

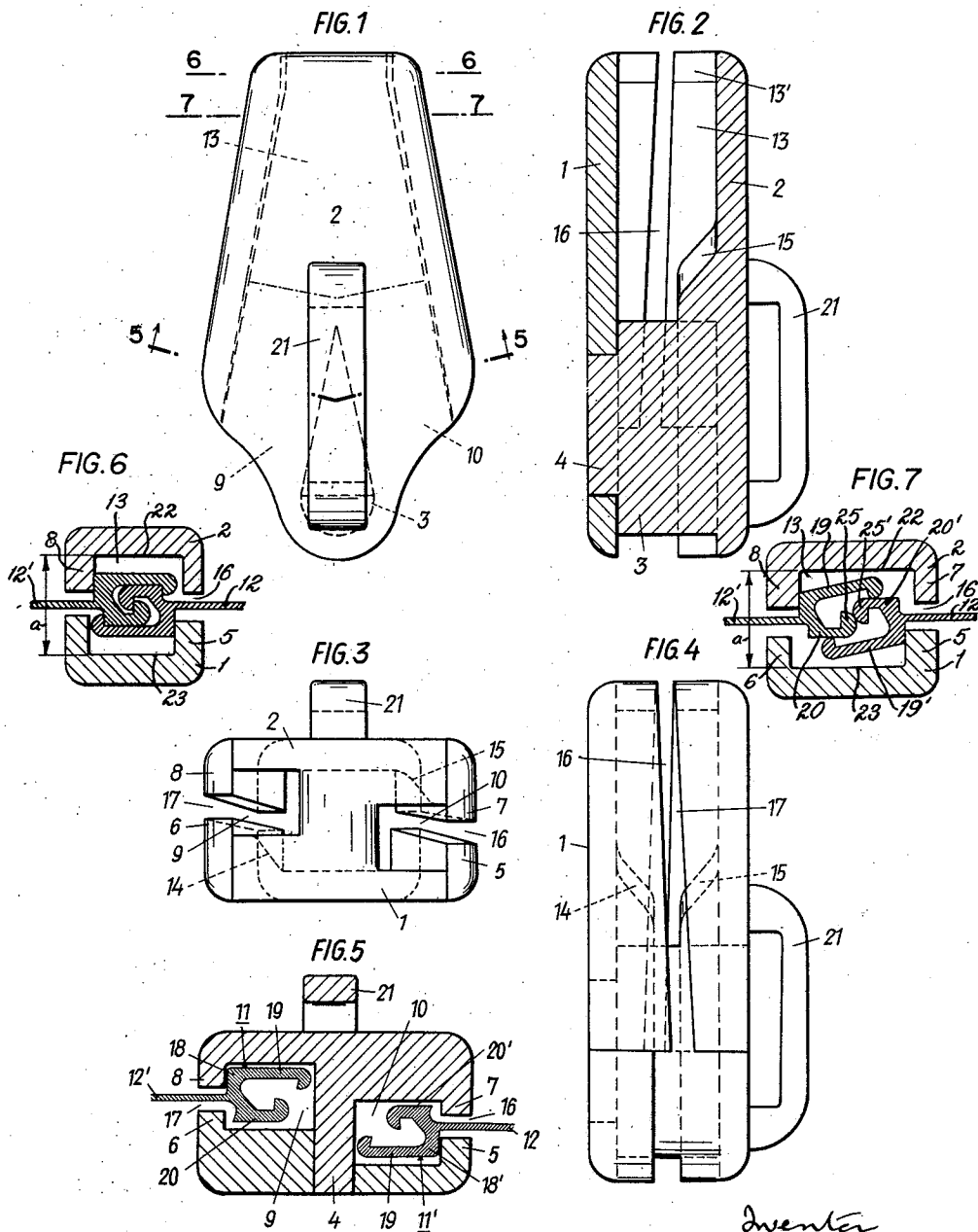
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SLIDER FOR SLIDE FASTENER

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1

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SLIDER FOR SLIDE FASTENER

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The invention relates to a slide for a slide fastener of plastic, e.g. thermoplastic material, comprising a profiled border of a clutch strip engaging a correspondingly profiled border of a counter-clutch strip, the clutch strips engaging and disengaging essentially in parallel relation to the principal plane of the slide fastener. In a manner known per se, said slide comprises a guide channel for each of the profiled borders converging at an acute angle to form a single guide channel in which the profiled borders are engaged or disengaged or closed.

In slides of conventional design the profiled borders are closed in such a way that at least one of the profiled borders is opened by means of an auxiliary device to such an extent that the counter-profiled border can be easily inserted, whereupon both profiled borders are engaged and closed again. For the purpose of expanding the profiled borders the interior of conventional slides presents wedge-formed elements or keyways or else the two guide channels converging at an acute angle are so shaped at their very entrance that one of the profiled borders or both enter the slide in opened condition already. The disadvantage of the conventional slides of this type resides in the fact that the slides are hard to pull or push and the profiled borders are frequently damaged as a result of which the slide fastener becomes unserviceable.

The basic idea of the invention is the realization that the difficulty is not due to an inevitably large amount of friction between the slide and the profiled borders but that principally, the opening and closing of the profiled borders by the slide produces substantial resistance. In fact, not only is an effort required to open and close the profiles, but a considerable amount of friction is caused by the opening and closing operation due to the sizeable pressure applied.

According to the invention it is proposed to encompass the profiled borders in their normal position loosely by means of the guide channels converging at an acute angle and providing sufficient clearance in the area of convergence in perpendicular relation to the central plane of the slide fastener, so that the profiled borders are free to perform the closing operation and in particular, the preceding opening motion. In accordance with the basic idea thus put into practice the two profiled borders inside the slide are essentially moved in relation to each other in their normal position only and in approximately parallel relation to the principal plane of the slide fastener. In the area of convergence of the two guide channels where the profiled borders are opened and closed, the two profiled borders are merely pressed against each other, sufficient clearance being provided in perpendicular relation to the plane of the slide fastener, so that the reciprocal opening of the profiled legs can proceed unimpeded, the profiles being opened to such an extent only that introduction is possible and besides, no additional frictional forces are produced because the profiled borders are compressed inwardly from the outside in the plane of the slide fastener only, for which only minor forces are required. Practical tests performed with such a slide go to show that the opening and closing of the slide requires a negligible effort only so that the slide can easily be moved with two fingers. Obviously also, damage to the profiled borders

2

will be avoided as a result of the ease with which the opening and closing motion of the slide is performed.

According to another feature of the invention, a particularly practical embodiment can be obtained by the fact that the two guide channels converging at an acute angle on the one hand and the guide channel in which the profiled borders engage or disengage or are closed on the other hand, are of approximately constant height each. The difference in height thus produced is eliminated by a step on each side or by progressive transition in the area of convergence of the channels. This slide is comparatively easy to produce because the cores are of simple formation. The cross-section for the guide channel of the closed profiled borders will be comparatively large because its size is the same as that of the element on which the opening and closing motion is performed and in which a larger clearance must therefore be provided in perpendicular relation to the plane of the slide fastener. According to another feature of the invention, the cross-section of the guide channel portion for the closed profiled borders may be only slightly larger than the cross-section of the closed profiled borders themselves, which offers the advantage of compressing and securing the closed profiled borders additionally by means of the slide.

In a further embodiment of the invention, on each narrow side of the slide one of the two lateral surfaces located on both sides of the slotted openings for the fastening webs of the clutch strips is slightly protruding inwardly as compared with the other lateral surface. Thus the friction surfaces, already considerably reduced as compared with slides of conventional design, are reduced to the very minimum. The lateral slotted openings for the fastening webs of the clutch strips can be made to taper off in the direction of the exit of the closed profiles in order to correspond to the comparatively large clearance of the separate profiled borders. The height of the slotted openings should be such that in any position within the clearance provided, the profiled borders pass freely through the slots, thereby eliminating additional friction in that place.

In the case of profiled borders having identical cross-sections and two legs of different length with hooked lugs facing each other it is preferable to have the inwardly protruding lateral guide surfaces engage the longer legs of the profiles. Thus the shorter legs which are encompassed by the longer legs are kept sufficiently far away from the outer guide surfaces so that this encompassing action is easily possible without additional friction being produced in the area of convergence of the two guide channels.

A further reduction of friction is achieved according to the invention by tapering the lateral slotted openings for the fastening webs of the clutch strips off in the direction of the exit of the closed profiles. In this manner a dragging contact between the fastening webs and the slide is avoided at least in the area of the separate guide channels in spite of the comparatively large free motion of the profiled borders in the guide channels.

According to a further feature of the invention the manufacture of the slide is facilitated by the fact that the slide is split in the area of the lateral slotted openings for the fastening webs of the clutch strip, the tongue located between the two guide channels converging at an acute angle constituting the connection between the two slide elements. In that case, the shape of the slide may be designed regardless of the removal of the cores during the production process, the manufacturer being absolutely free to design the guide channels as he may deem convenient. E.g. it will thus be possible to provide cross-

3

sections for the guide channels inside the slide which are larger than the apertures.

Further details of the invention will appear from the following description of an embodiment of the invention with reference to the accompanying drawing in which

FIGURE 1 is a plan view of a slide according to the invention,

FIGURE 2 is a longitudinal section thereof,

FIGURE 3 is a front view,

FIGURE 4 is a side elevation,

FIGURE 5 is a section on line 5—5 of FIGURE 1,

FIGURE 6 is a section on line 6—6 of FIG. 1, and

FIGURE 7 is a section on line 7—7 of FIG. 1.

The slide comprises essentially a base-plate 1 and a cover-plate 2, maintained in spaced relation to each other by a connecting member 3 of tear-shaped cross-section. A positive connection is provided by a lug 4 of trapezoidal shape which may be wedged in the base-plate or otherwise attached to the latter. The base-plate 1, the cover plate 2 and the connecting member 3 combined with the side flanks 5, 6, 7 and 8 constitute the guide channels 9 and 10 for the two profiled borders 11 and 12 to be united. The guide channels 9 and 10 converge to form a single guide channel 13 whose extremity 13' presents a constant cross-section. The two guide channels 9 and 10 each present a constant cross-section although they are located at somewhat different levels. The single guide channel 13 of larger cross-section is formed by the flat bottom or cover surfaces of the two guide channels 9 and 10 respectively. The difference of level between the bottom surface of the guide channel 9 on the one hand and the cover surface of the guide channel 10 on the other hand, is overcome by steps 14 and 15 respectively. The flanks 5 and 7 form an elongated slot 16 for the passage of the fastening webs 12, whereas the side flanks 6 and 8 form an elongated slot 17 for the passage of the fastening webs 12'.

The profiled borders 11 and 11' are located inside the guide channels 9 and 10 in their normal position as shown in the drawing, with ample clearance on all sides except for the side face 18 which is guided by the side flank 8 and the side face 18' guided by the side flank 5. The continuation of the side faces 18 and 18' is formed by the long legs 19, 19' of the profiled borders. The short legs 20, 20' of the profiled borders 11, 11' are arranged in spaced relation to the side flanks 6 and 7 respectively, so that they can be seized from behind by the longer legs of the profiled counter-strip. For this purpose, the side flanks 5 and 8 slightly protrude inwardly as against the side flanks 7 and 6 respectively, said protrusion increasing steadily toward the guide channel for the closed cross-section, e.g. in a linear direction as shown in FIGURE 1.

During the closing motion of the slide the two profiled borders are in their normal position moved essentially in about parallel relation to the principal plane of the slide fastener, coming into contact with each other at the end of the connecting member 3. As the slide moves farther along, both profiles are further compressed against each other in parallel relation to the principal plane of the slide fastener, the legs spreading to such an extent that the short legs enter the mouth of the respective profiled counter strip, as shown in FIG. 7, and the long legs can overlap the short ones. Finally, during passage of the profiled strips through the portion 13' of the guide channel 13, they will assume the fully engaged position as shown in FIG. 6. Since the cross-section of the guide channel 13 is sufficiently large, a very slight effort is needed to open the legs. Practically only the friction at the side flanks 5 and 8 has to be overcome.

The cover-plate 2 presents a bow 21 to which a holding clip or the like can be attached.

Obviously the invention is capable of other embodiments than that herein shown and described and its various details are capable of modification, all without departing

4

from the scope of the invention as hereinafter defined in the appended claims.

Having thus described my invention, I claim:

1. A slider in combination with a pair of elongated slide fastener members formed from flexible material and having each a strip portion and an interlocking portion extending along one longitudinal edge of the strip portion and having a thickness greater than that of said strip portion and including each a pair of legs extending substantially parallel to said strip portions and formed with interlocking projections adapted; to engage with and disengage from each other by moving the slider longitudinally along the slide fastener members so as to move the latter substantially in the plane of said strip portions toward and away from each other whereby during engagement and disengagement the legs of said members will resiliently spread, said slider comprising, a pair of substantially parallel slider plates extending spaced from each other and decreasing in width toward one end of said slider; a pair of flanges extending respectively along longitudinal edges of each plate and projecting therefrom toward but short of the flanges of the other plate so that opposite flanges on said plates form elongated slots between themselves for passage of the strip portions of said slide fastener members therethrough, each of said flanges having an inner face substantially normal to an inner surface of the respective plate; and a wedge-shaped connecting member connecting said slider plates in the region of the other end of said slider and having a pair of wedge faces each extending between opposite ends of said connecting member and substantially normal to and from one to the other of said inner surfaces of said plates and approaching each other toward said one end of said slider and including an acute angle between themselves so as to form respectively together with said inner surfaces of said plates and said inner faces of said flanges a pair of diverging channels meeting a single channel formed by said inner surfaces of said plates and said inner faces of said flanges and extending from said connecting member to said one end of said slider, said single channel having at least in the region of the junction with said diverging channels a height considerably greater than the combined thickness of said interlocking portions of said slide fastener members to provide ample clearance for the spreading of said legs during engagement and disengagement of said slide fastener members.

2. A slider in combination with a pair of elongated slide fastener members formed from flexible material and having each a strip portion and an interlocking portion extending along one longitudinal edge of the strip portion and having a thickness greater than that of said strip portion and including each a pair of legs extending substantially parallel to said strip portions and formed with interlocking projections adapted to engage with and disengage from each other by moving the slider longitudinally along the slide fastener members so as to move the latter substantially in the plane of said strip portions toward and away from each other whereby during engagement and disengagement the legs of said members will resiliently spread, said slider comprising, a pair of substantially parallel slider plates extending spaced from each other and decreasing in width toward one end of said slider; a pair of flanges extending respectively along longitudinal edges of each plate and projecting therefrom toward but short of the flanges of the other plate so that opposite flanges on said plates form elongated slots between themselves for passage of the strip portions of said slide fastener members therethrough, each of said flanges having an inner face substantially normal to an inner surface of the respective plate; and a wedge-shaped connecting member connecting said slider plates in the region of the other end of said slider and having a pair of wedge faces extending between and substantially normal to said inner surfaces of said plates and approaching each other toward said one end of said slider and including an acute

5

angle between themselves so as to form respectively together with said inner surfaces of said plates and said inner faces of said flanges a pair of diverging channels meeting a single channel formed by said inner surfaces of said plates and said inner faces of said flanges and extending from said connecting member to said one end of said slider, said inner plate surfaces being spaced in the region of said single channel from each other a distance considerably greater than the combined thickness of said interlocking portions to provide ample clearance for the spreading of said legs during engagement and disengagement of said slide fastener members and the inner plate surfaces in one of said diverging channels being offset in direction substantially normal to said surfaces with respect to the inner plate surfaces of the other diverging channel and the opposite inner plate surfaces in said diverging channels being spaced from each other a distance smaller than the distance between said inner plate surfaces in said single channel.

3. A slider in combination with a pair of elongated slide fastener members formed from flexible material and having each a strip portion and an interlocking portion extending along one longitudinal edge of the strip portion and having a thickness greater than that of said strip portion and including each a pair of legs extending substantially parallel to said strip portions and formed with interlocking projections adapted to engage with and disengage from each other by moving the slider longitudinally along the slide fastener members so as to move the latter substantially in the plane of said strip portions toward and away from each other whereby during engagement and disengagement the legs of said members will resiliently spread, said slider comprising, a pair of substantially parallel slider plates extending spaced from each other and decreasing in width toward one end of said slider; a pair of flanges extending respectively along longitudinal edges of each plate and projecting therefrom toward but short of the flanges of the other plate so that opposite flanges on said plates form elongated slots between themselves for passage of the strip portions of said slide fastener members therethrough, each of said flanges having an inner face substantially normal to an inner surface of the respective plate; and a wedge-shaped connecting member connecting said slider plates in the region of the other end of said slider and having a pair of wedge faces extending between and substantially normal to said inner surfaces of said plates and approaching each other toward said one end of said slider and including an acute angle between themselves so as to form respectively together with said inner surfaces of said plates and said inner faces of said flanges a pair of diverging channels meeting a single channel formed by said inner surfaces of said plates and said inner faces of said flanges and extending from said connecting member to said one end of said slider, said inner plate surfaces being spaced in the region of said single channel from each other a distance considerably greater than the combined thickness of said interlocking portions to provide ample clearance for the spreading of said legs during engagement and disengagement of said slide fastener members, the upper of said inner plate surfaces in one of said diverging channels being located in one plane with the upper inner plate surface in said single channel and the lower inner plate surface in said one diverging channel being offset with respect to the plane of the lower inner plate surface in said single channel and meeting said lower inner surface in said single channel along an inclined surface portion, and the lower of said inner plate surfaces in the other of said diverging channels being located in one plane with the lower inner plate surface in said single channel and the upper inner plate surface in said other diverging channel being offset with respect to the plane of the upper inner plate surface in said inner channel and meeting said upper single surface in said single channel along an inclined surface portion.

6

4. A slider in combination with a pair of elongated slide fastener members formed from flexible material and having each a strip portion and an interlocking portion extending along one longitudinal edge of the strip portion and having a thickness greater than that of said strip portion and including each a pair of legs extending substantially parallel to said strip portions and formed with interlocking projections adapted to engage with and disengage from each other by moving the slider longitudinally along the slide fastener members so as to move the latter substantially in the plane of said strip portions toward and away from each other whereby during engagement and disengagement the legs of said members will resiliently spread, said slider comprising, a pair of substantially parallel slider plates extending spaced from each other and decreasing in width toward one end of said slider; a pair of flanges extending respectively along longitudinal edges of each plate and projecting therefrom toward but short of the flanges of the other plate so that opposite flanges on said plates form elongated slots between themselves for passage of the strip portions of said slide fastener members therethrough, each of said flanges having an inner face substantially normal to an inner surface of the respective plate, each of said flanges having a free edge face and the edge faces on the pair of flanges on one plate facing respectively the free edge faces of the pair of flanges on the other plate and the distance between said facing edge faces increasing from said one toward the other end of said slider; and a wedge-shaped connecting member connecting said slider plates in the region of the other end of said slider and having a pair of wedge faces each extending between opposite ends of said connecting member and substantially normal to and from one to the other of said inner surfaces of said plates and approaching each other toward said one end of slider and including an acute angle between themselves so as to form respectively together with said inner surfaces of said plates and said inner faces of said flanges a pair of diverging channels meeting a single channel formed by said inner surfaces of said plates and said inner faces of said flanges and extending from said connecting member to said one end of said slider, said single channel having at least in the region of the junction with said diverging channels a height considerably greater than the combined thickness of said interlocking portions of said slide fastener members to provide ample clearance for the spreading of said legs during engagement and disengagement of said slide fastener members.

5. A slider in combination with a pair of elongated slide fastener members formed from flexible material and having each a strip portion and an interlocking portion extending along one longitudinal edge of the strip portion and having a thickness greater than that of said strip portion and including each a pair of legs extending substantially parallel to said strip portions and formed with interlocking projections adapted to engage with and disengage from each other by moving the slider longitudinally along the slide fastener members so as to move the latter substantially in the plane of said strip portions toward and away from each other whereby during engagement and disengagement the legs of said members will resiliently spread, said slider comprising, a pair of substantially parallel slider plates extending spaced from each other and decreasing in width toward one end of said slider; a pair of flanges extending respectively along longitudinal edges of each plate and projecting therefrom toward but short of the flanges of the other plate so that opposite flanges on said plates form elongated slots between themselves for passage of the strip portions of said slide fastener members therethrough, each of said flanges having an inner face substantially normal to an inner surface of the respective plate; and a wedge-shaped connecting member connecting said slider plates in the region of the other end of said slider and having a pair of wedge faces each

7

extending between opposite ends of said connecting member and substantially normal to and from one to the other of said inner surfaces of said plates and approaching each other toward said one end of said slider and including an acute angle between themselves so as to form respectively together with said inner surfaces of said plates and said inner faces of said flanges a pair of diverging channels meeting a single channel formed by said inner surfaces of said plates and said inner faces of said flanges and extending from said connecting member to said one end of said slider, the distance between said inner faces of said flanges at said one end of said slider being substantially equal to the distance between the inner face of each flange and the corresponding inner wedge face at the other end of said slider, said single channel having at least in the region of the junction with said diverging channels a height considerably greater than the combined thickness of said interlocking portions of said slide fastener members to provide ample clearance for the spreading of said legs during engagement and disengagement of said slide fastener members.

6. A slider in combination with a pair of elongated slide fastener members formed from flexible material and having each a strip portion and an interlocking portion extending along one longitudinal edge of the strip portion and having a thickness greater than that of said strip portion and including each a pair of legs extending substantially parallel to said strip portions and formed with interlocking projections adapted to engage with and disengage from each other by moving the slider longitudinally along the slide fastener members so as to move the latter substantially in the plane of said strip portions toward and away from each other whereby during engagement and disengagement the legs of said members will resiliently spread, said slider comprising, a pair of substantially parallel slider plates extending spaced from each other and decreasing in width toward one end of said slider; a pair of flanges extending respectively along longitudinal edges of each plate and projecting therefrom toward but short of the flanges of the other plate so that opposite flanges on said plates form elongated slots between themselves for passage of the strip portions of said slide fastener members therethrough, each of said flanges having an inner face substantially normal to an inner surface of the respective plate, each of said flanges having a free edge face and the edge faces on the pair of flanges on one plate facing respectively the free edge faces of the pair of flanges on the other plate; and a wedge-shaped connecting member connecting said slider plates in the region of the other end of said slider and having a pair of wedge faces extending between and substantially normal to said inner surfaces of said plates and approaching each other toward said one end of said slider and including an acute angle between themselves so as to form respectively together with said inner surfaces of said plates and said inner faces of said flanges a pair of diverging channels meeting a single channel formed by said inner surfaces of said plates and said inner faces of said flanges and extending from said connecting member to said one end of said slider, said inner plate surfaces being spaced in the region of said single channel from each other a distance considerably greater than the combined thickness of said interlocking portions to provide ample clearance for the spreading of said legs during engagement and disengagement of said slide fastener members, the upper of said inner plate surfaces in one of said diverging channels being located in one plane with the upper inner plate surface in said single channel and the lower inner plate surface in said one diverging channel being offset with respect to the plane of the lower inner plate surface in said single channel and meeting said lower inner surface in said single channel along an inclined surface portion, and the lower of said inner plate surfaces in the other of said diverging channels being located in

8

one plane with the lower inner plate surface in said single channel and the upper inner plate surface in said other diverging channel being offset with respect to the plane of the upper inner plate surface in said inner channel and meeting said upper inner surface in said inner channel along an inclined surface portion, the pairs of facing free edge faces of said flanges being equally spaced from said inner plate surfaces at said one and at said other end of said slider so that one pair of facing edge faces extend upwardly inclined and the other pair of facing edge faces downwardly inclined from said one to said other end of said slider.

7. A slider in combination with a pair of elongated slide fastener members formed from flexible material and having each a strip portion and an interlocking portion extending along one longitudinal edge of the strip portion and having a thickness greater than that of said strip portion and including each a pair of legs extending substantially parallel to said strip portions and formed with interlocking projections adapted to engage with and disengage from each other by moving the slider longitudinally along the slide fastener members so as to move the latter substantially in the plane of said strip portions toward and away from each other whereby during engagement and disengagement the legs of said members will resiliently spread, said slider comprising, a pair of substantially parallel slider plates extending spaced from each other and decreasing in width toward one end of said slider; a pair of flanges extending respectively along longitudinal edges of each plate and projecting therefrom toward but short of the flanges of the other plate so that opposite flanges on said plates form elongated slots between themselves for passage of the strip portions of said slide fastener members there-through, each of said flanges having an inner face substantially normal to an inner surface of the respective plate, the inner face on one flange on one plate being at least in the region of said one end of said slider inwardly offset with respect to the inner face on the opposite flange on the other plate and the inner face of the other flange on said one plate being at least in the region of said one end of said slider outwardly offset with respect to the inner face on the opposite flange on the other plate; and a wedge-shaped connecting member connecting said slider plates in the region of the other end of said slider and having a pair of wedge faces extending between and substantially normal to said inner surfaces of said plates and approaching each other toward said one end of said slider and including an acute angle between themselves so as to form respectively together with said inner surfaces of said plates and said inner faces of said flanges a pair of diverging channels meeting a single channel formed by said inner surfaces of said plates and said inner faces of said flanges and extending from said connecting member to said one end of said slider, said single channel having at least in the region of the junction with said diverging channels a height considerably greater than the combined thickness of said interlocking portions of said slide fastener members to provide ample clearance for the spreading of said legs during engagement and disengagement of said slide fastener members.

8. A slide fastener comprising, in combination, a pair of slide fastener stringers each formed from flexible material and each having a strip portion and an interlocking portion extending along an edge of each stringer and facing the corresponding edge of the other stringer, each of said interlocking portions including a pair of legs extending respectively in planes substantially parallel to and being connected along one edge thereof to said strip portion and being formed along the other edge thereof with interlocking projections extending transverse to the planes of said legs and being adapted to engage with and disengage from the interlocking projections on the legs of the other stringer; and slider means movable along said stringers for engaging said interlocking projections

9

during movement of said slider means in one direction and for disengaging said interlocking projections during movement of said slider means in the other direction, said slider means including at the one end which is leading during movement of said slider means in said one direction means for forcing the interlocking projections on one stringer toward and in engagement with the interlocking projections of the other stringer so as to couple said stringers to each other during movement of said slider means in said one direction, and said slider means including at the end thereof trailing during movement of said slider means in said other direction means for forcing the interlocking projections on one stringer away from the interlocking projections on the other stringer and additional means for simultaneously moving the interlocking portion of at least one stringer in direction transverse to the planes of the legs thereof for

10

facilitating disengagement of the interlocking projections of one stringer from the interlocking projections of the other stringer so as to uncouple said stringers from each other during movement of said slider means in said other direction.

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