, such that when the ball joint 28 is received within the clasp 19, the locating pin 22 cooperates with the recess 30 on said ball joint 28.

[0119] In order to disengage the protruding member 11 from the receiving means 12, the user must exert an upward force on the handle 3 of the second zip slider 7, against the bias exerted on the locking member 13 and the locating pin 22, thereby moving the locating pin 22 in an upward direction so that it no longer cooperates with the recess 30 on the ball joint 28. The protruding member 11 can then be disengaged from the receiving means 12 although suitable bias can be exerted by the clasp itself, as also discussed above.

[0120] Figure 5A shows that as the zip sliders are pushed together, the ball joint on zip slider 1 is gripped by the sprung clasp 19 on the second zip slider 7 and the locating pin 22 is forced upwards and located into the recess 30 on the ball joint 28. Figure 5C shows that to disengage the zip sliders, the handle 3 on the second zip slider 7 is pulled in an upward direction, thus moving the locating pin 22 in an upward direction and, thereby, releasing the ball joint 28 of zip slider 1.

[0121] Figure 6 shows a similar arrangement to Figure 4, except that the spring loaded ball bearings 23 are present in the socket 27 of the receiving means 12 on the second zip slider 7. Furthermore, the recess 24 is present on the ball joint 28 of the protruding member of the first cooperating means 5 on the zip slider 1.

[0122] Figure 6A shows that as the zip sliders 1 and 7 are pushed together, the ball joint 28 on zip slider 1 is located within the socket 27 on the second zip slider 7 and the spring loaded ball bearings 23 are forced upwards and then moved under bias downwards to lock the ball joint 28 in place.

[0123] Figure 7 shows an arrangement whereby the receiving means 12 comprises a clip 31, whilst the protruding member 11 comprises an arrow portion 16 with a recess 32 adapted to receive the point 33 of clip 31. Figure 7A shows that as the zip slider 1 and the zip slider 7 are pushed together, the protruding member 11 forces the clip 31 on the second zip slider 7 upwards, such that the point 33 on the clip 31 cooperates with the recess 32 behind the arrow portion 16 on the protruding member 11.

[0124] Figure 7B shows that by rotating handle 3 on second zip slider 7 from the substantially vertical position to a substantially horizontal position an additional locking mechanism is provided. In order to release the two zip sliders, the handle 3 on the second zip slider 7 must be rotated back to the substantially vertical position. The connecting portion 34 connecting the clip 31 to the base 35 of the handle 3 is under bias, so that in the absence of the protruding member 11 cooperating with the receiving means 12, the clip 31 is angled back as shown in Figure 7C, provided that the handle 3 of the second zip slider 7 is in the substantially vertical position.

[0125] The zip slider 1 comprising a protruding member 11, further comprising a tapered ball 26, may be made

by die-casting metal, as is well known in the art. Similarly, the second zip slider 7 may also be made by die-casting metal, with the socket 27 being die-cast separately and then riveted to the underside of second zip slide 7.

[0126] Figure 8 shows a view of a first embodiment of a zip closure system according to the first, second, third and fourth aspect of the invention.

[0127] Figure 8 shows a sketch schematic view of a first zip slider 40 and a second zip slider 41. The first zip slider is rotatably attached at a pivot part 42 to a first handle 43. The second zip slider 41 is connected at a second pivot part 44 to a second handle 45. The first handle 43 comprises a puller part 46, a bridge part 47 (shown in figure 10) and the pivot part 42. The second handle 45 comprises a puller part 48, a bridge part 49 and the pivot part 44.

[0128] The sliders and teeth of the closure are of conventional design and details are not shown.

[0129] Figure 8 shows the sliders 40 and 41 in their locked position. It can be seen that, according to the first aspect of the invention, the first handle 43 overlies the second slider 41 and the second handle 48 overlies the first slider 40. It can be seen that each of the puller parts 46 and 48 comprises a step 50, the steps matching one another and forming a closed junction when the sliders are in this position. From the outside, all a casual observer sees is a smooth, continuous surface. In accordance with the fourth aspect of the invention, it is accordingly not evident to the casual observer that the sliders are locked.

[0130] The term "locked" as used in the present application is used to mean that the first slider cannot be moved with respect to the second slider or zip closure end simply by pulling the first handle without any other manipulation. At least one unlocking movement must be undertaken, the effect of which is to allow the first slider to move, without necessarily actually moving the first slider.

[0131] The interlocking of the steps 50 holds the puller parts 46 and 48 stably in position. They are further held in position by magnets (not shown) with poles of opposite polarity facing one another, mounted in each puller part. The step surfaces define first and second holding surfaces for holding the handles in the position shown in Figure 8.

[0132] Figure 9 shows a section along line IX-IX through the zip closure of figure 8. It shows the steps 50 matching one another.

[0133] Figure 10 shows a section along line X-X, which is closer to the line of the zip closure than line IX-IX. It can be seen (by comparing the hatching in figures 9 and 10) that the puller part 46 is integral with the bridge part 47. Similarly, the puller part 48 is integral with the bridge part 49. In figure 10, the outlines of the puller parts are shown in dotted lines for clarity.

[0134] It can be seen that there are stop surfaces 51, 52 at the ends of the bridge parts 47 and 49. In the position shown in figure 8, the stop parts are not in contact.

[0135] Figure 11 shows a section along line XI - XI which is located even closer to the line of the zip closure. It can be seen that the bridge part 47 is integral with the pivot part 42 and the bridge part 49 is integral with the pivot part 44.

[0136] Figure 12a is a view which corresponds to figure 10 but shows what happens if one of the puller parts 46 or 48 (or both of them) is pulled in the natural direction, that is, away from the other puller part. Because of the way the bridge parts cross over one another, it can be seen that this will draw the stop parts 51 and 52 into contact with one another, preventing any further movement. The stop parts 51 and 52 accordingly provide first and second cooperating means according to the invention which have the affect of holding the sliders 41 and 40 together.

[0137] Figure 12b corresponds to figure 9 and shows the position of the puller parts 46 and 48 when they have been drawn apart as shown in figure 12a. It can be now seen that the steps 50 are pulled out of contact with one another.

[0138] In the configuration shown in 12b, a thief who does not understand the system will simply find that the puller parts will not pull any further apart, due to the interaction of the stop surfaces 51 and 52. However, a person who knows the system will understand that they now have to rotate the puller 46, 48 parts in the directions shown by the arrows in figure 12b. Rotation is now possible because the steps 50 are out of engagement.

[0139] The rotation shown in figure 12b leads to disconnection of the stop surfaces 51 and 52 so that the puller parts 46 and 48 can continue to be rotated, outwards and upwards so that they disengage completely until they are in the positions shown in figure 14. The pulling parts are now rotated to the opposite side to what is shown in figure 8. They can now be independently pulled apart to open the zip closure.

[0140] Closure of the zip closure is achieved by the reverse series of moves.

[0141] In accordance with the second aspect of the invention, the embodiment shown in figure 8 represents a first design of a range of designs. The range of designs may include a second design which operates in exactly the same way as figure 8, but is a mirror image thereof. The zip closure system of the second design is operated using the same principles as the design shown in figure 8, but in the opposite sense (for example, the handles would need to be rotated in anticlockwise directions when seen looking at figure 12b, rather than clockwise directions).

[0142] Even if the thief knows that the handles have to be rotated in one direction or another, a thief has to guess which of clockwise or anticlockwise is the correct direction and only has a 50% chance of being right.

[0143] Figure 15 is a sketch isometric view of a slider of the zip closure of the second embodiment according to the first, second, third and fourth aspects of the invention. It comprises a slider body 60. On the left hand side,

the slider body 60 is of conventional design, the details of which which will be familiar to the skilled person, including slide runners 61, an opening 62 for non-engaged teeth of the zip closure and a exit 63 for joined teeth. However, on the right hand side there is a first projection 63 with an opening 64 displaced forwardly from the opening 62, providing another entry for non-engaged teeth, including slide runners 65. The slider body 60 works in a conventional way. The length of the channel from the opening 64 on the right hand side is longer than on the left hand side, but the function is the same as a normal zip slider.

[0144] In this embodiment, the slider will be used together with a second slider which is of the same design. The second slider can be seen in figure 16 and 18. It can be seen that it is of the same design but rotated through 180°. The second slider has a second projection 63a, located on the left hand side seen looking at figure 16.

[0145] The first projection 63 comprises a third projection 74 which extends to the left of the projection 63, looking at figure 15.

[0146] Between the third projection 74 and the opening 62, it can be seen that a recess 75 is formed, which can be seen more clearly in figure 17.

[0147] On top of the third projection 74 of the first slider, there is a handle 66 which is pivotably mounted on the projection 63 in a conventional manner. On its left hand side, the third projection 74 comprises a wall 67 having projecting there from a first cooperating member 68 comprising an upwardly directed hook.

[0148] A further cooperating member comprising a groove (not shown), whose form is the precise inverse of the hook 68, is formed on the underside of the top wall of the first projection 63 adjacent an edge of 69 thereof.

[0149] Figure 16 shows the first and second sliders of this type, engaged.

[0150] It can be seen from figure 16, that when the sliders are engaged, the wall 67 of the first slider comes to rest exactly adjacent the edge 69a of the second slider. In this position, the hook 68 of the first slider will engage in the groove formed on the underside of the edge 69' of the second slider.

[0151] Similarly, a hook of form corresponding to the hook 68 shown in figure 15 is formed on the second slider and engages in the groove formed adjacent the edge 69 of the first slider. That is, there are two sets of cooperating means which engage and prevent the sliders being separated.

[0152] Further, the third projection 74 of the first slider comes to rest in the recess 75a of the second slider and the fourth projection 76 which is formed on the second projection 63a of the second slider comes to rest in the recess 75 of the first slider. In this way, further locking is obtained.

[0153] It should be noted that the handles are not shown in figures 17 and 18, for clarity. Further, when the handles are present, the first handle 66 will tend to lie towards the right hand side of figure 18, overlying the

second slider and the second handle 66a of the second slider will come to rest overlying the first slider, on the left hand side of figure 18. According to the first aspect of the invention, a casual thief's first attempt at opening the zip closure would be to pull to the first and second handles 66 and 66a apart from one another, which would just draw the sliders more firmly together.

[0154] The movement required to separate the sliders 60 and 70 is shown in figure 16. It can be seen that each slider 60, 70 can be rotated around an axis XVI-XVI which is parallel to the line of the closure. If slider 60 is rotated anticlockwise and if the slider 70 is rotated clockwise it can be seen that the hook 68 will move downwards relatively to the slider 70. This causes the hook 68 of the first slider 60 to disengage from the groove (not shown) of the second slider 70.

[0155] The nature of the zip closure, comprising fabric on which a number of teeth are mounted, will permit a certain amount of rotation of the sliders 60 and 70. The material of the zip closure will resiliently resist this rotation, tending to bias the sliders into a position in which their top surfaces are parallel and in which the respective hooks and grooves are engaged.

[0156] The respective rotations of the sliders can be produced by the user pressing the sliders downwards, for example using the handles 66.

[0157] A side foot 71, 72 is provided on each slider 60, 70 respectively. The side foot is configured to engage with a structure of the zip closure, for example a sewn seam or similar structure. The side foot 71, 72 provides a pivot around which the respective slider 60, 70 can be rotated in order to unlock.

[0158] The internal surfaces of the slider 60, 70 may be configured so that they distort the natural straight line path of the zip closure. This distortion will cause a natural tendency for the zip closures to push the sliders 60, 70 into the position in which they engage. It can also introduce a degree of friction which resists separation of the sliders, causing a thief to assume that the sliders are jammed.

[0159] Further, once the hook 68 has been disconnected from the respective recess, it will be necessary to pull the first slider 60 toward the top of the page (referring to figure 18) and the second slider towards the bottom of the page, (referring to figure 18), to draw the third projection 74 out of the recess 75a and the fourth projection 76 out of the recess 75. This provides a series of movements which will not be immediately apparent to a casual thief.

[0160] Even if the casual thief knows that this design of slider has to be pushed down, or pulled up to release the hooks from the respective grooves and if the thief further knows that it is necessary to subsequently pull one slider to the right and the other to the left, the thief will not know in this case exactly which combination of movements is required. A range of products can be provided comprising a first design which is as shown in figures 16-18 and a second design which comprises a mirror image of these structures. Although it will work in exactly

the same way, the second design will require the first slider 60 to be pulled in the opposite to direction to the direction which is required for releasing the first slider 60 of figure 15. The thief will not know which design of a range of designs is present and only has a 50% chance of guessing the direction correctly.

[0161] Figure 15 and 16 show a groove 73 in the top surface of the slider 60 and 70 respectively. When the sliders 60 and 70 are engaged, these grooves 73 line up. The grooves 73 have the appearance of a boundary between sliders of a conventional design. This makes it harder for a casual observer to realise that the sliders comprise a pair of interlocking projections.

[0162] Further, the grooves make it harder for a thief to determine whether to pull the first slider left or right.

[0163] Figures 19-24 show the handle of a slider of a zip closure of a third embodiment according to the first, second, third and fourth aspects of the invention.

[0164] The handle of the third embodiment according to the first, second, third and fourth aspects of the invention is very similar to the design shown figures 8-14. In particular, there will be two handles, 80, each of the same design. Only the handles 80 are shown in figures 19-24. They will be pivoted at a pivot part 81 with respect to a mounting of the type shown in figure 8 on a corresponding slider 41 or 40.

[0165] Each handle 80 comprises a puller part 82 and a body 83. The body 83 is connected to the pivot part via a bridge portion 84.

[0166] The bridge portion 84 comprises a stepped, oblique face 85, which is configured so that when two handles 80 according to the third embodiment are placed in the correct configuration with respect to one another, the stepped parts touch and fit one another exactly. The stepped parts tend to resist separation of the handles 80. To draw the handles firmly together, a magnet 85 is provided (see figure 23) with the north pole projecting in one handle and the south pole projecting in the other so that the handles are pulled together by the north and south poles of the magnets. The bodies 83 have flat ends 86 which abut one another in the closed position. The flat ends 86 each comprise a short projection 87 and recess 88 whose shape is configured to accept the projection 87. When two handles are placed in the correct configuration, the projection 87 of one will slot into the recess 86 of the other, providing further holding surfaces which tend to resist lateral separation of the handles. The sequence of operations required to separate two handles 80 according to the third embodiment corresponds to the sequence shown in figures 12b, 13 and 14.

[0167] In a first step, the puller parts 82 are pulled so that the flat surfaces 86 of the two handles separate. This also causes the stepped surfaces 85 to separate from one another. This will allow the handles to be moved in a direction which is at an angle to the line of the zip closure, suitably at a right angle thereto, separation being continued as a rotational movement. Rotation is continued until the handles have been moved from a position

in which they overlie the opposite slider to a position in which they overlie the slider to which they are attached, in a manner corresponding to that shown in figure 14, at which point they can be pulled apart to open the closure.

[0168] The present invention has been described above purely by way of example, and modifications can be made within the invention, which extends to equivalents of the features described. The invention also consists in any individual features described or implicit herein or shown or implicit in the drawings or any combination of any such features or any generalisation of any such features or combination.

Claims

1. A zip closure system comprising a zip slider, capable of fastening and un-fastening the teeth of a zip closure, and at least one of a second zip slider and an end of a zip closure, the zip slider comprising; a slider body; a handle for sliding the slider body along the zip closure; and a first cooperating means for releasably cooperating with a second cooperating means on the second zip slider or the end of the zip closure; the first and second cooperating means not being visible from the handle side of the closure when the slider and the second slider, or the slider and an end of the zip closure, are substantially adjacent each other such that the first and second cooperating means are operably linked.
2. A zip closure system according to Claim 1, wherein the zip closure system comprises a first slider body and a second slider body or a zip closure end, the first slider body comprising a first projection and the second slider body or the zip closure end comprising a second projection, the first and second projections lying adjacent to one another when the first slider body is engaged with the second slider body or with the zip closure end, first cooperating means being provided on the first projection and second cooperating means being provided on the second projection for engaging the first cooperating means.
3. A zip closure system according to Claim 2, wherein the first and second projections each comprise a projection surface which is not at a right angle to the line of the zip closure, the projection surfaces lying adjacent to one another when the first and second cooperating means are engaged.
4. A zip closure system according to Claim 3, wherein the first and second projection surfaces are substantially parallel to the direction of the zip closure.
5. A zip closure system according to Claim 4, wherein the first and second cooperating means are formed in the respective projection surfaces.
6. A zip closure system according to any of claims 2 to 5, wherein the first and second cooperating means comprise first and second locking surfaces configured to prevent relative movement in the direction of the zip closure system, the first and second locking surfaces being engageable by moving the first slider body with respect to the second slider body in a direction at an angle to the direction of the zip closure.
7. A zip closure system according to any of claims 2 to 6, wherein at least the first slider body has a handle, the handle on the first slider body being mounted on a structure which is positioned adjacent the first projection surface.
8. A zip closure system according to any of claims 2 to 7, wherein the first slider body comprises a hook or groove and the second slider body comprises a corresponding groove or hook.
9. A zip closure system according to Claim 10, wherein each of the first slider body and second slider body comprises a hook and a groove for engaging a corresponding groove and hook in the other.
10. A zip slider, capable of fastening and un-fastening the teeth of a zip closure, comprising; a slider body; a handle for sliding the slider body along the zip closure; and a first cooperating means for releasably cooperating with a second cooperating means on a second zip slider or an end of the zip closure; the first and second cooperating means not being visible from the zip handle side of the closure when the slider and the second slider, or the slider and an end of the zip closure, are substantially adjacent each other such that the first and second cooperating means are operably linked.
11. An item of luggage comprising a zip closure system according to any of claims 1-9, or a zip slider according to claim 10.

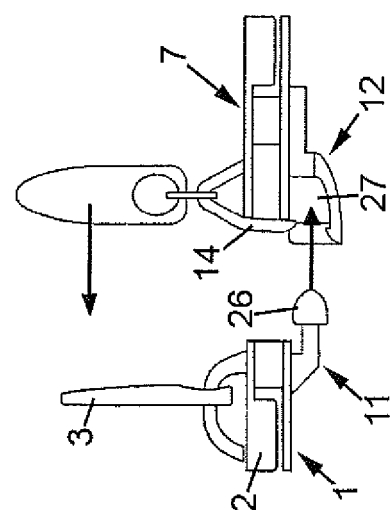


Fig. 1A

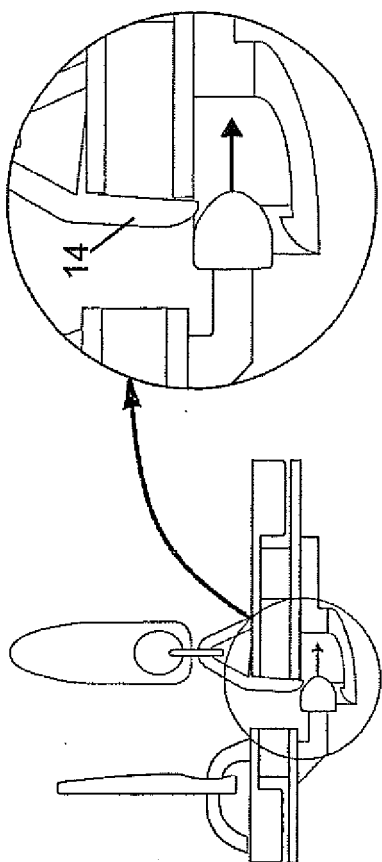


Fig. 1B

Fig. 1C

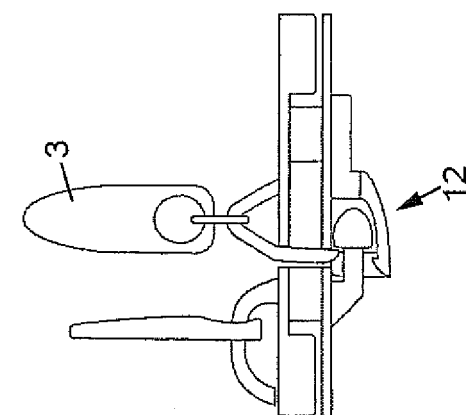


Fig. 1D

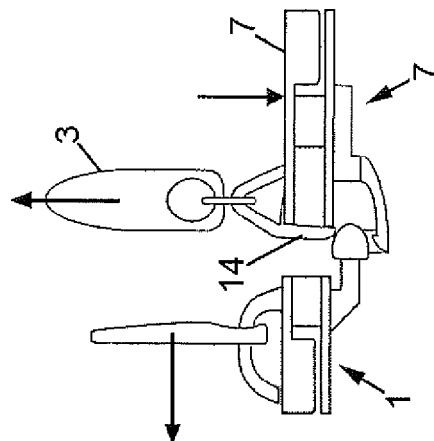


Fig. 1E

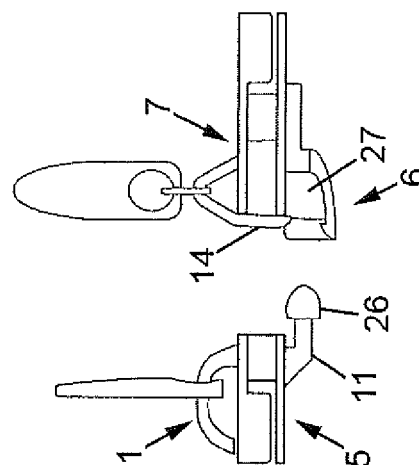
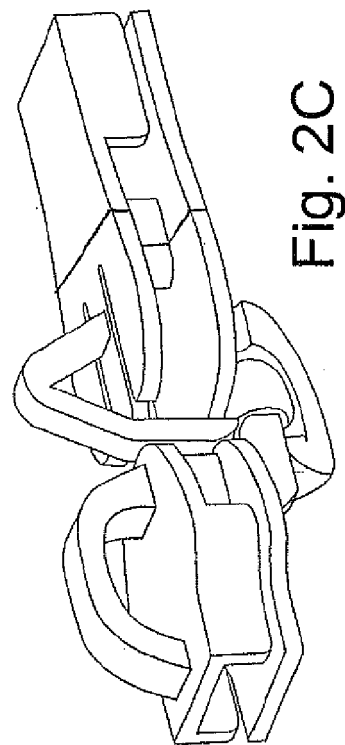
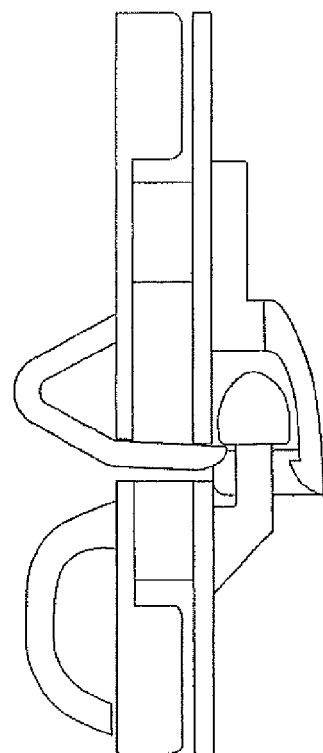
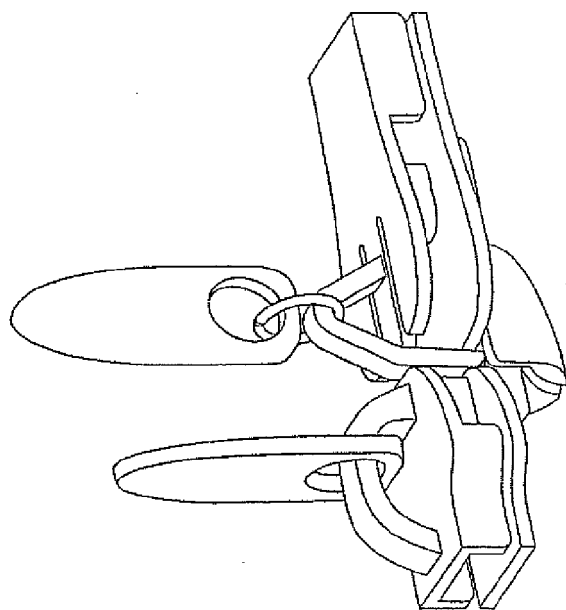
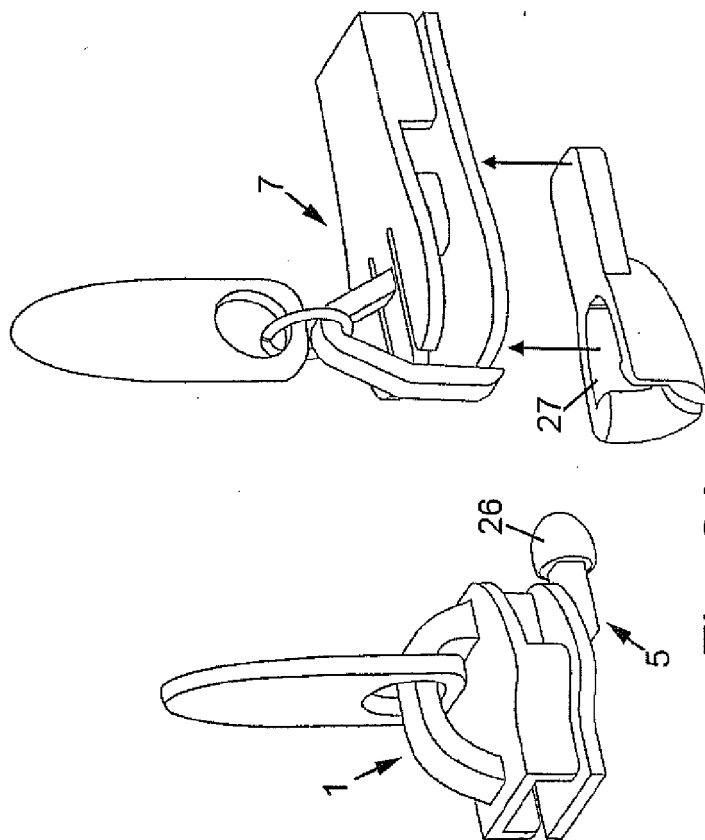


Fig. 1F



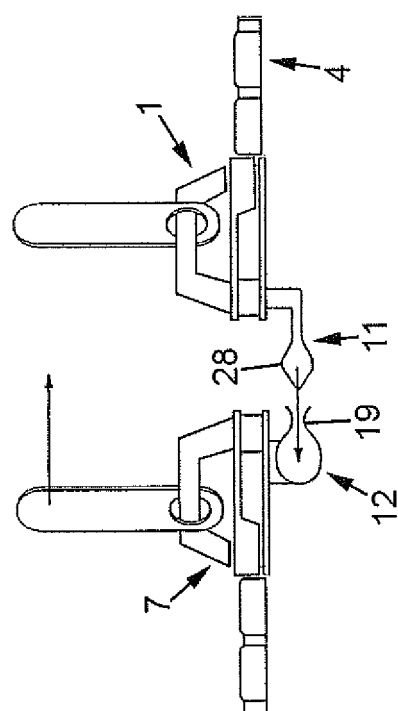


Fig. 3A

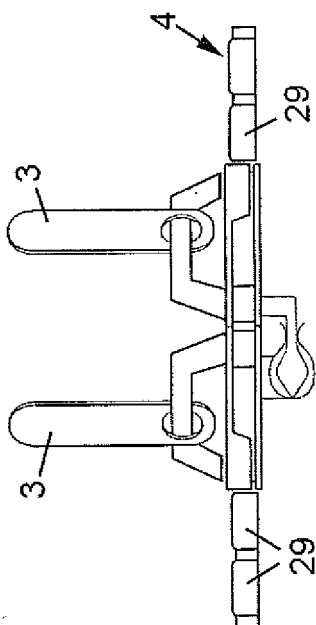


Fig. 3B

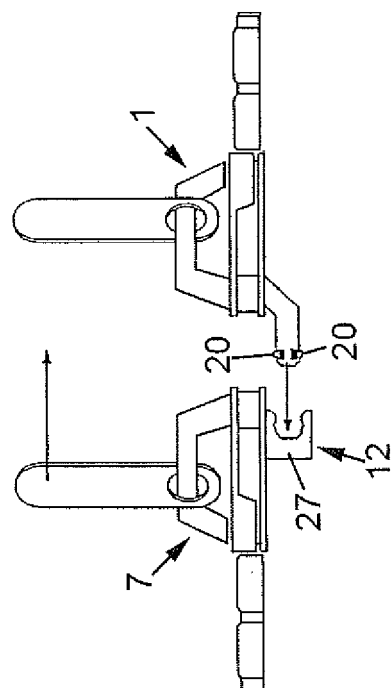


Fig. 4A

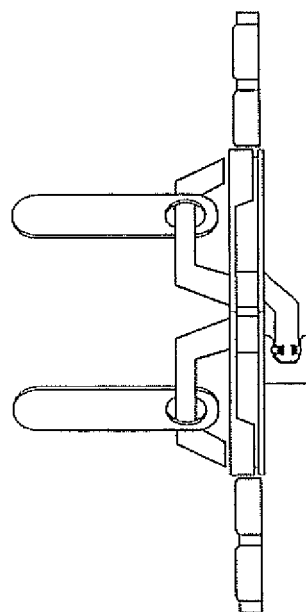


Fig. 4B

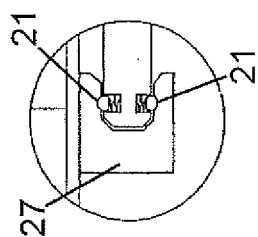


Fig. 4C

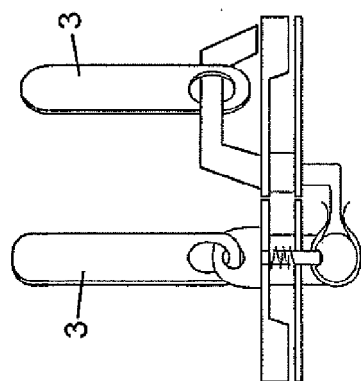
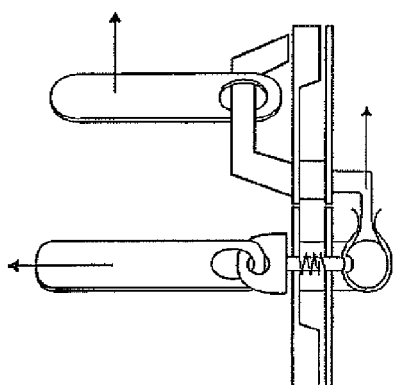


Fig. 5B

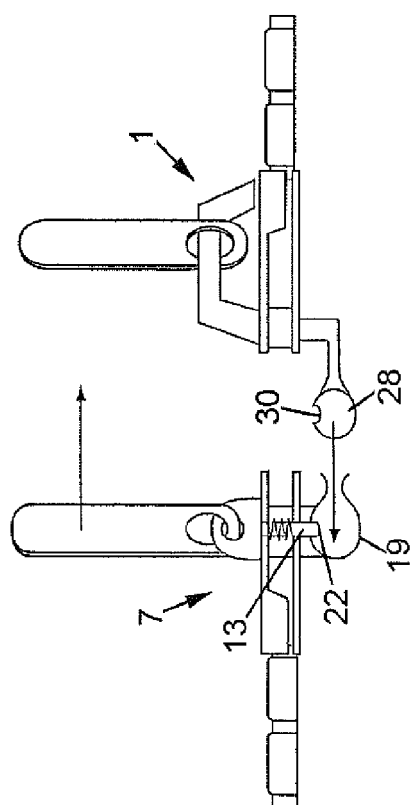


Fig. 5A

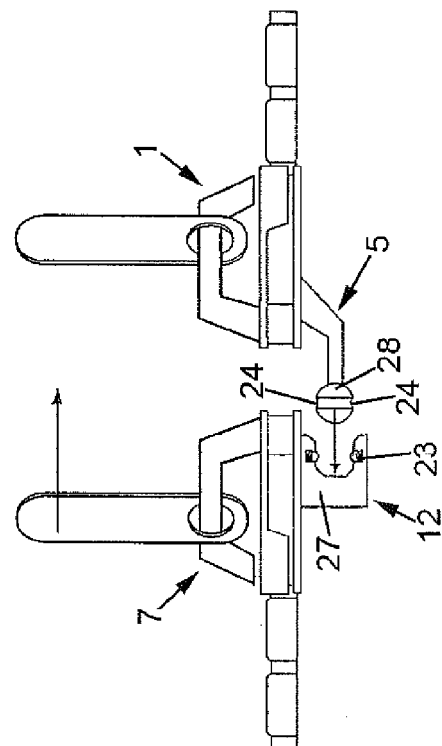


Fig. 6A

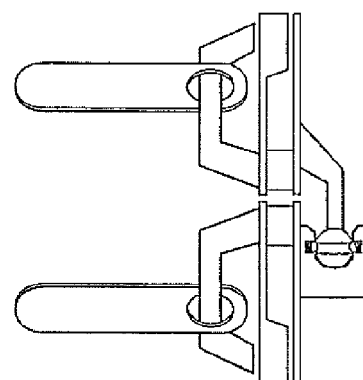


Fig. 6B

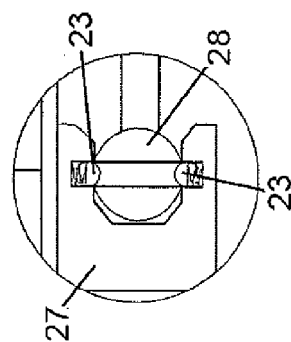


Fig. 6C

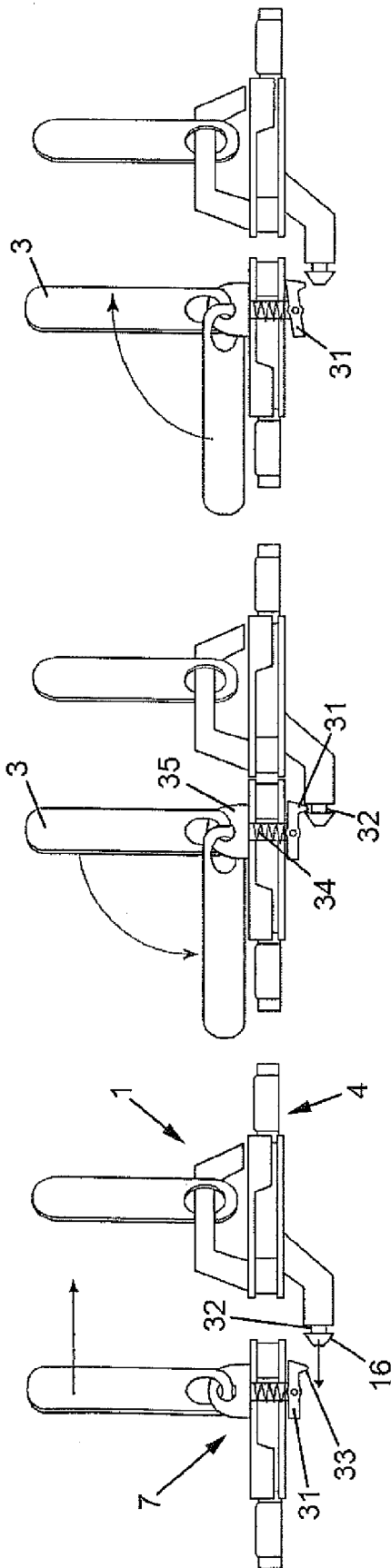
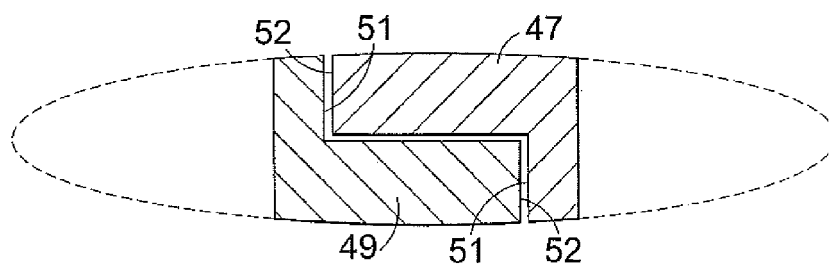
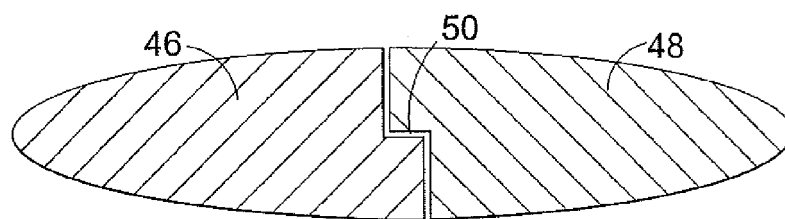
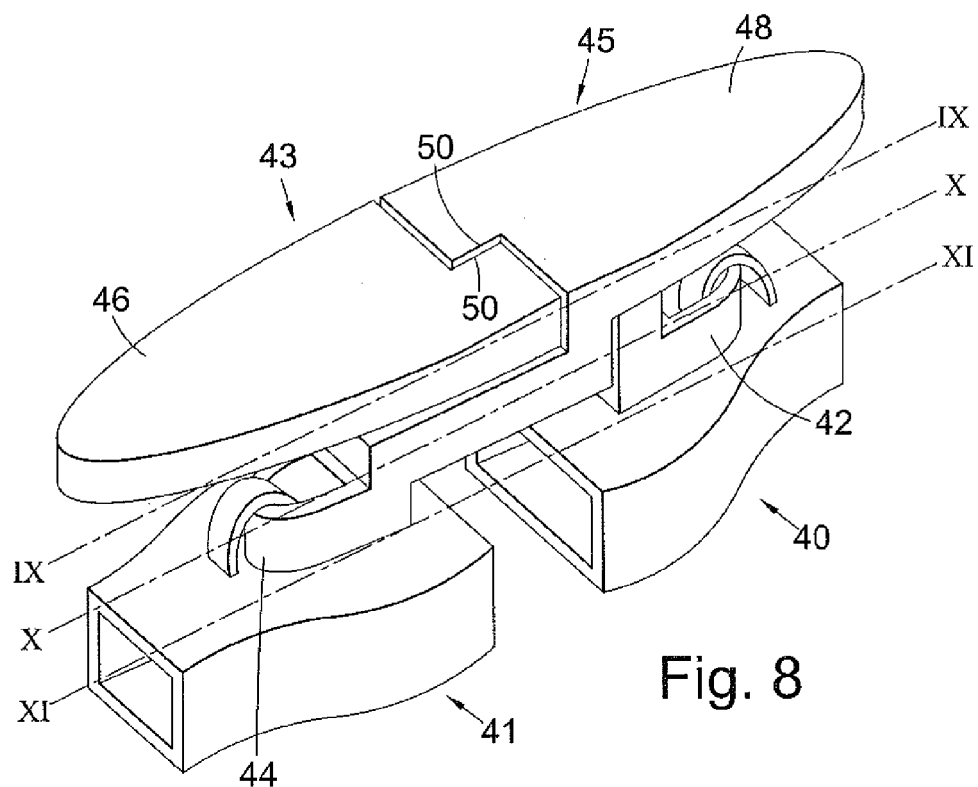


Fig. 7C

Fig. 7B

Fig. 7A



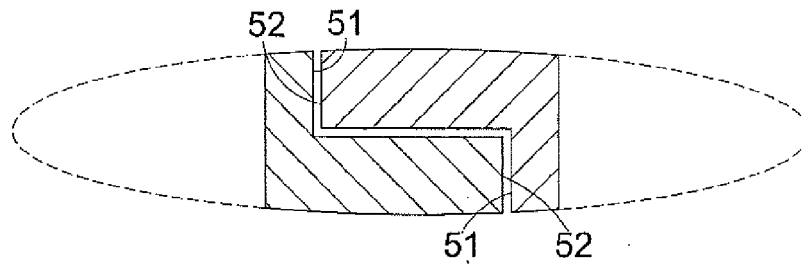


Fig. 12a

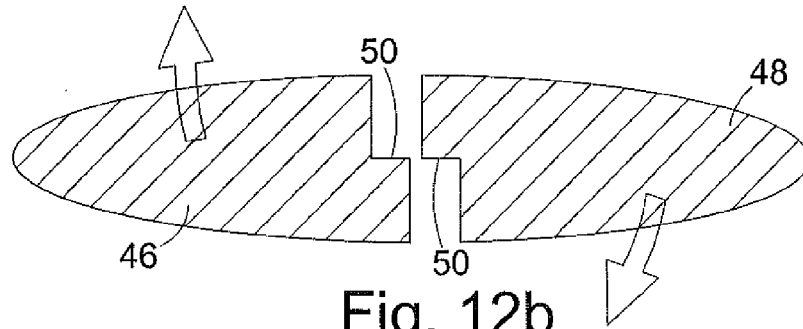


Fig. 12b

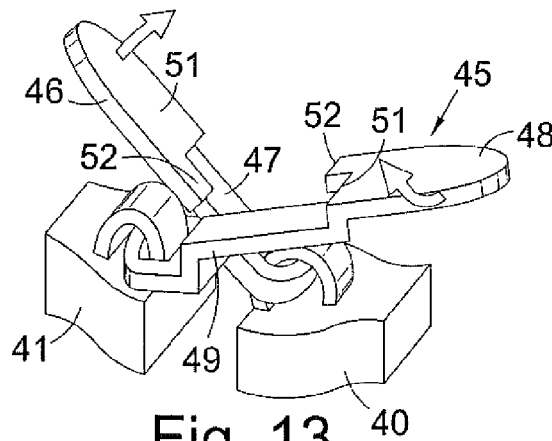


Fig. 13

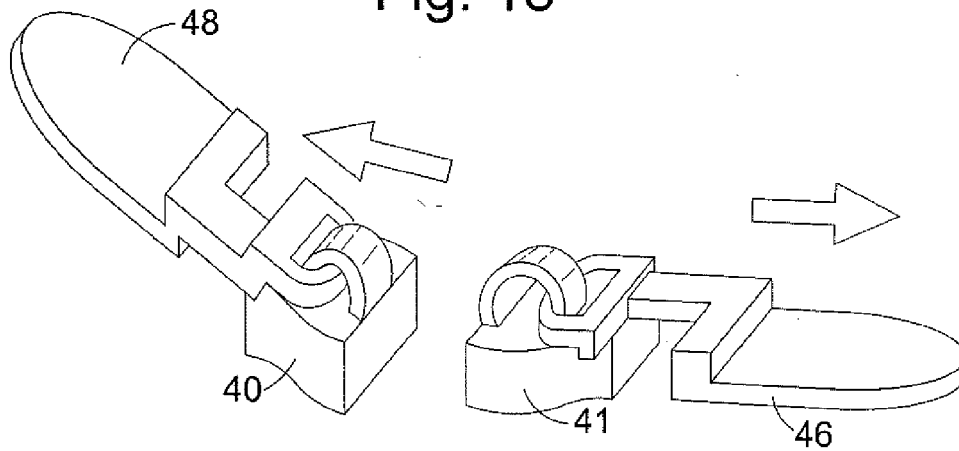


Fig. 14

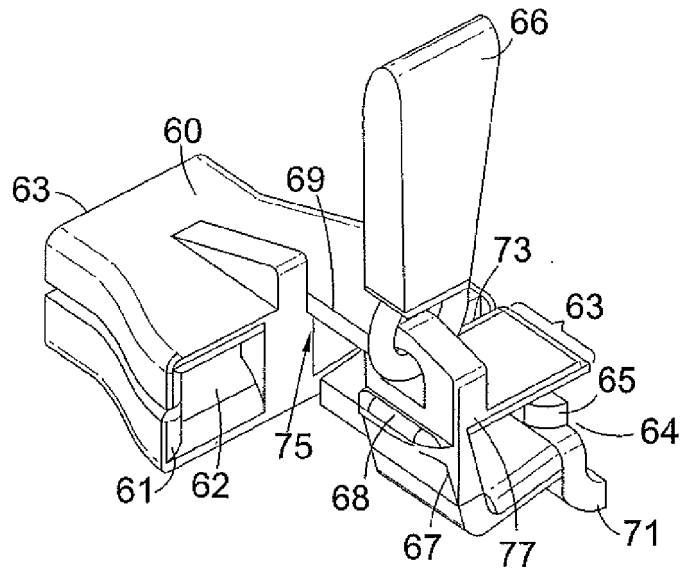


Fig. 15

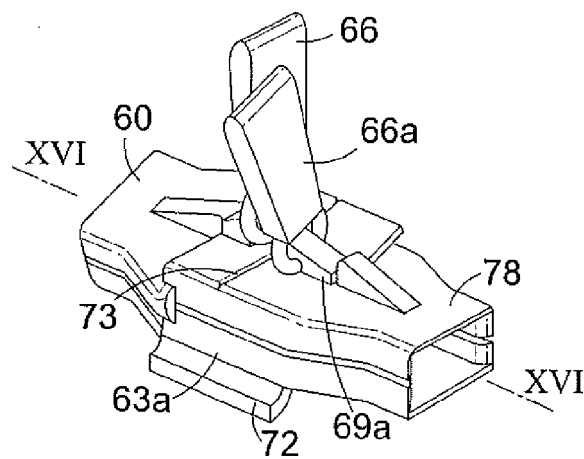


Fig. 16

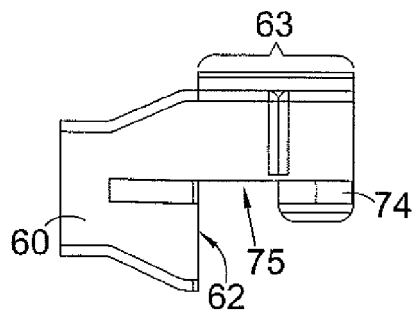


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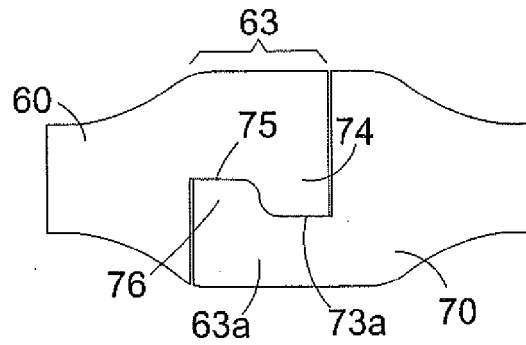


Fig. 18

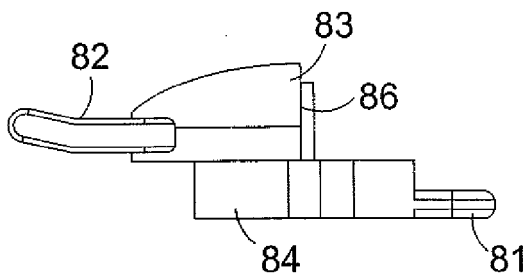


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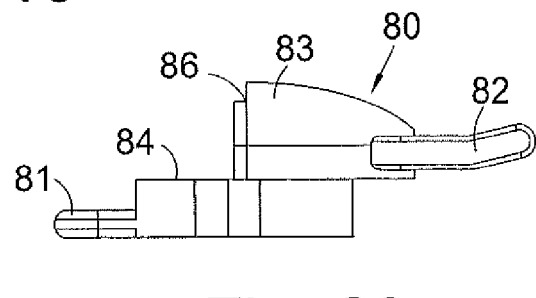


Fig. 20

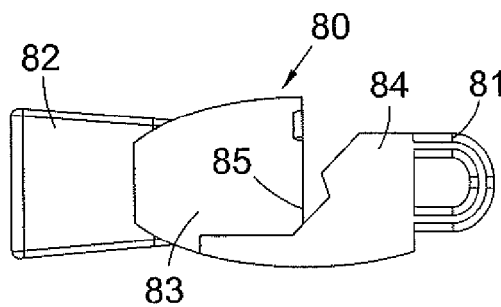


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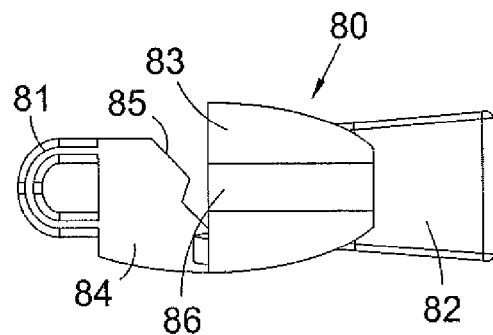


Fig. 22

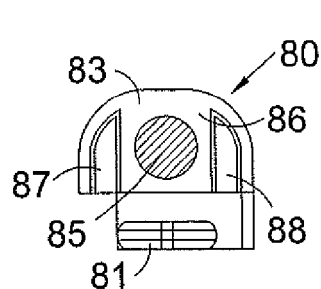


Fig. 23

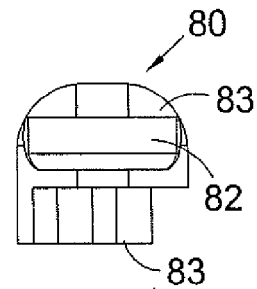


Fig. 24

REFERENCES CITED IN THE DESCRIPTION

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