

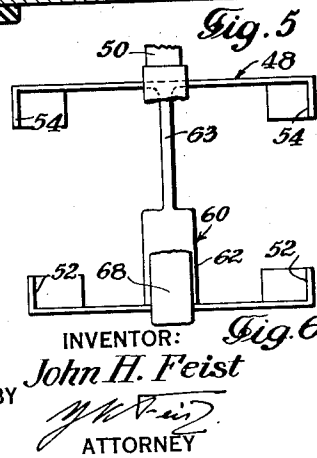
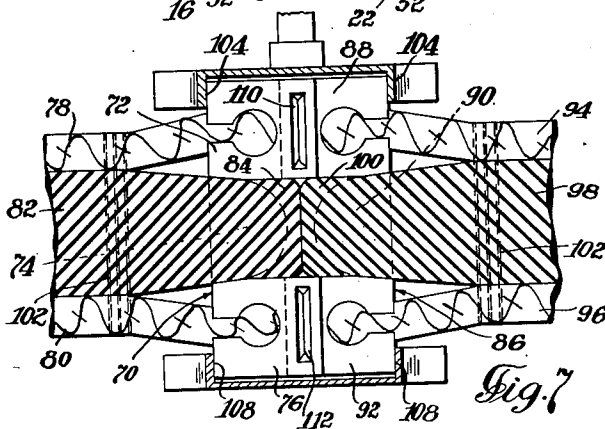
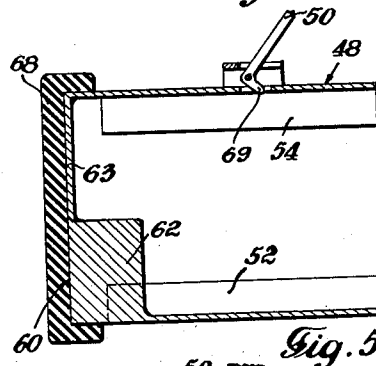
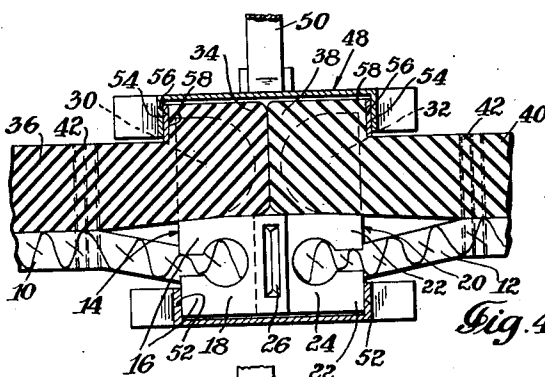
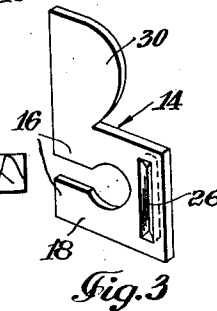
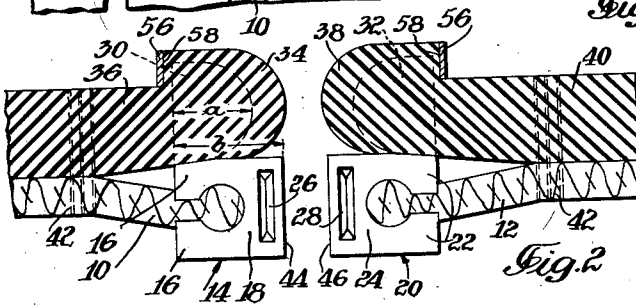
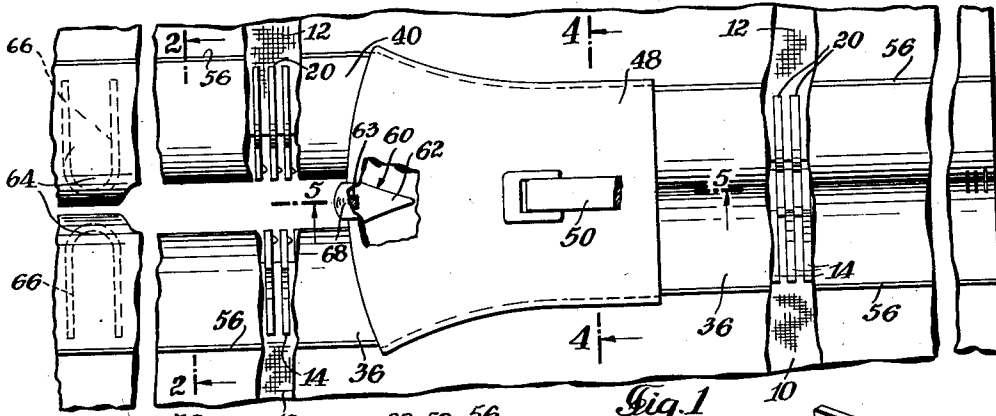
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SLIDE FASTENER

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SLIDE FASTENER

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15 Claims. (Cl. 24—205)

My invention relates to separable fasteners, and more particularly to slide fasteners or so-called "zippers."

One object of my invention is to provide a water-proof slide fastener, which may be applied to various articles, such as rain-coats, rubber-boots, pouches, covers, tents, brief-cases, etc.

Another object of my invention is to construct a water-proof slide fastener in such a way, that a perfect sealing is obtained when the slide fastener is closed.

In order to carry out my invention into practice I provide a slide fastener comprising opposed flexible tapes, opposed series of interlocking fastening elements connected to said flexible tapes along their opposed edges, opposed flexible strips of water-proof material, the interlocking fastening elements having portions inserted into the opposed edges of said flexible strips, the main body of said flexible strips being attached to said flexible tapes, and a slider on said interlocking fastening elements for opening and closing same.

The above mentioned objects and advantages as well as other objects and advantages will be more fully disclosed in the following specification reference being had to the accompanying drawing forming part of this specification, wherein:

Fig. 1 is a top plan view of a water-proof slide fastener according to my invention, portions of the strips of water-proof material being omitted for a better illustration of the interlocking fastening elements,

Fig. 2 is a cross-sectional view of the slide fastener shown in Fig. 1, taken on line 2—2 of Fig. 1,

Fig. 3 is a perspective view of an interlocking fastening element of the slide fastener shown in Figs. 1 and 2,

Fig. 4 is a cross-sectional view of the slide fastener shown in Fig. 1, taken on line 4—4 of Fig. 1,

Fig. 5 is a sectional view of the slider of the slide fastener shown in Fig. 1, taken on line 5—5 of Fig. 1,

Fig. 6 is a front elevational view of the slider shown in Fig. 5, and

Fig. 7 is a cross-sectional view of a slide fastener similar to that shown in Fig. 4 illustrating, however, a different embodiment of a slide fastener according to the invention.

Referring now to Figs. 1-6, 10 and 12 indicate opposed flexible tapes of fabric or the like. A series of interlocking fastening elements 14 is connected to the edge of the tape 10 by means

of prongs 16 arranged on the inner end of the plate 18 of the fastening elements. Likewise, a series of interlocking fastening elements 20 is connected to the edge of the tape 12 by prongs 22 on the inner end of the plate 24 of said fastening elements. The fastening elements of one series are arranged opposite the spaces between the fastening elements of the other series. The slide fastener may be closed by an interlocking engagement of the interlocking means 26 and 28 on the plates 18 and 24 respectively of the fastening elements of the two series.

The plates 18 and 24 of the fastening elements 14 and 20 are integral with extensions or lugs 30 and 32 respectively projecting upwardly from the upper ends of said plates and having curved edges. The maximum width *a* of an extension is smaller than the width *b* of a plate associated with said extension.

The extensions 30 of the fastening elements 14 are embedded in a bead-like portion 34 of a flexible strip 36 of elastic and water-proof material, for example rubber or a plastic composition. Likewise, the extensions 32 of the fastening elements 20 are embedded in a bead-like portion 38 of a flexible strip 40 of elastic and water-proof material. Thus, the opposed edges of the elastic strips 36 and 40 are held in their position by the extensions 30 and 32. The main body of the elastic strips 36 and 40 is attached to the upper surface of the tapes 10 and 12 by an adhesive and/or by seams indicated at 42.

As best shown in Fig. 2, the outer edge of the bead-like portions 34 and 38 is curved, and the outermost point of said curved edge is in alignment with the outer edge 44 or 46 respectively of the outer end of the plate 18 or 24 respectively when the slide fastener is open. Therefore, the opposed edges of the elastic bead-
portions 34 and 38 contact each other and are deformed when, upon closure of the slide fastener, the interlocking means 26 and 28 arranged at a certain distance inwardly from the outer edges 44 and 46 are engaged with each other as shown in Fig. 4. Thus, a perfect sealing of the slide fastener is obtained by the material of the elastic strips 36 and 40 covering all spaces between the fastening elements the extensions of which are embedded in the edges of said strips. Preferably, the interlocking means 26 and 28 have a substantially rectangular base, and the height of said base is about three times the width of said base, so as to prevent an undesired disengagement of the interlocking fastening elements by turning forces which may be

caused by the elasticity of the material of the deformed edges of the elastic strips.

A slider 48 with a pull 50 serves to open and close the interlocking fastening elements of the slide fastener in conventional manner. The surfaces 52 of the lower portion of the slider 48 cooperate with guiding surfaces on the inner ends of the plates 18 and 24 of the fastening elements, and the surfaces 54 of the upper portion of the slider 48 cooperate with reinforcing bands 56 of metal or any other suitable material attached to guiding edges 58 formed on the elastic strips 36 and 40. The transversal distance between the opposed surfaces 52 of the lower portion of the slider is smaller than the transversal distance between the opposed surfaces 54 of the upper portion of the slider.

The reinforcing band 56 serves to reduce the friction between the movable portions and the stationary portions of the slide fastener to a minimum. If desired, however, the reinforcing band 56 may be replaced by a reinforcing wire or may be entirely omitted. If there are no reinforcing means attached to the guiding edges 58 of the elastic strips, the guiding edges may be reinforced by a vulcanization of their surfaces, if desired.

As best shown in Figs. 1, 5 and 6, the upper portion of the slider 48 and the lower portion thereof are connected with each other by a member 60 integral with both portions of the slider. The lower portion 62 of said member 60 is in the shape of a wedge for cooperation with the outer edges 44 and 46 of the plates 18 and 24 of the interlocking fastening elements during the shifting of the slider along the fastening elements. The upper portion 63 of said member 60 is in the shape of a rib and has a cross-section smaller than that of the wedge-like portion 62, so that a contact of the rib 63 with the edges 34 and 38 of the elastic strips is avoided when the slider is moved along the interlocking fastening elements.

In the drawing, the height of the plates 18 and 24 is equal to the height of the bead-like portions 34 and 38 of the elastic strips 36 and 40. If desired, however, the height of the plates 18 and 24 may be made two or three times the height of said bead-like portions.

The right hand ends of the flexible strips 36 and 40 (as viewed in Fig. 1) are connected with each other in any suitable manner, for example by sewing or by melting. The left hand ends of the strips 36 and 40 are provided with projecting portions 64 supported by members 66 embedded in said portions and secured to the tapes 10 and 12. A sealing member 68 of elastic and water-proof material arranged on the end of the slider 48 is tightly pressed against said projecting portions 64 when the slide fastener is closed, and the slider may be held in this end position by a braking element 69, which forms a part of the pull 50 and may be pressed against the upper surface of the strips 36 and 40. Thus, a water-proof closure at both ends of the slide fastener is obtained.

According to a preferred method of making the slide fastener, at first, the series of interlocking fastening elements is secured to the tapes. Then, the extensions 30 and 32 of the elements are dipped into a viscous composition of water-proof material placed in a mould of suitable shape. After the coagulation or hardening of the composition, the elastic strip thus formed is removed from the mould together with the extensions embedded in the strip. If de-

sired, the composition may be stretched in longitudinal direction while being in a viscous state, so that its particles are oriented in a direction substantially parallel to the direction of movement of the slider on the finished strips. This orientation of the particles improves the sealing effect of the strips. Instead of dipping the extensions of the fastening elements into the viscous composition, the viscous composition may be poured onto the extensions or may be applied to the extensions by a spraying operation, whereupon the composition applied to the extensions is pressed into the proper shape.

It may be mentioned that the perfect sealing effect of the slide fastener according to the invention also permits the use of the slide fastener in instances where an air-tight or gas-tight closure is desired.

Fig. 7 illustrates a different embodiment of the slide fastener according to my invention. A series of interlocking fastening elements 70 comprising an upper plate 72, an intermediate portion 74 and a lower plate 76 formed of a single piece of material is secured to the edges of an upper flexible tape 78 and a lower flexible tape 80. An elastic strip 82 of water-proof material is placed between the tapes 78 and 80, and the intermediate portion 74 of the fastening elements is embedded in the outer edge 84 of the strip 82. Likewise, a series of interlocking fastening elements 86 comprising an upper plate 88, and intermediate portion 90 and a lower plate 92 is secured to the edges of an upper flexible tape 94 and a lower flexible tape 96. An elastic strip 98 of water-proof material is placed between the tapes 94 and 96, and the intermediate portion 90 of the fastening elements is embedded in the outer edge 100 of the strip 98. The main body of the strips 82 and 98 is attached to the tapes 78, 80 and 94, 96 respectively by an adhesive and/or by seams 102. The surfaces 104 of the upper portion of the slider 106 cooperate with guiding surfaces on the inner end of the upper plates 72 and 88, and the surfaces 108 of the lower portion of the slider 106 cooperate with guiding surfaces on the inner end of the lower plates 76 and 92. When the slide fastener is opened, the outermost point of the curved outer edges 84 and 100 of the elastic strips 82 and 98 is in alignment with the outer edge of the outer end of the plates 72, 76 and 88, 92 as is true of the embodiment shown in Fig. 2. Upon closure of the slide fastener, the outer edges 84 and 100 of the strips 82 and 98 are tightly pressed against each other and deformed, as shown in Fig. 7, so as to cause a perfect sealing of the slide fastener. In the drawing the interlocking means 110 and 112 of the fastening elements have a substantially rectangular base; if desired, however, the interlocking means may be of different shape, as, owing to the central arrangement of the elastic strip, the fastening elements are not subjected to turning forces tending to cause a disengagement thereof. Preferably, the intermediate portion 74 of the interlocking fastening element 70 is of the same height as the upper plate 72 and the lower plate 76.

I have described preferred embodiments of my invention, but it is clear that numerous changes and omissions may be made without departing from the spirit of my invention.

What I claim is:

1. A slide fastener comprising: opposed flexible tapes, opposed series of interlocking fastening elements connected to said flexible tapes along their opposed edges, opposed flexible strips of

water-proof material, the interlocking fastening elements having portions inserted into the opposed edges of said flexible strips, the main body of said flexible strips being attached to said flexible tapes, and a slider on said interlocking fastening elements for opening and closing same.

2. A slide fastener comprising: a pair of flexible tapes, a series of interlocking fastening elements connected to each of said flexible tapes along their opposed edges, each interlocking fastening element of each series having a plate, the inner end of said plate being connected to the edge of the tape, the outer end of said plate having means for interlocking engagement with corresponding means of an interlocking fastening element of the other series, each interlocking fastening element of each series having an extension projecting from the upper end of said plate, a flexible strip of water-proof material arranged on the upper surface of each of said flexible tapes, said extensions being inserted into the opposed edges of said flexible strips, the main body of said flexible strips being attached to said flexible tapes, and a slider on said fastening elements for opening and closing same.

3. A slide fastener as claimed in claim 2, a guiding edge being formed on each of said flexible strips, a guiding surface being formed on the lower inner end of said plate of the interlocking fastening elements, and said slider being arranged for cooperation with said guiding edges and guiding surfaces.

4. A slide fastener as claimed in claim 2, a guiding edge being formed on each of said flexible strips, said guiding edges being reinforced, a guiding surface being formed on the lower inner end of said plate of the interlocking fastening elements, and said slider being arranged for cooperation with said guiding edges and guiding surfaces.

5. A slide fastener as claimed in claim 2, a guiding edge being formed on each of said flexible strips, a reinforcing member arranged on said guiding edges, a guiding surface being formed on the lower inner end of said plate of the interlocking fastening elements, and said slider being arranged for cooperation with said reinforcing members and said guiding surfaces.

6. A slide fastener comprising: a pair of flexible tapes, a series of interlocking fastening elements connected to each of said flexible tapes along their opposed edges, each interlocking fastening element of each series having a plate, the inner end of said plate being connected to the edge of the tape, the outer end of said plate having means for interlocking engagement with corresponding means of an interlocking fastening element of the other series, each interlocking fastening element of each series having an extension projecting from the upper end of said plate, a flexible strip of an elastic and water-proof material arranged on the upper surface of each of said flexible tapes, said strip having a bead-like portion with a curved outer edge, the main body of said elastic strip being attached to said flexible tape, said extensions being embedded in said bead-like portion of said elastic strip for holding same, the outermost point of the curved edge of said bead-like portion being substantially in alignment with the outer edge of the outer end of said plate of the interlocking fastening element, a guiding edge being formed on each of said elastic strips, a guiding surface being formed on the lower inner end of said plate of the interlocking fastening elements, and a slider ar-

ranged for cooperation with said guiding edges and guiding surfaces for opening and closing the fastening elements whereby, upon closing, the outer edges of the bead-like portions are tightly pressed against each other so as to seal the slide fastener.

7. A slide fastener as claimed in claim 6, said interlocking means on the plate of the fastening element having a substantially rectangular base, the height of the base being about three times the width of the base.

8. A slide fastener as claimed in claim 2, the height of the plate of the interlocking fastening element being substantially equal to the height of the edge of the flexible strip embracing the extension projecting from said plate.

9. A slide fastener as claimed in claim 2, the height of the plate of the interlocking fastening element being larger than the height of the edge of the flexible strip embracing the extension projecting from said plate.

10. A slide fastener as claimed in claim 6, the lower portion of the body of the slider having lower surfaces cooperating with the guiding surfaces on the inner end of the plate of the fastening elements, the upper portion of the body of the slider having upper surfaces cooperating with the guiding edges on the elastic strip, and the transversal distance between said lower surfaces of the body of the slider being smaller than the transversal distance between said upper surfaces of the body of the slider.

11. A slide fastener as claimed in claim 6, the body of the slider including a lower portion and an upper portion, a member connecting said lower portion of the slider with said upper portion, the lower portion of said member being in the shape of a wedge for cooperation with the outer edges of the outer ends of the plates of the interlocking fastening elements, and the upper portion of said member being in the shape of a rib having a cross-section smaller than that of said wedge.

12. A slide fastener as claimed in claim 6, the slider having a wedge-like portion with a pointed end, the lower portion of said wedge-like portion being arranged for cooperation with the outer edges of the outer ends of the plates of the interlocking fastening elements, a part of the upper portion of said wedge-like portion being cut away adjacent the pointed end of the wedge-like portion, the lower portion of the body of the slider having lower surfaces cooperating with the guiding surfaces on the inner end of the plate of the fastening elements, the upper portion of the body of the slider having upper surfaces cooperating with the guiding edges on the elastic strip, and the transversal distance between said lower surfaces of the body of the slider being smaller than the transversal distance between said upper surfaces of the body of the slider.

13. A slide fastener comprising: a pair of flexible members; each member including an upper flexible tape, an intermediate elastic strip of water-proof material, and a lower flexible tape, the main body of said elastic strip being attached to said flexible tapes; a series of interlocking fastening elements connected to each of said flexible members along their opposed edges; each interlocking fastening element of each series having an upper plate, an intermediate portion, and a lower plate, said plates and said intermediate portion forming an integral piece; the inner ends of said upper and lower plates being connected to the edges of the upper and lower tapes; the

outer ends of said upper and lower plates having means for interlocking engagement with corresponding means of an interlocking fastening element of the other series; said intermediate portions of the fastening elements being inserted into the opposed outer edges of said elastic strips; and a slider on said fastening elements for opening and closing same.

14. A slide fastener as claimed in claim 13, the outer edge of said elastic strip being curved, and the outermost point of said curved edge

being substantially in alignment with the outer edges of the outer ends of said plates of the interlocking fastening elements whereby, upon closing of the fastening elements, the outer edges of the elastic strips are tightly pressed against each other so as to seal the slide fastener.

15. A slide fastener as claimed in claim 13, the upper plate, the lower plate, and the intermediate portion of the interlocking fastening element having substantially the same height.

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