

Jan. 13, 1959

K. J. STALLER ET AL

2,867,877

SLIDER FOR SLIDE FASTENERS

Filed Nov. 20, 1953

2 Sheets-Sheet 1

FIG 1

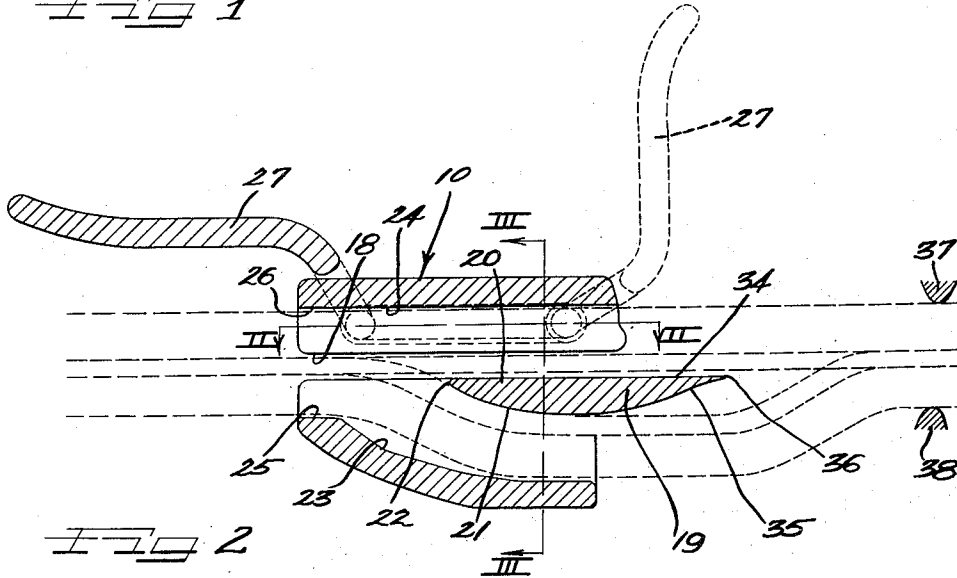


FIG 2

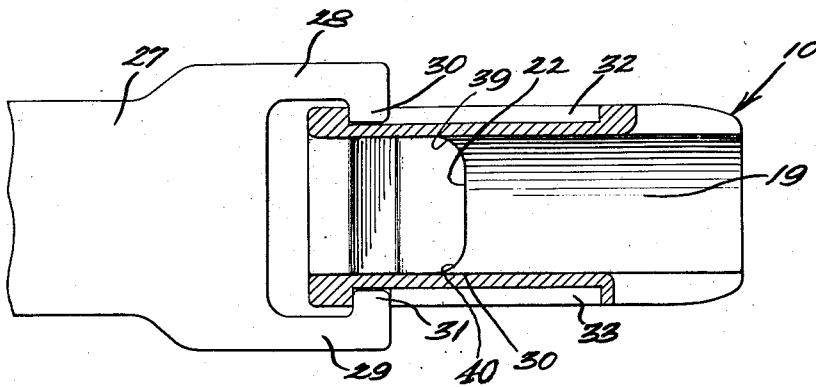
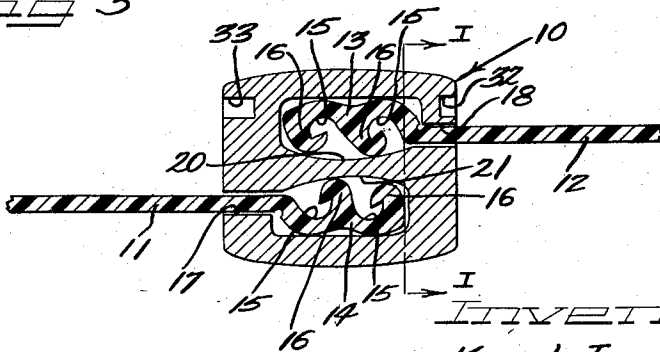


FIG 3



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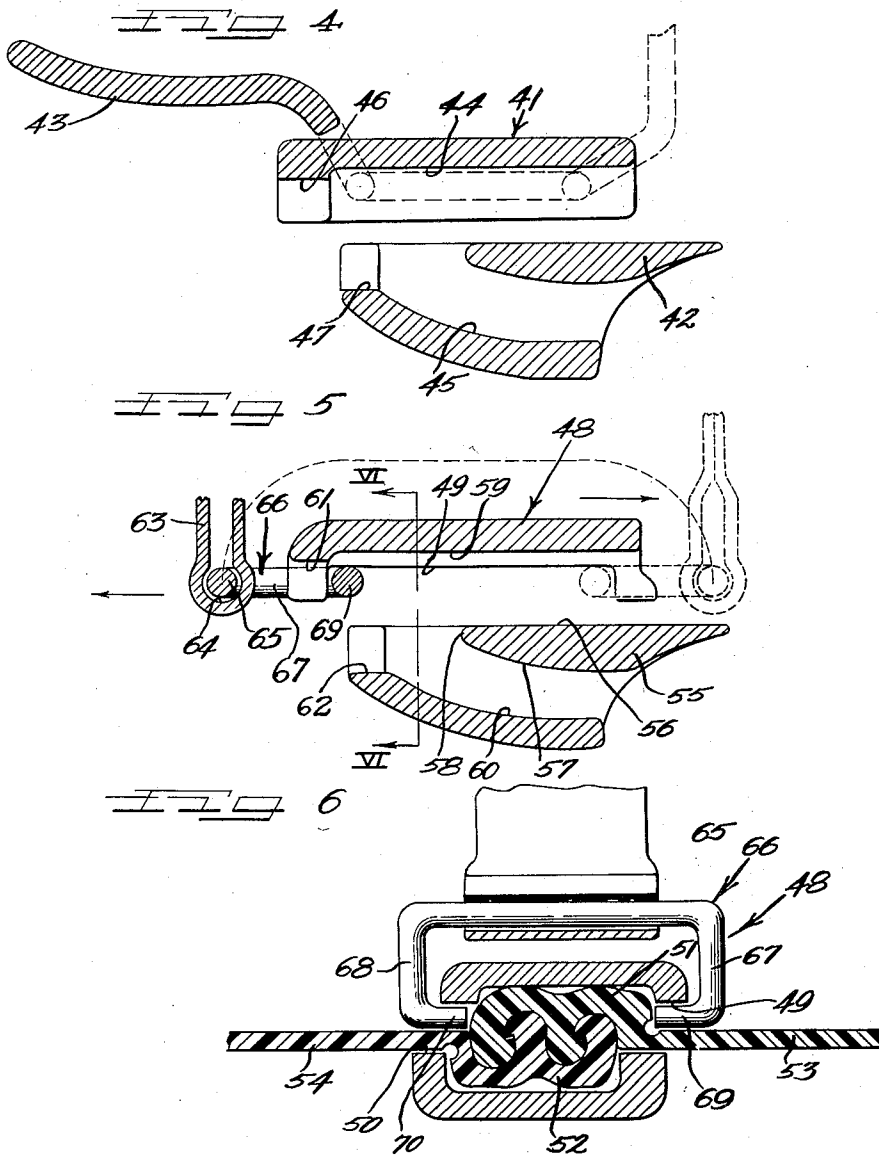
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SLIDER FOR SLIDE FASTENERS

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Application November 20, 1953, Serial No. 393,352

4 Claims. (Cl. 24—201)

This invention relates to a slider for slide fasteners and more particularly to a slider so constructed as to engage and disengage slide fastener members with minimum friction and binding action between the slider and the slide fastener members.

The slider of this invention constitutes an improvement over the slider disclosed in our copending application entitled "Slider for Slide Fasteners," filed February 8, 1952, U. S. Serial No. 270,682, now Patent No. 2,736,079 issued February 28, 1956, and is of the type having slots in opposite sides thereof for receiving overlapping marginal portions of a pair of flexible slide fastener members, the slots defining therebetween a connecting bridge having convergent surfaces for wedging between and disengaging the marginal portions of the slide fastener members.

The overlapping marginal portions of the slide fastener members may have alternate elongated channels and projections which interlock when the marginal portions of the two flexible members are pressed together, or they may have interlockable projections spaced therealong. The principles of this invention may also be applied to other types of slide fasteners.

It has been discovered that in order to engage and disengage the slide fastener members with minimum friction and binding action between the slider and the slide fastener members, the retarding forces exerted between the slider and the slide fastener members should be balanced with respect to the actuating force applied to the slider in a manner such that there is no tendency to tilt the slider about a transverse axis. It has further been discovered that in order to avoid such tilting of the slider, the actuating force applied to the slider in rearward movement thereof, in which movement the rearward portion of the bridge wedges between and separates the marginal edges of the slide fastener members, should be applied as far rearwardly of the bridge as possible while in the forward movement of the slider, the actuating force should be applied as far forwardly as possible.

According to an important feature of the invention, therefore, the actuating means for the slider is arranged to act at a point spaced forwardly from the rearward end portion of the bridge to move the slider in the forward direction and is arranged to act at a point spaced rearwardly from the rearward end portion of the bridge to move the slider in the rearward direction.

Another discovery on which the present invention is based is that tilting of the slider may be minimized by applying the rearward actuating force along a line which bisects the angle between the converging surfaces of the bridge. In the symmetrically constructed sliders heretofore employed such as, for example, the slider disclosed in our above identified copending application, a line bisecting the angle between the converging surfaces of the bridge is approximately parallel to and midway between the oppositely facing outer surfaces of the marginal edge portions of the slide fastener members. It is, of course, impossible to apply a force along such a line.

According to another highly important feature of this

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invention, one of the convergent surfaces of the bridge is inclined at a greater angle to the path of travel of the slider than the other of the convergent surfaces, so that a line bisecting the angle between the convergent surfaces is at an angle to the path of travel of the slider and it is possible to apply an actuating force approximately along such a line. The actuating means should, as will be appreciated, act on the side of the slider which is adjacent the convergent surface of the bridge having a lesser angle of inclination relative to the path of travel of the slider.

A further discovery on which the present invention is based relates to the application of forces in the forward movement of the slider. In the forward movement, of course, facing convergent surfaces engage oppositely facing surfaces of the marginal edge portions of the slide fastener member to urge the marginal portions into interlocking engagement. In sliders of symmetrical design heretofore used, such as, for example, the slider disclosed in our above-identified copending application, the facing convergent surfaces are at the same angle to the path of travel of the slider. In order to prevent tilting movement of the slider with such symmetrical constructions, the forward actuating force should be applied along a line parallel to and midway between the oppositely facing surfaces of the marginal edge portions of the slide fastener members. It would not be possible to apply a force in such a direction using actuating means located on only one side of the slider.

According to this invention, one of the facing convergent surfaces is at a greater angle to the path of travel of the slider than the other of the convergent surfaces which, in itself, would tend to produce a tilting movement of the slider. However, the actuating means is disposed on the side of the slider opposite the convergent surface having the greater inclination to the path of travel of the slider and the actuating force counteracts the tilting tendency of the slider so that the slider may be moved along without tilting.

According to a further feature of the invention, the feature in which one of the convergent surfaces of the bridge is at a greater angle to the path of travel of the slider than the other and the feature in which one of the facing convergent surfaces of the slider is at a greater angle to the path of travel of the slider than the other are combined in a single slider so that the tendency of the slider to tilt will be minimized in both the forward and rearward travel thereof. With this feature, also, both the bridge and the convergent facing surfaces may be defined by slots extending inwardly from opposite sides of the slider with the facing convergent surfaces and the opposed convergent surfaces of the bridge in complementary relation.

Most preferably, the surfaces having the lesser inclination to the path of travel of the slider may be straight and at no inclination to the path of travel, but parallel thereto, so that one of the slots may be straight while the other is curved. With this feature, of course, the manufacture of the slider is greatly simplified.

In conjunction with the feature in which one of each pair of convergent surfaces is at a greater angle to the path of travel of the slider than the other, the actuating means is preferably arranged to act at a point spaced forwardly from the rearward end portion of the bridge to move the slider in the forward direction and is arranged to act at a point spaced rearwardly from the rearward end portion of the bridge to move the slider in the rearward direction. With this combination, an actual balance between the actuating forces applied to the slider and the retarding forces arising from inner engagement of the slider with the slide fastener members can be achieved

so that there is no tendency of the slider to tilt in either the forward or rearward movements thereof.

The facing convergent surfaces arranged to force the marginal edge portions of the slide fastener members into interlocking engagement on forward movement of the slider preferably have rearward end portions spaced transversely to the direction of travel of the slider a distance equal to the distance between the oppositely facing surfaces of the marginal edge portions when they are in interlocked relation, so as to insure such interlocking engagement of the marginal edge portions. According to a further important feature of the invention, the rearward end portion of one of the convergent facing surfaces is spaced forwardly relative to the other. This, in itself, promotes a tilting tendency of the slider which may be counteracted by locating the actuating means on the side of the slider opposite the surface having the forwardly disposed rearward end portion, so that the end effect is that the slider is not tilted when actuated in the forward direction.

This forward spacing of the rearward end portion of one of the convergent surfaces may be utilized alone to produce an appropriate tilting tendency of the slider or it may be used in conjunction with the feature in which one of the facing convergent surfaces is at a greater angle to the path of travel of the slider than the other. Most preferably, a combination of the two features is employed.

In accordance with a still further important feature of the invention, at least one and preferably both surfaces of the bridge are concave so as to tend to center the marginal edge portions of the slide fastener members in the slider and to resist any tendency of the slide fastener members to move laterally relative to the slider.

A still further feature of the invention is in making the rearward edge of the bridge concave by which feature the bridge is heavier at the point of connection thereto to the portions of the slider on opposite sides of the bridge. By this feature, accordingly, the bridge may be stronger without necessitating any increase in the thickness thereof or any increase in the angle between the converging surfaces thereon and, conversely, the angle between the converging surfaces and/or the thickness of the bridge may be decreased without decreasing the strength of the bridge.

In one preferred embodiment, the actuating means for the slider may comprise a handle having spaced parallel legs with the terminal ends of the legs turned inwardly and engaged in slots at opposite sides of the slider for sliding movement between points spaced rearwardly and forwardly of the rearward edge of the bridge. As an alternative, a link may be pivotally secured to a handle with the link having spaced parallel legs with the terminal ends of the legs turned inwardly and engaged in slots in opposite sides of the slider.

In another preferred embodiment of the actuating means, the in-turned ends of the legs of the handle, or of a link such as described above, may be engaged in the same slots in which the overlapping marginal portions of the slide fastener members extend, the slots being suitably enlarged at the sides of the slider for this purpose. With this construction, the formation of the slider is simplified since no special or auxiliary slots are required for the actuating means. Further, this construction has the advantage in that the actuating means acts at points very close to the surfaces of the slide fastener members so that only slight tilting tendencies are produced by the actuating means and the angles of inclination of the convergent surfaces of the slider and/or the forward spacing of the rearward end portion of one facing convergent surface relative to the other may be at a minimum and yet balance such a slight tilting tendency, thereby to achieve smooth operation of the slider.

An object of this invention, accordingly, is to provide an improved slider for effecting smooth engagement and

disengagement of the marginal edge portions of slide fastener members with minimum friction and binding action between the slider and such marginal portions.

Another object of the present invention is to provide an improved slider for slide fasteners which is simple, compact and readily constructed and yet strong, durable and highly efficient in operation.

A more specific object of the present invention is to provide an improved slider including actuating means acting on one side of the slider with the slider so constructed as to balance the tendency of the actuating means to tilt the slider so that the slider may be actuated without tilting.

Still another specific object of the invention is to provide a slider for engaging and disengaging overlapping marginal portions of a pair of flexible slide fastener members with an improved connecting bridge portion for wedging between and separating the marginal edge portions of the flexible slide fastener members.

A still further specific object of this invention is to provide improved actuating means for a slider for slide fasteners and an improved connection between such actuating means and the slider.

This invention contemplates other objects, features and advantages which will become more fully apparent from the following detailed description taken in conjunction with the accompanying drawings which illustrate preferred embodiments and in which:

Figure 1 is a longitudinal vertical sectional view through one preferred form of slider constructed according to the principles of this invention;

Figure 2 is a horizontal sectional view taken substantially along line II—II of Figure 1;

Figure 3 is a transverse vertical sectional view taken substantially along lines III—III of Figure 1;

Figure 4 is a longitudinal vertical sectional view through another preferred form of slider constructed according to the principles of this invention;

Figure 5 is a longitudinal vertical sectional view of still another preferred form of slider constructed according to the principles of this invention; and

Figure 6 is a transverse vertical sectional view taken substantially along lines VI—VI of Figure 5.

Reference numeral 10 generally designates one preferred form of slider constructed according to the principles of this invention. The slider 10 is particularly adapted for use with a slide fastener comprising a pair of flexible members 11 and 12 having respectively overlapping marginal portions 13 and 14 which may be provided with alternate longitudinal channels 15 and ribs 16 which interlock to secure the marginal edge portions 13 and 14 together, when they are pressed into engagement.

It will, of course, be understood that the slider 10 may be used to engage and disengage other types of slide fasteners including, for example, slide fasteners comprising flexible members having interlocking projections spaced longitudinally along overlapping marginal portions thereof.

The slider 10 is arranged to move longitudinally along the marginal portions 13 and 14 to engage the same when moved in a forward direction (to the right in Figure 1) and to disengage the same when moved in a rearward direction (to the left in Figure 1). The slider 10 is provided with slots 17 and 18 in opposite sides thereof which may be internally enlarged to interlockingly receive the overlapping marginal portions 13 and 14 of the illustrated slide fastener which are thicker than the adjoining portions of the flexible slide fastener members 11 and 12. The slots 17 and 18 are coextensive at the rearward end of the slider 10 but at the forward end of the slider 10 they define therebetween a connecting bridge 19 which in operation is positioned between the overlapping marginal portions 13 and 14.

The bridge 19 at its rearward end has opposite surfaces 20 and 21 converging to the rearward edge 22 thereof and

arranged to wedge between and separate the marginal portions 13 and 14 when the slider is moved in a rearward direction (to the left in Figure 1).

For engaging the marginal portions 13 and 14, the slots 17 and 18 have facing convergent surfaces 23 and 24 for camming the marginal portions 13 and 14 into engagement when the slider is moved in a forward direction (to the right in Figure 1). To insure interlocking engagement between the marginal portions 13 and 14, the facing convergent surfaces 23 and 24 have rearward end portions 25 and 26, respectively, which are spaced apart a distance equal to the distance between the oppositely facing surfaces of the marginal edge portions 13 and 14 when they are in interlocked relation, it being understood that the term "equal" as used herein means approximately or substantially equal.

It has been discovered that the slider 10 will engage and disengage the marginal portions 13 and 14 most smoothly and with minimum actuating force when the slider is not tilted about a transverse axis so as to minimize frictional and binding engagement between the slider and the slide fastener members.

According to this invention, the tendency of the slider to tilt is minimized by the provision of actuating means acting at a point spaced rearwardly of the rearward edge 22 of the bridge when the slider is actuated in a rearward direction and acting at a point spaced forwardly of the rearward edge 22 of the bridge when the slider is actuated in a forward direction. This actuating means may preferably take the form of a handle 27 having parallel leg portions 28 and 29, the terminal ends of the leg portions 28 and 29 being turned inwardly at 30 and 31 and engaged in slots 32 and 33 in the opposite sides of the body of the slider 10. The slots 32 and 33 are preferably straight and extend longitudinally between points spaced forwardly and rearwardly of the rearward edge 22 of the bridge 19.

It has been further discovered that the tendency of the slider to tilt about a transverse axis is minimized when the rearward actuating force is applied as nearly as possible along a line bisecting the angle between the convergent surfaces of the bridge. In symmetrically constructed sliders previously used such as, for example, the slider disclosed in our copending application entitled "Slider for Slide Fasteners," filed February 8, 1952, U. S. Serial No. 270,682, the line bisecting the angle between the convergent surfaces of the bridge is parallel to and midway between the oppositely facing surfaces of the marginal edge portions of the slide fastener members and it is not physically possible to exert a force along such a line, unless the actuating means act on both sides of the slider with the forces applied to the actuating means being balanced. An actuating means operating on both sides of the slider would, of course, be undesirable in almost every practical application.

According to this invention, one of the convergent surfaces of the bridge, in this case the surface 21, is inclined at a greater angle to the path of travel of the slider than the other surface, in this case the surface 20, and the actuating means acts on the side of the slider adjacent the other of the surfaces 20. With this asymmetrical disposition of the surfaces, the effect of the engagement between the surfaces and the marginal edge portions 13 and 14 of the slide fastener members 11 and 12 is to tend to tilt the slider 10 about a transverse axis when the slider is moved in a rearward direction. This effect is, however, balanced by the actuating means which because it is located on one side of the slider tends to tilt the slider in a reverse direction. Accordingly, the tendency of the slider to tilt when moved in a rearward direction is minimized.

It has also been discovered that with symmetrically constructed sliders, in which the facing convergent surfaces for engaging the slide fastener members are disposed at equal inclinations through the path of travel of

the slider, the forward actuating force should be applied along a median line parallel to the path of travel of the slider. This is not physically possible unless actuating means are disposed on both sides of the slider and such would, of course, be undesirable in most practical applications.

According to this invention, one of the convergent facing surfaces of the slider, in this case the surface 23, is disposed at a greater angle to the path of travel of the slider than the facing convergent surface, in this case the surface 24, and the actuating means is disposed on the side of the slider opposite the surface 23 having the greater inclination to the path of travel of the slider. In operation, when the slider is moved in a forward direction, the effect of the engagement between the surface 23 and the marginal edge portion 14 is to tend to tilt the slider about a transverse axis (in a clockwise direction in Figure 1). This effect is balanced by the actuating handle 27 which, being located on only one side of the slider, tends to tilt the slider in a reverse direction (counterclockwise in Figure 1).

The feature in which the surfaces 21 and 23 are at greater angles to the path of travel of the slider than the surfaces 20 and 24 may preferably be combined in the manner as illustrated with the surfaces 21 and 23 and with the surfaces 20 and 24 being complementary. Most preferably, the surfaces 20 and 24 may be straight with only the surfaces 21 and 23 curved, the surfaces 20 and 24 then being parallel to the path of travel of the slider 10. This, of course, simplifies the construction of the slider and it also simplifies the connection between the slider and the actuating means 27, since the slots 32 and 33 may then be parallel with the surfaces 20 and 24. Further, it may be noted that with a straight and curved formation of the slots 17 and 18 as illustrated, only the marginal edge portion 14 is deformed on forward and rearward movement of the slider. Accordingly, the marginal portion 13 may be relatively rigid which may be desirable in many applications.

According to a further important feature of the invention, at least one and preferably both surfaces 20 and 21 of the bridge 19 are concave about axes parallel to the path of movement of the slider, as illustrated best in Figure 3, so as to resist lateral displacement of the marginal portions 13 and 14 relative to the slider and so as to tend to center the slider relative to the marginal portions 13 and 14. The provision of such concave surfaces has a further advantage in that the bridge more securely connects the opposite portions of the slider without increasing the weight thereof and without increasing the effective operative thickness of the bridge. Conversely, the bridge may be made thinner without decreasing the strength thereof by the provision of such concave surfaces. It is, of course, highly desirable to have the bridge as thin as possible commensurate with strength requirements, since the rearward actuating force is directly dependent upon the thickness of the bridge.

At its forward end portion, the bridge 19 preferably has opposed surfaces 34 and 35 converging to a forward edge 36 so as to define a wedge for engagement between the marginal portions 13 and 14 when the slider 10 is moved to the limit of its forward movement for watertight and air-tight engagement, the ends of the marginal portions 13 and 14 being secured together as between points 37 and 38.

The surfaces 34 and 35, of course, form continuations of the surfaces 20 and 21, respectively, and may be concave in the same manner as illustrated in Figure 3.

According to a further feature of the invention, the rearward edge 22 of the bridge 19 may be concave as illustrated in Figure 2 so as to be heavier at points 39 and 40 where it connects the opposite portions of the slider so that the thickness of the bridge and the angle between the converging surfaces thereof may be decreased without decreasing the strength thereof or, conversely, the

connecting bridge may be stronger without increasing the thickness thereof or the angle between the converging surfaces thereof. It may be noted that the feature in which the rearward edge 22 of the bridge is concave is advantageous in combination with the feature in which the converging surfaces 20 and 21 thereof are concave since by making the converging surfaces 20 and 21 concave, the forward edge 22 will naturally be concave.

In Figure 4, reference numeral 41 generally designates another preferred form of slider constructed according to the principles of this invention which may comprise a bridge 42 similar to the bridge 19 of the slider 10 above described and a handle 43 similar to the handle 27 in the slider 10 above described and connected to the slider body in a similar manner.

In the slider 41 facing convergent surfaces 44 and 45 which have rearward end portions 46 and 47, respectively, spaced in a direction transverse to the direction of movement of the slider a distance equal to the distance between the oppositely facing surfaces of the marginal portions of the slide fastener members when they are in interlocked relation, it being understood that the term "equal" as used herein means substantially or approximately equal.

According to this invention, one of the rearward end portions, in this case the rearward end portion 47, is spaced forwardly from the other rearward end portion, in this case the rearward end portion 46. This structure produces a force tending to tilt the slider about a transverse axis as it is moved in a forward direction which force may be balanced by the actuating means located on the side of the slider opposite the forwardly spaced rearward end portion 47. This feature may be used in conjunction with a slider which is otherwise symmetrically constructed but is preferably employed with an asymmetrical design as illustrated in which the surface 45 is inclined at a greater angle than the surface 44 relative to the path of travel of the slider. With a combination of the two features, the angle of inclination of the surface 45 need not be as great as otherwise so that the slider may be operated with less forward actuating force.

In Figures 5 and 6, reference numeral 48 generally designates another preferred form of slider embodying further features of the present invention. The slider 48 is provided with slots 49 and 50 extending inwardly from opposite sides thereof and internally enlarged to receive overlapping marginal portions 51 and 52 of flexible slide fastener members 53 and 54, the slots 49 and 50 defining therebetween a bridge 55 similar to the bridge 19 of the slider 10 above described and having surfaces 56 and 57, preferably concave, converging to a rearward edge 58 which is also preferably concave. The slots 49 and 50 also define facing convergent surfaces 59 and 60 which may preferably have rearward end portions 61 and 62, respectively spaced apart in a direction transverse to the direction of travel of the slider a distance equal to the distance between the oppositely facing surfaces of the overlapping interlockable marginal portions 51 and 52 with the rearward edge portion 62 spaced forwardly from the rearward edge portion 61, this construction being like that described above in connection with Figure 4.

According to a further important feature of the invention, the actuating means for the slider 48 comprises a handle member 63 which is formed to provide a suitable aperture 64 for pivotally receiving a bight portion 65 of a generally U-shaped link member 66 having generally parallel leg portions 67 and 68 which, in turn, have inwardly turned terminal end portions 69 and 70, respectively. The link member 66 is movable longitudinally relative to the slider between points spaced forwardly and rearwardly of the rearward edge portion 58 of the bridge 55 so as to minimize tilting of the slider 48. The actuating means of the slider 48, as thus far described, has a distinct advantage over that illustrated and described in conjunction with the slider 10 of Figures 1-3, because there

is considerably less tendency for the operator of the slider to attempt to effect tilting action of the slider in operation thereof. However, it might be noted that the actuating means of the slider 10 as above described has the advantage of being simpler to construct and if the slider is not preferably balanced, the operator, if skillful, can counterbalance any tilting tendency by appropriate handling of the actuating means.

According to a further feature of the invention, the in-turned ends 69 and 70 are engaged in the slots 49 and 50 which receive the marginal edge portions 51 and 52 of the flexible slide fastener members 53 and 54, the slots 49 and 50 being suitably enlarged at the sides of the slider for this purpose. The upper edge of the slot 50 may be parallel to the upper edge of the slot 49 but preferably is curved toward parallel relation to the surfaces 57, 60.

This construction has the distinct advantage of simplifying the construction of the slider and has the further advantage that the forward and rearward actuating forces may be applied along lines very close to the median plane of the slide fastener members so that the asymmetrical design of the slider need counteract only a slight tilting tendency arising from the actuating means.

It will be apparent that the handle 27 might be used in conjunction with the slider 48 in place of the handle 63 and the link member 66 with the in-turned ends 30 and 31 engaged in the slots 49 and 50.

It will be understood that modifications and variations may be effected without departing from the spirit and scope of the novel concepts of the present invention.

We claim as our invention:

1. A slider having a straight slot and a curved slot in opposite sides thereof defining therebetween a connecting bridge having concave surfaces respectively parallel to said straight and curved slots and converging to a concave rearward edge, the rearward end portion of said curved slot being spaced forwardly from the rearward end portion of said straight slot, a handle on the same side of the slider as said straight slot, and a link pivotally connected to said handle and having ends projecting into said slots for sliding movement between points spaced forwardly and rearwardly of said rearward edge of said bridge.

2. In a slider for a pair of flexible slide fastener members with overlapping marginal portions having upstanding interlockable projections therealong, a bridge positioned between said marginal portions and having convergent surfaces for wedging between and separating said marginal portions, one of said surfaces being parallel to the path of travel of the slider along said marginal portions, and actuating means acting at the side of said slider adjacent said one of said surfaces.

3. In a slider for a pair of flexible slide fastener members with overlapping marginal portions having upstanding interlockable projections therealong, means for guiding said marginal portions into interlocking engagement on forward movement of the slider therealong, a bridge positioned between said marginal portions and including a rearward end portion having convergent surfaces for wedging between and separating said marginal portions on rearward movement of said slider, one of said surfaces being inclined at a greater angle to the path of travel of the slider along said marginal portions than the other of said surfaces, and actuating means at the side of said slider adjacent said other of said surfaces and arranged to act at a point spaced forwardly from said rearward end portion of said bridge to move the slider in the forward direction and at a point spaced rearwardly from said rearward end portion of said bridge to move the slider in a rearward direction.

4. In a slider for a pair of flexible slide fastener members with overlapping marginal portions having upstanding interlockable projections therealong, means for guiding said marginal portions into interlocking engagement on forward movement of the slider therealong comprising facing surfaces converging to a rearward end portions

spaced transversely to the direction of travel of the slider a distance equal to the distance between the oppositely facing surfaces of said marginal edge portions when they are in interlocked relation, one of said rearward end portions being spaced forwardly relative to the other, and actuating means on the side of the slider opposite said one of said rearward end portions.

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