

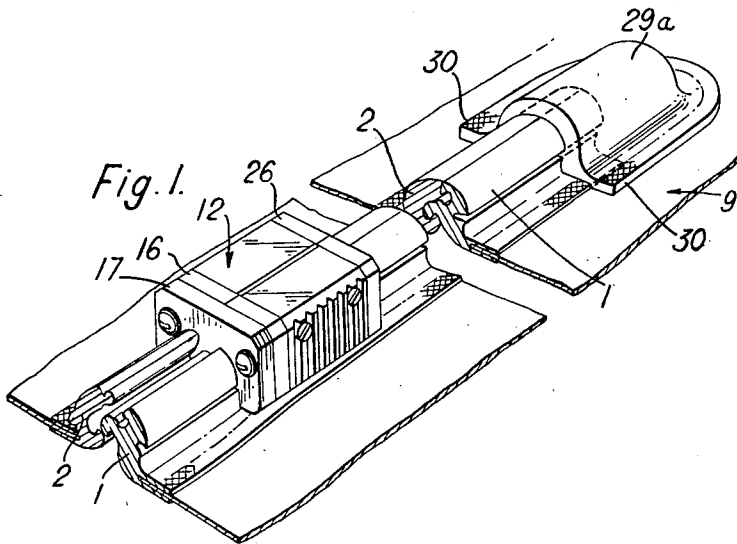
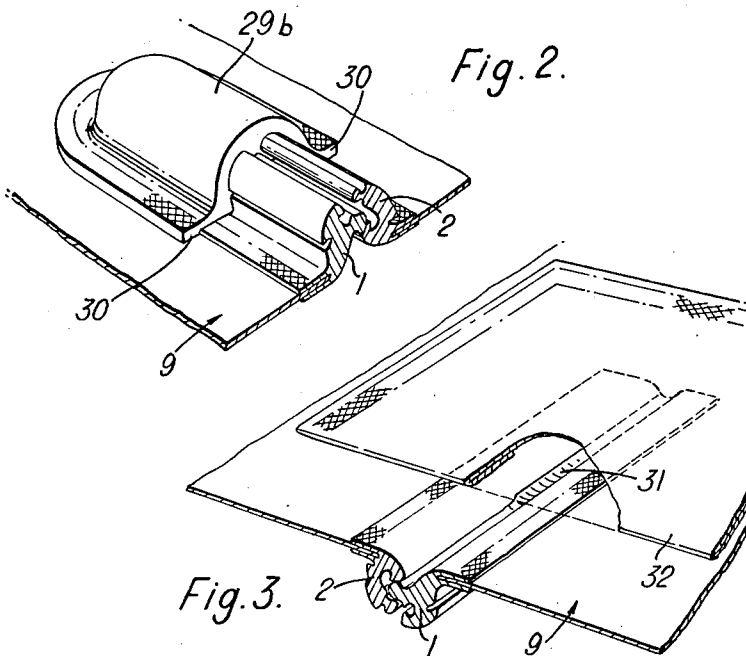
Jan. 22, 1963

E. L. HAWLEY
SLIDE FASTENERS

3,074,137

Filed Jan. 8, 1960

3 Sheets-Sheet 1



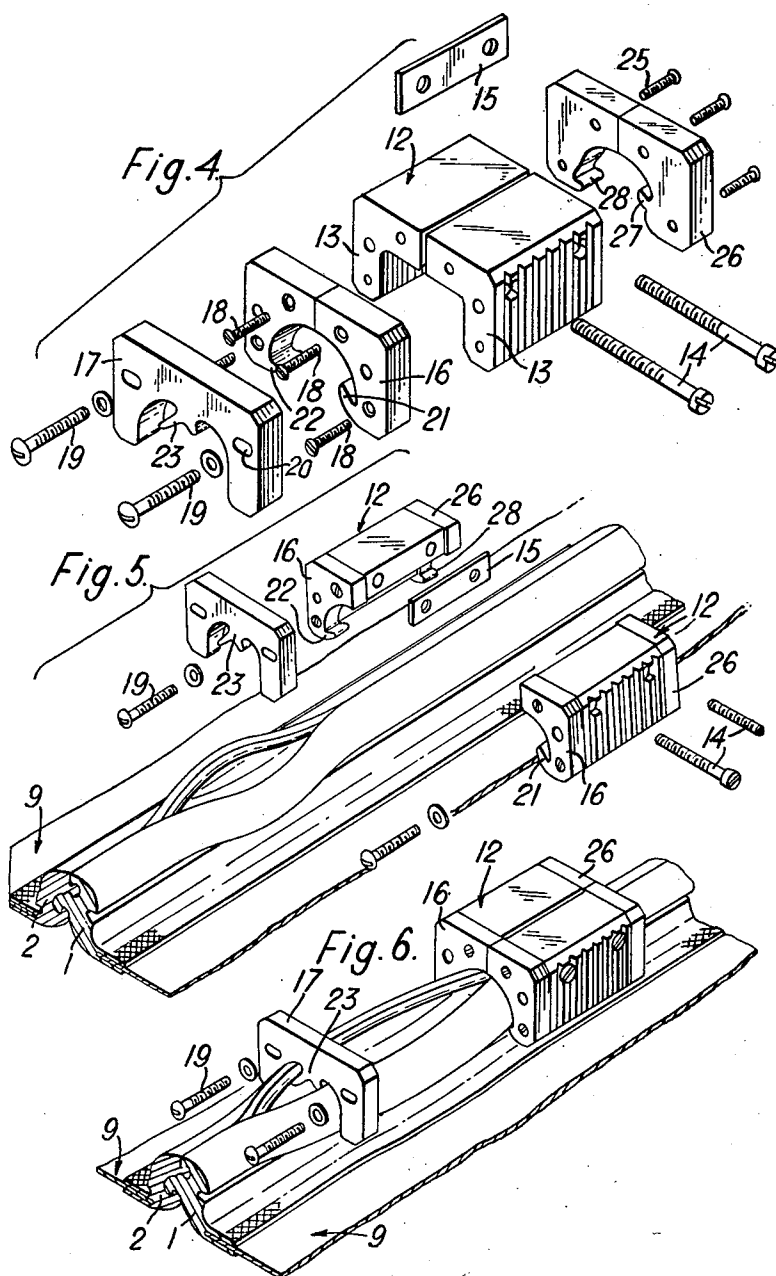
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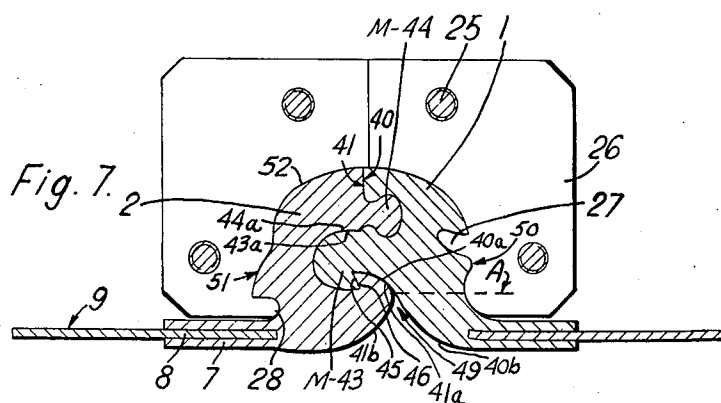
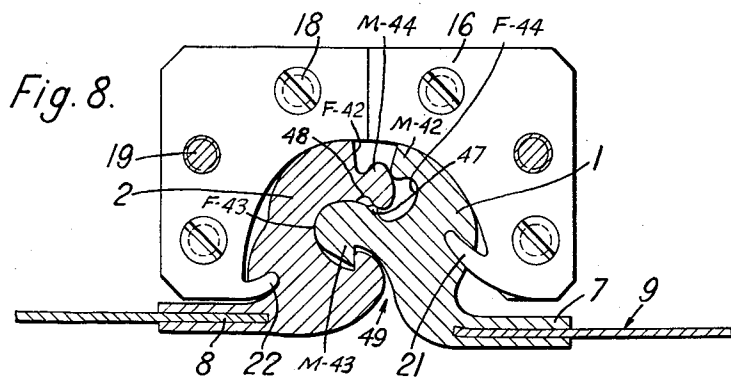
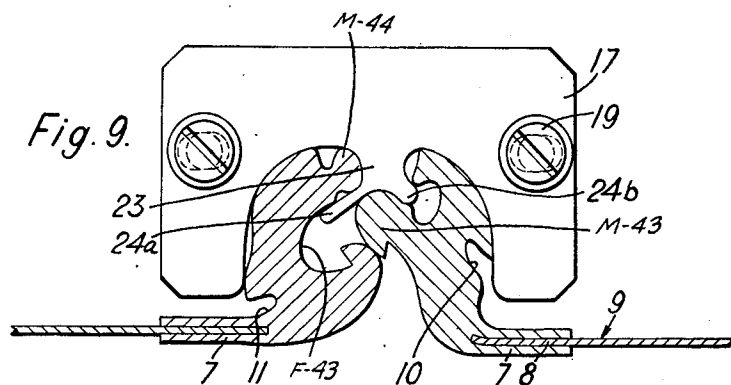
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3,074,137

SLIDE FASTENERS

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7 Claims. (Cl. 24-201)

This invention concerns improvements in or relating to slide fasteners and has for one object the provision of an improved fastener, particularly suitable for use as a closure in a container or covering for protecting articles which would be subject to deterioration if exposed to the atmosphere for any substantial length of time.

According to this invention, there is provided a slide fastener including two fastener strips having interlocking configurations and a slider, the latter comprising a body of saddle form, which embraces the fastener strips, and an opening projection carried by the slider at one end thereof and extending inwardly between the fastener strips for part only of the depth thereof, the said strips and projection being so shaped that, on movement of the slider along the interlocked fastener strips with the end of the slider which carries the said projection trailing, the projection pries the two fastener strips apart along an outer longitudinal marginal portion of the junction of these strips and thereby causes the latter to pivot or roll about an inner longitudinal marginal portion of this junction to disengage the interlocked strips.

In the fastener according to this invention, since the opening projection of the slider does not pass completely through the fastener strips, the fastener can be made in such a form that a very tight sealing of the junction of the interlocking strips may be achieved and this invention enables, by making the strips of a moisture proof material, the manufacture of a substantially moisture-tight fastener suitable for use in closing moisture proof protective coverings, for example covers made from the material described and claimed in the copending patent application Serial No. 706,782, now Patent No. 3,035,956, of myself and Desire Gonda, which are required to be opened from time to time, e.g. for inspection purposes.

In order that this invention may more readily be understood and further features thereof appreciated, one embodiment of the slide fastener according to the invention will now be described by way of example with reference to the accompanying drawings in which:

FIGURE 1 is a fragmentary perspective view, partly in section, of a container employing the slide fastener of this embodiment, this view showing the fastener strips, the slider and the sealing hood at one end of the fastener;

FIGURE 2 is a perspective view illustrating the sealing hood at the other end of the fastener;

FIGURE 3 is an underneath perspective view showing one end of the junction of the fastener with the material of the container in which it is provided;

FIGURE 4 is an exploded perspective view of the slider of the fastener;

FIGURES 5 and 6 are perspective views showing stages in the assembly of the slider on the fastener; and

FIGURES 7, 8 and 9 are sections through the fastener illustrating the section of the slider in opening and closing the fastener.

The embodiment illustrated in the drawings is a slide fastener particularly suitable for use in a flexible moisture proof container, e.g. a container formed of a material such as is described and claimed in the said copending patent applications Serial No. 706,782, such material comprising a layer of lead foil to each side of which is adhered a sheet of fabric reinforced flexible corrosion-resistant heat-sealable material.

The fastener comprises two coextensive and interlocking

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fastener strips 1 and 2, each of which is of flexible and resilient material such as an extruded strip of a heat-sealable synthetic resin material, e.g., polyvinyl chloride. Referring to FIGURE 7 wherein the strips are shown in interlocked condition, the fastener strip 1 has an interior surface 40 which may be considered as divided vertically, above and below the dotted indicating line A, into an upper portion 40a and a lower portion 40b. Similarly, the fastener strip 2 has an interior surface 41 which may be considered as divided vertically, above and below the same line A, into an upper portion 41a and a lower portion 41b. Included in the configurations of the respective interior surface upper portions 40a and 41a are transversely projecting co-mating male and female elements indicated generally by the reference characters F and M. As will be observed from the drawing, the fastener strip 1 has a relatively short male element M-42 adjacent the top surface of the strip; a relatively long male element M-43 at a middle-height location; and a correspondingly short female element F-44 between the male elements M-42 and M-43. Co-mating with the male and female elements M-42, M-43 and F-44 are the corresponding female and male elements F-42, F-43 and M-44 of the interior surface upper portion 41a of fastener strip 2.

The long male element M-43 of fastener strip 1 has a downwardly projecting hook-like portion 45 substantially adjacent the end of its length of projection, which engages a corresponding upwardly projecting hook-like portion 46 formed within the female element F-43 as shown in FIGURE 7.

Also to be noted is the longitudinally extending auxiliary male element 47 which projects upwardly from the substantially horizontal upper surface 43a of the long male element M-43 of fastener strip 1. The auxiliary male element 47 is disposed at a location along the projecting length of element M-43 a distance outward which is substantially equal to the projecting length of the relatively short male element M-42, as shown. This auxiliary male element 47 engages the underside surface 44a of the male element M-44 of fastener strip 2 either by distortion of the resilient material thereof, or by engaging a correspondingly located upwardly projecting female element 48 formed in the underside surface 44a, as indicated in FIGURE 8, for example.

Each of the lower portions 40b and 41b of the respective fastener strips 1, 2 has chamfered configuration, as shown, to provide a longitudinally extending gap, indicated by reference numeral 49, between the interlocked fastener strips. The chamfered lower portions 40b, 41b provide the inner longitudinal marginal portion of the junction between the strips, as previously referred to, about which the strips roll to disengage the upper portions 40a, 41a thereof, and as will be hereinafter more fully explained.

Each of the fastener strips has along its outer edge an outwardly projecting flange 7 having therein a deep longitudinal slot to receive a marginal edge portion 8 of the piece of material 9 used in forming the container in which the fastener is provided.

As previously explained, the fastener is particularly suitable for use in a container or covering formed of a heat-sealable material and, in this case, it will be appreciated that the fastener parts above described may be secured to such material by heat sealing the marginal edge portions 8 of the latter in the slots in the flanges 7.

In addition, each fastener strip 1 and 2 has an exterior side edge 50, 51, respectively, as shown in FIGURES 7-9. At the lower extremity of exterior side edge 51, fastener strip 2 has a transversely inward projecting, and longitudinally extending groove portion 11 to be engaged by the slider element of the fastener, as will be described. Also to be engaged by the slider element in a manner to

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be described is a transversely inward projecting, and longitudinally extending groove portion 10 of the fastener strip 1. The groove 10 is at a middle height location within the exterior side edge 50.

The slider of the fastener comprises a saddle 12 the arms 13 of which straddle the two fastener strips. The saddle 12 is longitudinally divided centrally of the portion extending between the arms 13 so as to comprise two separable portions, which in use of the slider are bolted together by bolts 14, one or more shims 15 being provided between the two portions to enable the width of the slider to be adjusted to the dimensions of the fastener strip and standard parts thereby used for fastener strips of different dimensions.

At the end which is the trailing end when the slide is moved in its opening direction, the slider is provided with two plates 16 and 17 secured by screws 18 and 19 respectively to the saddle 12. The apertures 20 through the plate 17 are elongated in the direction of width of the slider so as to allow for alteration of the lateral position of the screws which occurs when the width of the slider has to be adjusted. The plate 16 is formed in two halves to allow for this adjustment of width.

The plate 16 has extending inwardly from the sides thereof the transversely inward and upwardly projecting prongs 21, 22. One prong, indicated by the reference 21, engages the groove 10 in the fastener strip 1 and the other prong, indicated by the reference 22, engages the groove 11 of the other fastener strip 2. The upward projection of the prongs 21, 22, engaging the substantially horizontal grooves 10, 11, imparts downward and inwardly directed compressive pressure on the respective fastener strips in the region of their respective interior surface lower portions 40b, 41b as the slider is moved along the strips in a fastener opening operation, thereby causing the interior surface lower portions 40b, 41b to roll against each other to disengage the upper portions 40a, 41a as indicated sequentially in FIGURE 7-9. The plate 17 has extending inwardly from its upper part a fastener-opening element 23 adapted to extend inwardly between the fastener strips for part only of the depth thereof, this element 23 having two prongs 24a, 24b (FIGURE 9) which are adapted, in opening of the fastener, to engage in the female elements F-43 and F-44, respectively. At the other end, the saddle 12 has secured thereto by screws 25 a plate 26 which is, like the plate 16, formed in two halves and has an internal configuration matching the external configuration of the fully interlocked fastener strips, side prongs 27 and 28 oriented and projecting inwardly to engage in the grooves 10 and 11 respectively of the fastener strips. As the slider is moved along the strips in a fastener-closing operation, these prongs 27, 28 exert transversely inward compressive pressure to cause interlocking engagement of the interior surface upper portions 40a, 41a of the strips.

To enable the slider to be more easily gripped in moving the slider along the fastener strips, the outer faces of the arms 13 of the saddle 12 are serrated as shown.

In applying the above described fastener to the article in which the fastener is to be used, the end portions of the fastener strips at each end of the fastener are covered by a hood 29a, 29b, respectively, each of which is, preferably formed of the same material as the fastener strips, the latter being secured, e.g. heat-sealed, to the hood and the hood being secured, e.g. heat-sealed to the material 9. Each hood 29 comprises a hollow moulding of substantially semi-cylindrical form having a closed end and a flange 30 by which the hood is secured to the material 9 and fastener strip flanges 7. The hood 29a at the closed end of the fastener, i.e. the end away from which the slider is moved in closing the fastener, is shown in FIGURE 1 and has an internal configuration matching the external configuration of the fully interlocked fastener strips. The hood 29b at the open end of the fastener, i.e. the end away from which the slider is moved

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in opening the fastener, is shown in FIGURE 2 and has an internal configuration similar to that of the plate 17 which abuts this hood when the fastener is closed. As shown in FIGURE 3, and to assure firm attachment of the fastener, at each end thereof, internally of the covering in which the fastener is provided, the fastener strips are preferably heat-sealed together as shown at 31 over a short length, e.g. 3 inches, and a panel 32 of heat-sealable material is secured to the material 9 so as to extend across the end of the fastener.

The operation of the slide fastener above described will be appreciated from FIGURES 7 to 9 which show the actions of the plate 26 in closing the fastener and the plates 16 and 17 in opening the fastener. In opening of the fastener, as the slider is moved along the fastener strips the prongs 21 and 22 on the plate 16 engage in the grooves 10 and 11 of the fastener strips and press the latter together at the inner marginal portion of the junction of the strips so as partially to force the male element M-44 from the female element F-44. The prong 23 of the plate 17 then enters between the two strips and pries these apart to cause the strips further to pivot or roll away from one another at their upper part to disengage the male element M-43 from the female element F-43. In closing of the fastener, the two strips of the latter are brought, and pressed, together within the saddle 12, the final interlocking of the two parts being achieved by the plate 26 since the internal configuration of the latter exactly corresponds to the external shape of the fully interlocked fastener strips. It will be noted that, during the fastener-closing operation, strip 2 is braced by an interior surface 52 of the slider against lateral movement in response to the transversely inward pressure exerted by slider prong 27 in the groove portion 10 of fastener strip 1.

The slider and plate 16, 17 and 26 may be formed of any suitable material and may, for example be formed of stainless steel, or as injection mouldings of molybdenum di-sulphide loaded nylon.

It will be appreciated that the fastener above described may be used in articles formed of materials other than that particularly mentioned and may, for example, be used in articles formed of polyvinyl chloride covered fibre glass or any other convenient suitable material having an outer surface of heat sealable material.

If desired, the said slider may be provided, in addition, or alternatively to the said serrations with a handle or bail to facilitate movements of the slider along the fastener strips. Further, the slider may be provided internally with rollers rolling in longitudinal grooves in the outer edges of the fastener strips. Such rollers could provide the prongs 21 and 22 of plate 16 and/or the prongs 27 or 28 of plate 26.

I claim:

1. A slide fastener comprising a pair of coextensive and interlocking longitudinal fastener strips, each fastener strip being of flexible and resilient material and each having a longitudinally extending interior surface including along an upper portion thereof transversely projecting longitudinal male and female elements in co-mating arrangement and construction with respect to those elements at the upper portion of the other fastener strip, said male and female elements of one fastener strip comprising a relatively short and plainly rounded male element adjacent the top surface of said strip and a relatively long and generally rounded male element at substantially a middle location of its said interior surface upper portion and, further, a similarly short and plainly rounded female element between said relatively short and long male elements, said relatively long male element including along its longitudinal length a single, downwardly projecting hook-like portion for engaging the other of said fastener strips, said hook-like portion disposed substantially adjacent the outer extremity of projection of said relatively long male element, and said relatively long

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male element further having an upwardly projecting auxiliary male element extending along the longitudinal length of an upper substantially horizontal surface thereof, at a location on the projecting length of said relatively long male element corresponding to the projecting length of said relatively short male element.

2. A slide fastener according to claim 1, wherein that male element of said other fastener strip which co-mates with said female element of said one strip has an upwardly projecting auxiliary female element extending along the longitudinal length of the lower substantially horizontal surface thereof which engages said upper horizontal surface of said relatively long male element, said auxiliary female element being disposed to engage said auxiliary male element.

3. A slide fastener comprising a pair of coextensive and interlocking longitudinal fastener strips, each fastener strip being of flexible and resilient material and each having a longitudinally extending interior surface including along an upper portion thereof transversely projecting longitudinal male and female elements of generally rounded configuration and in co-mating arrangement and construction with respect to those elements at the upper portion of the other fastener strip, said interior surface of each fastener strip further including along a lower portion thereof a chamfered surface to provide a longitudinally extending gap along the underside of the interlocked fastener strips, whereby transversely inward compressive pressure on said strips in the region of said interior surface lower portions promotes longitudinal rolling action one with respect to the other to disengage said interior surface upper portions, each said fastener strip further having a longitudinally extending exterior side surface, said exterior side surface of one fastener strip at a middle location along its height having a transversely inward projecting longitudinal first groove portion, said exterior side surface of the other of said fastener strips having adjacent the lower extremity of its height a transversely inward projecting longitudinal second groove portion, and a slider engaging said interlocked fastener strips at said respective exterior side surfaces thereof, said slider having a pair of transversely inward projecting fastener-opening prongs, the first of said prongs angulated upwardly with respect to said fastener strips and engaging said first groove portion to distort and compress said one strip downwardly to thereby impart said transversely inward compressive pressure thereto, and the second of said prongs angulated upwardly with respect to said fastener strips and engaging said second groove portion to distort and compress said other strip downwardly to thereby impart said transversely inward compressive pressure thereto.

4. A slide fastener according to claim 3, wherein said slider further has a pair of transversely inward projecting fastener-closing prongs engaging, respectively, said first and second groove portions, and interior surface means engaging said other fastener strip at said exterior side surface thereof in the region of said upper portion of its said interior surface to support said other strip against the lateral movement responsive to the transversely inwardly directed pressure of engagement of that one of said fastener-closing prongs which engages said first groove portion.

5. A slide fastener according to claim 3, wherein said male and female elements of one fastener strip comprise a relatively short male element adjacent the top surface of

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said strip and a relatively long male element at substantially a middle location of said interior surface upper portion and, further, a similarly short female element between said relatively short and long male elements, said relatively long male element including along its longitudinal length a single, downwardly projecting hook-like portion for engaging the other of said fastener strips, said hook-like portion disposed substantially adjacent the outer extremity of projection of said relatively long element.

6. A slide fastener according to claim 5, wherein said slider further has a downwardly projecting strip-separating element disposed between said co-mating interior surfaces of said fastener strips, said strip-separating element having a pair of outwardly directed prongs, one of said strip-separating element prongs adapted to project into said female element of said one fastener strip and the other of said strip-separating element prongs adapted to project into that female element of said other fastener strip which co-matingly corresponds with said relatively long male element of said one strip.

7. A slide fastener comprising a pair of coextensive and interlocking longitudinal fastener strips, each fastener strip being of flexible and resilient material and each having a longitudinally extending interior surface including along an upper portion thereof transversely projecting longitudinal male and female elements in co-mating arrangement and construction with respect to those elements at the upper portion of the other fastener strip, said male and female elements of one fastener strip comprising a relatively short and plainly rounded male element adjacent the top surface of said strip and a relatively long and generally rounded male element at substantially a middle location of its said interior surface upper portion and, further, a similarly short and plainly rounded female element between said relatively short and long male elements, said relatively long male element including along its longitudinal length a single, downwardly projecting hook-like portion for engaging the other of said fastener strips, said hook-like portion disposed substantially adjacent the outer extremity of projection of said relatively long male element, said interior surface of each fastener strip further including along a lower portion thereof a chamfered surface to provide a longitudinally extending gap along the underside of the interlocked fastener strips and extending upwardly to a level adjacent the proximal end of the lowest of said male elements whereby transversely inward compressive pressure on said strips in the region of said interior surface lower portions promotes longitudinal rolling action one with respect to the other to disengage said interior surface upper portions.

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