

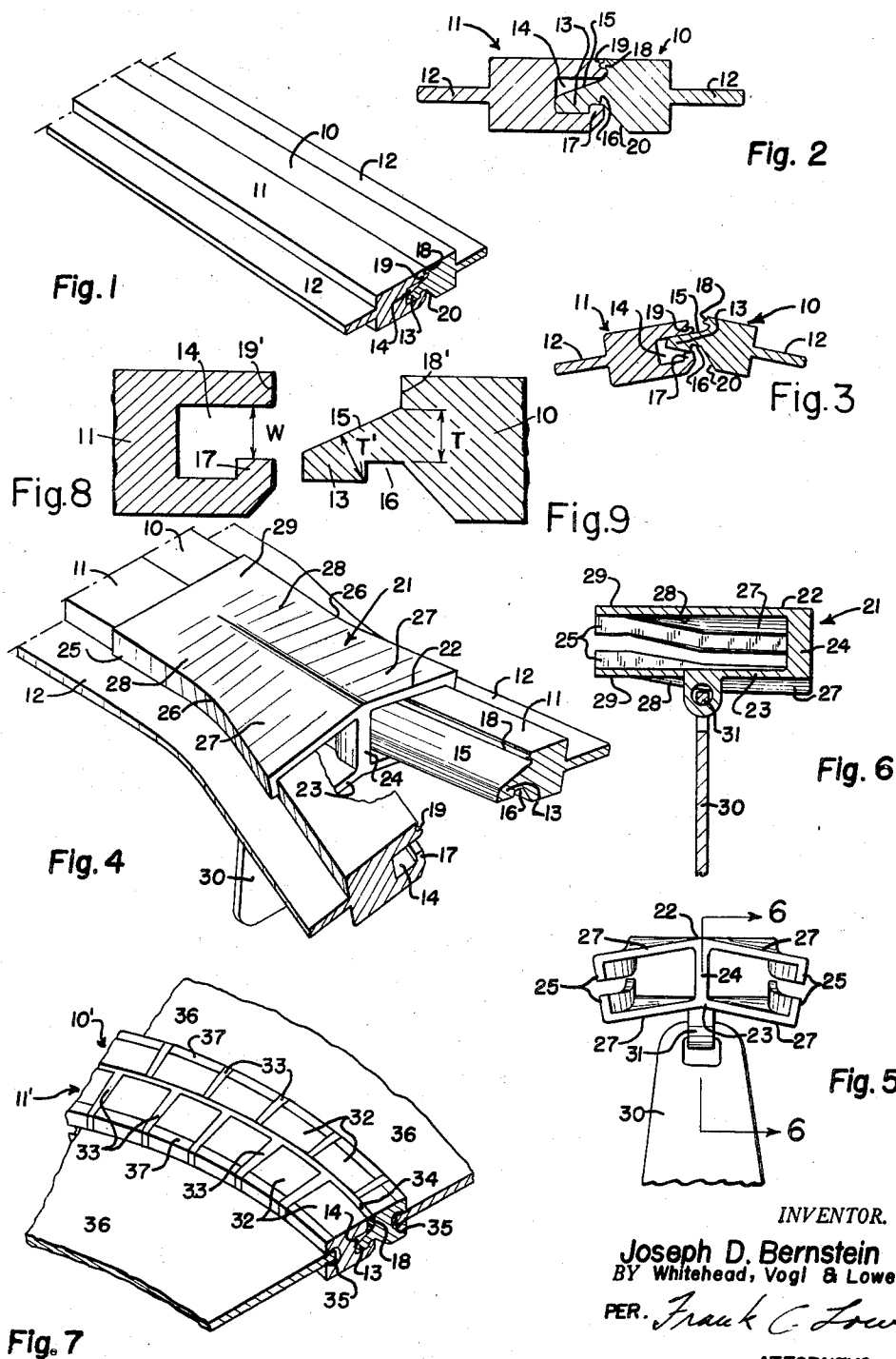
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SLIDE FASTENER

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SLIDE FASTENER

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This invention relates to slide fasteners for joining the confronting edges of cloth or the like, and more particularly to that class of slide fasteners which employ a pair of continuous inter-engageable strips as the fastening elements and the invention will be hereinafter referred to as a continuous-strip slide fastener.

The objects of the invention are to provide a novel and improved continuous-strip slide fastener which (a) forms a continuous, tight seam especially adapted for use as a weather-proof or leak-proof construction; (b) may be formed of substantially rigid materials, such as metal and hard plastics; (c) forms a very strong connection that will not ordinarily pull apart when the interlocked strips are under tension; (d) is especially adapted for the fastening of cloth tops of convertible type automobiles and the like which must be leakproof and which are subjected to considerable stress and tension; (e) incorporates positive, non-flexible interlocking between the interengageable faces of the strips; (f) incorporates in combination with a positive, non-flexible interlock an improved interlocking slide element, and (g) is a simply constructed, economical, positive, rugged and durable article.

With the foregoing and other objects in view, all of which more fully hereinafter appear, my invention comprises certain novel and improved constructions, combinations and arrangements of parts and elements as hereinafter described and as defined in the appended claims and illustrated in preferred embodiment in the accompanying drawing, in which:

Figure 1 is an isometric view of a portion of my improved continuous-strip like fastener with the elements thereof being interlocked and with the transverse end portion being shown in section;

Figure 2 is a transverse section of the slide fastener shown at Fig. 1, but on an enlarged scale;

Figure 3 is a transverse section similar to Fig. 2, but illustrating the strip elements as being twisted with respect to each other to a position for separating and disengaging, a partial separation being therein illustrated;

Figure 4 is an isometric view similar to Fig. 1, but on an enlarged scale and illustrating the strips as being opened by a slidable fastener constructed in accordance with the principles of the invention;

Figure 5 is an elevation view of the front of the slidable fastener per se.

Figure 6 is a transverse section of the fastener as viewed from the indicated line 6—6 at Fig. 5;

Figure 7 is a fragmentary isometric view of a portion of another form of continuous strip slide fastener constructed in accordance with the invention and showing the fastener as being connected with sheets of material.

Figure 8 is a fragmentary detail of a portion of the elements shown at Fig. 2 but on a greatly enlarged scale.

Figure 9 is another fragmentary detail of a portion of the elements shown at Fig. 2 but on a greatly enlarged scale, similar to Fig. 8.

The widespread popularity of metallic slide fasteners

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formed as strips of closely spaced projections or teeth which interlock with strips of opposing teeth has brought about a recognition of the great value of such fasteners. However, such fasteners have definite limitations and even shortcomings. When portions of fabric are lodged between the projections the movement of the slide is impaired and the fabric is often torn in an attempt to remove the fabric portions. More important is the fact that such fasteners are not water resistant and although shielding strips over the fasteners may be provided the construction is not altogether satisfactory.

An improvement over the tooth-type slide fastener is the continuous-strip construction which is generally formed of flexible plastic or rubber extruded strips with interlocking faces which mate when the strips are joined together. Such strips are essentially leak-proof under low pressure but have little connective strength and when the fabric they are connecting is under stress they easily pull apart. Such weakness is inherent in their construction because they must be of flexible construction material and the interlocking elements of the strips must be easily dilated in order to obtain the interlock.

With such in view, the present invention was conceived and developed to provide a continuous-strip slide fastener construction which is of comparatively rigid material and which may even be of metal for the interlocking elements need not dilate to obtain the interlock. The interlocking action is effected by torsional deflection of the strips as hereinafter described in detail.

Referring more particularly to the drawings, my improved slide fastener is formed as a male strip 10 and female strip 11 which join together at confronting faces as clearly illustrated in the drawing. Each strip is formed as a uniform cross section, and as such may be ideally manufactured by extruding process or the like. Each section includes a central body which is illustrated as being larger than it need be. Such body may be substantially rectangular in form as shown but may also be of any other desirable shape. A continuous tab 12 outstands from the outward sides of each body opposite the confronting connection faces and this tab 12 is adapted for connection with the joining faces with cloth sheets or the like, in any conventional manner. A tongue 13 outstands from the center of the inward confronting face of the male strip 10 and a channel 14 lies along the center of the opposing inward confronting face of the female strip and is adapted to receive the tongue 13. One side which may be referred to as the top surface 15, of the tongue 13 is sloped from a normal flat surface to provide a tapered construction while the opposite side or under surface of the tongue is notched at its base, at the confronting face, to form a slot 16. The tongue-receiving channel 14 is substantially rectangular in form having the same depth as the projection of the tongue, having the same width as the gross thickness of the tongue at its base and having an upturned lip 17 at the channel surface at the confronting face and along its lower edge which is adapted to fit into the slot 16 when the strips are engaged and interlocked in the normal position.

When so engaged the shoulder 18 of the male strip 10 above the edge of the tongue abuts against the opposing shoulder 19 of the female strip to provide a continuous sealing edge between the two strips and these shoulders 18 and 19 substantially define the contacting portions of the confronting faces of the strips 10 and 11. The surfaces at these shoulders may be flat as at 18' and 19' as illustrated at Figs. 8 and 9 but are preferably formed with longitudinal corrugations and grooves which mesh together in an arrangement such as illustrated at Figs. 1 to 4 to enhance the effectiveness of the sealing action.

When cloth or other sheet material is attached to the

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strips the strips connected together and the cloth held under tension with the strips in their normal position as illustrated at Fig. 2, the strips lie substantially flat and in a common plane and are positively interlocked. It is contemplated that the strips will be formed of a substantially rigid plastic material or even of metal and be sufficiently rigid so that they will not be pulled apart by a springing of the lip 17 from the slot 16. This is a novel concept since all conventional slide fasteners of the continuous strip type are formed of relatively flexible plastic materials which, by their very nature, must yield, and dilate for the interlocking and separating actions. In the present invention the separation of the substantially rigid strips 10 and 11 is effected by longitudinal rotation of one strip with respect to the other to the interrelatively rotated positions and in the manner clearly illustrated at Fig. 3. When so rotated, the inclined top face 15 of the tongue 13 is moved upwardly against the top of the slot and the notch 16 is lifted above and disengaged from the lip 17. The degree of twist necessary to effect such separation is dependent upon the proportions of the tongue, groove, slot and lip. To permit a free torsional movement of the male strip 10 with respect to the other strip 11, the shoulder 20 of the strip 10 below the tongue must be inclined sufficiently to provide for clearance and for purposes of illustration the inclination shown in the drawing is greater than need be. Any selected proportions may be predetermined by a skilled designer.

Figures 8 and 9 illustrate, diagrammatically, the necessary proportions of the tongue 13 and channel 14 which are required to effect a joining or release of the two strips 10 and 11 by their interrelative longitudinal rotation. The lip 17 decreases the width of the channel at its entrance at the confronting face 19' to an entrance width W, indicated at Fig. 8. The net thickness of the tongue at its base, which is the actual thickness because the gross or overall thickness is reduced by the depth of the slot 16, must be substantially the same as the channel entrance width W and this tongue thickness at its base at the confronting face 18', is indicated as T at Fig. 9. Moreover, to remove or insert the tongue into the channel 14 as by rotation and without distortion of the channel, it is essential that no other portion of the tongue thickness exceed the channel entrance width W, and the taper-forming top surface 15 must be such that the maximum tongue width T', which is adjacent to the outer edge of the slot as illustrated at Fig. 9 be no greater than the width W illustrated at Fig. 8.

In construction of a tapered tongue which is to be inserted into the channel 14 by rotation of the strips 10 and 11, it is further essential that the space within the channel be greater than the size of the tongue 13 to permit the tongue to be first inserted at an inclination and then to permit the tongue, by rotation to drop into locking position with the slot 16 over the lip 17, and while the channel is illustrated as being essentially rectangular, it is contemplated that other forms are also possible to accomplish this purpose.

It was discovered that a strip of plastic or metal which is substantially rigid in section will nevertheless rotate in an elastic manner and will bend or arch in an elastic manner in a substantial arc without permanently distorting the metal and without distorting the sectional form. It follows that a pair of strips 10 and 11 progressively joined together or separated in the manner of a slide fastener may be bending torsionally and rotating the strips with respect to each other. To facilitate such progressive connection and disconnection of the strips in this manner it was discovered that a fastener slide 21 could be formed whose general appearance and mode of operation was similar to that of conventional fastener slides but whose passageways therethrough were modified in accordance with the principles of the invention.

The fastener slide 21, illustrated at Figs. 4, 5, and 6,

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is formed in the general shape of a wedge-shaped box having the top section 22 and bottom section 23 interconnected by a divider strut 24 at one end thereof. The strips 10 and 11 extend through this box and are separated by the end of the strut and joined together at the opposite end. Each section 22 and 23 is formed with inturned edges 25 which are adapted to overlap each side of the bodies of strips 10 and 11 to embrace the bodies and lie against the faces of the lapping edges 12 in conventional manner. In plan the slide 21 arches inwardly as at 26 at an arc which permits a longitudinal flexing of the strips without their permanent distortion. For purposes of illustration, the arc 26 shown at Fig. 4 is sharper than would be normally desirable where metal strips are used to form the fastener.

This slide fastener is further formed with the strip openings at the separating end, at the divider 24, being inclined from a normal position to effect an interrelative twist of the strips to position them for insertion of the tongue into the slot 14, and this tilting is continued through a substantial portion of the slide body and until the elements come together at the arc 26. Beyond this point there is a warping of the surface of the slide as at 27 to effect a torsional movement of the strips into locking position and then a flat portion 29 at the end of the slide. In operation, this slide is similar to that of a conventional slide fastener, and a grasping tab 30 may be affixed to either side of the slide 21 as in an eye 31 affixed thereto to facilitate the pulling of the slide.

It is to be emphasized that strips of hard plastic or metallic material suitable for use as my slide fastener are substantially rigid and unyielding in cross section, but they are nevertheless longitudinally flexible and will bend and twist. This longitudinal flexure, bending and twisting, can be used to engage and separate the strips and actually may be accomplished in a comparatively short space along the strips. It is the purpose of the slide 21 to flex the strips at the slide by a longitudinal twist and bend, as illustrated at Fig. 4, sufficiently to permit interlocking of the tongue 13 into the channel 14 past the lip 17. Movement of the slide 21 along the strips 10 and 11 thereby effects a continuous longitudinal twisting and bending to completely connect or disconnect the strips depending upon the direction of movement of the slide.

The construction illustrated at Fig. 7 shows a modified form of the strips 10' and 11' where the tongue 13 and groove 14 are substantially the same in form as hereinbefore described, but the strip constructions are modified by forming the same as a series of metallic blocks 32 interconnected with rubber pads 33 to permit greater flexibility, and with a rubber sealing strip 34 at the shoulder 19 of the female strip effecting a tighter seal. In this construction, the lapping edges 12 are eliminated and sharp edged slots 35 are provided to grip the edges of a sheet 36 upon which the apparatus is fastened, the gripping being effected by pressing the edges of the slots 35 together as at 37 in a manner similar to the attachment of the analogous toothed elements of conventional slide fasteners upon a cloth strip.

While I have described and illustrated my invention in detail, it is obvious that others skilled in the art, can devise and make equivalent and alternate forms and constructions which are within the spirit and scope of my invention; hence it is my desire that my invention be limited, not by the construction illustrated and described, but only by the proper scope of the appended claims.

I claim:

1. A continuous strip fastener including a pair of substantially-rigid torsionally-elastic strips having connectible confronting faces, a tongue outstanding from the confronting face of one strip and a tongue-receiving channel in the confronting face of the other strip, said tongue being tapered and having a slot in one side at its base, said channel having a lip at its entrance at the side ad-

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5 adjacent to the tongue slot and being adapted to be lockingly inserted into the slot when the strips are engaged with the tongue in the channel, the thickness of the tongue at its base at the slot being substantially the same as the width of the channel entrance at the lip and the taper of the tongue being such as to reduce its thickness beyond the slot to a thickness no greater than the width of the channel entrance at the lip, and the width of the channel beyond the entrance being sufficiently greater than the thickness of the tongue whereby to permit the tongue 10 when inserted into the channel to shift and move the lip into and out of engagement with the slot when the strips are interrelatively rotated about their longitudinal axes.

2. The slide fastener defined in claim 1 wherein said confronting faces form shoulders at the side of the tongue and of the channel opposite the lip and slot, which contact 15 each other with the strips confrontingly joined.

3. The slide fastener defined in claim 2, wherein said shoulders are matingly corrugated.

4. The slide fastener defined in claim 1 wherein the channel is substantially rectangular and the tongue is tapered at the side opposite the channel at an inclination which permits disengagement of said lip from the slot with the tapered surface rotated against the side of the groove. 20

5. A continuous strip slide fastener of the type which includes a pair of longitudinally extended strips having connectible confronting faces and which lie in a common plane when the faces are interconnected, a tongue projecting from the face of one strip and a channel in the face of the other strip adapted to receive the tongue, a slot in one side of the tongue, at the base thereof, adjacent 25

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to the face, and a lip in the corresponding side of the channel at the entrance thereof adjacent to the face adapted to lockingly engage the slot when the tongue is within the channel, and the strips are interconnected and 5 lie in said common plane, said tongue being tapered from its base with the thickness of the tongue portion outstanding beyond the base slot being not greater than the thickness of the tongue portion at the base of the tongue at the slot, said channel width at the lip being substantially 10 the same as the tongue base thickness at the slot and the inside width of the channel being greater than the size of the tongue whereby to permit the strips to rotate about a longitudinal axis with respect to each other and thereby to rotate the tongue within the channel to a position 15 where the lip portion may move into and out of the slot and the tongue portion outstanding beyond the slot may move past the channel at the lip for separation and interconnection of the strips without distortion and dilation of the channel.

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