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SEPARABLE SLIDE FASTENER

This invention relates to slide fasteners and more specifically to an improved slide fastener having a separable bottom end assembly. Such fastener is particularly suitable for use with self-locking
5 sliders.

Numerous slide fasteners of the separating type have been proposed, a typical example of which is provided with a pin-and-socket connector commonly referred to as a separable bottom end assembly and
10 mounted on a pair of fastener stringers at their lower ends. This connector is composed of a socket member clamped to one of the stringers, a socket pin extending from the socket and secured to that stringer, and a guide pin clamped to the other stringer. The guide pin
15 is releasably insertable into the socket.

A self-locking slider is slidably mounted on the opposed longitudinal edges of the stringers. The slider includes a slider body, a pull tab pivotally connected thereto, and a locking prong operatively

associated with the pull tab. The locking prong is engageable with the leg portion of any one coupling element on the socket-carrying stringer when the pull tab is in locked position. As the slider is lowered to
5 contact with the socket, the locking prong comes to ride directly above the socket pin.

A transverse pull exerted above the slider permits the guide pin to be extracted or withdrawn first from the socket and then from the slider after
10 full disengagement of the coupling elements by the slider, i.e. with the slider located immediately adjacent to the socket. Thus, the fastener halves are completely separated from each other.

However, this conventional separable slide
15 fastener is objectionable in that the guide pin fails oftentimes to move into the slider when interconnecting the fastener halves that have been separated. This has been found attributable to the fact that the socket pin has a rod-like shape and is planar throughout its outer
20 surface.

Such a socket pin on one stringer generally assists in withdrawing or thrusting a guide pin on the other stringer out of or into a slider when opposed fastener halves are separated or coupled together.

25 In the known separable fastener structure, removal of the guide pin fully from the slider causes the latter to tilt or deflect angularly with respect to

the socket-carrying stringer and the locking prong displaced outwardly of the socket pin. Under this condition, when an attempt is made to insert or thread the guide pin into the slider, the locking prong bears
5 against and is caught by the socket pin on the outer side wall thereof directed to the associated stringer. The guide pin when thus threaded into the slider abuts at its tip end against the corner of the socket pin and hence cannot be reassembled with the slider.

10 Therefore, the prior art technique has always required the locking prong to be moved or retracted out of contact with the side wall of the socket pin by manipulating the pull tab in such a manner that the slider held in deflection may take its proper or
15 upright posture. This is tedious and unsatisfactory for practical use.

According to the present invention, there is provided a separable slide fastener comprising:

(a) a pair of oppositely disposed stringers each
20 carrying a row of coupling elements along one longitudinal edge portion thereof;

(b) a slider movable reciprocally on and along said pair of stringers to couple and uncouple the coupling elements, said slider including a locking
25 prong; and

(c) a separable bottom end assembly mounted on adjacent lower ends of said stringers, characterized in

that said bottom end assembly includes:

(1) a socket member fixedly connected to one of said stringers;

(2) a first separate pin member projecting from said socket member and fixedly connected to said one stringer;

(3) a second separate pin member fixedly connected to the other of said stringers and extending at both of its ends beyond the ends of said first pin member, said second pin member having a substantially planar outer surface; and

(4) said first pin member having a first outer surface defined flatly adjacent to and flush with said second pin member, and a second outer surface extending integrally from said first flat surface and beveled transversely toward the plane of said one stringer.

It is believed possible by means of the invention to provide an improved slide fastener of the separable type which is free of the above noted difficulties of the prior art and which is efficient and effective in use and simple in construction.

It is also believed possible by means of the invention to provide such an improved fastener which assures smooth, reliable interconnection of two opposed stringers once separated, even when a slider is in tilted posture with respect to the plane of the fastener, by means of a special bottom end assembly.

The invention will be described by way of example with reference to the accompanying drawings, wherein:-

Figure 1 is a plan view of a separable slide fastener embodying this invention;

5 Figure 2 is an enlarged plan view, partly broken away, of the rearward segment of the fastener of Figure 1;

Figure 3 is a (transverse) cross-sectional view taken along the line III - III of Figure 2;

10 Figure 4 is a (longitudinal) cross-sectiona view taken along the line IV - IV of Figure 2 and showing a pull tab being put into unlocked position;

Figure 5 is a fragmentary plan view showing the manner in which a guide pin is being inserted into a
15 slider; and

Figure 6 is a view similar to Figure 5, but showing a prior art bottom end assembly.

Referring to the drawings and more particularly to Figure 1, there is shown a slide fastener of the
20 separable type which embodies this invention. The fastener comprises a pair of stringers 10 and 11, a slider 20 and a separable bottom end assembly 30. The stringers 10, 11 include carrier tapes 12 and 13 each having a row of spaced-apart coupling elements 14 or 15

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formed from suitable thermoplastic material and attached to one longitudinal edge thereof. The slider 20, hereinafter described, is disposed to reciprocally move on and along the coupling elements 14 and 15 whereby the fastener is opened and closed. Mounted on the confronted lower end portions of the stringers 10 and 11 is the bottom end assembly 30, details of which will be described hereinafter.

Secured adjacent to the uppermost coupling elements on the carrier tapes 12 and 13 are top end stops 16 and 17 for limiting the movement of the slider 20 in the closed direction. The carrier tapes 12 and 13 are also provided at their respective upper end portions with reinforcing strips 18 and 18 adapted to prevent the tape ends against fraying or any tendency to tear. For the same purpose, similar but somewhat wider reinforcing strips 19 and 19 are arranged on the lower end portions of the carrier tapes 12 and 13.

The slider 20 may be of any self-locking type well known in the art. The illustrated slider construction includes a front wing 21 and a back wing 22 united together in spaced parallel relation by a wedge 23 so as to define a substantially Y-shaped channel adapted to slidably receive the coupling elements 14 and 15. The front wing 21 has a linearly canting or sloping surface as viewed in cross-section in Figure 4. Designated at 24 is a cover member

mounted on a lug 26 integral with the front wing 21 at the foreward end thereof. The lug 26 is provided with two fulcrum ends 27 and 27, Figure 2, which support the cover 24 for swinging movement.

5 To the cover 24 is pivotally secured a pull tab 25 which is a flat metal plate bifurcated at one end to define arms. A connector bar connects the arms and engages with the cover 24 through openings 24a formed in the side walls thereof. Designated at 28 is a
10 locking prong arranged integrally with the rear end of the cover 24 and positioned to project into and out of the slider channel for passage of the coupling elements 14 on one of the two stringers 10 and 11, i.e. the right stringer 10. A leaf spring 29 is cantilever
15 mounted on the front wing 21 over its canted surface and cooperates with both the pull tab 25 and the locking prong 28. Designated at 29a are angular ears fixedly mounted on the lateral edges of the leaf spring 29 and adapted to restrain movement of the pull tab 25
20 within the cover 24.

Because of the resilience imparted by the leaf spring 29, the locking prong 28 is normally urged against any one selected coupling element 14 on the right stringer 10 when the pull tab 25 is in locked
25 position. The slider 20 is thus held immovable. Forcibly downward movement of the pull tab 25 permits the cover 24 to rotate counter-clockwise about the

fulcrum ends 27 and 27 in the position shown in Figure 4. In response to the rotation of the cover 24, the locking prong 28 is lifted away from the coupling element 14, rendering the slider 20 freely movable.

5 The bottom end assembly 30 comprises a socket member 31 fabricated from thermoplastic material and fixedly connected to the reinforced lower end portion of the right stringer 10 from which an elongate socket pin member 32 projects and is attached to the stringer 10. A similar guide pin member 33 is fixedly connected to the reinforced lower end portion of the left stringer 11. The guide pin 33 is somewhat longer and extends at both of its ends beyond the ends of the socket pin 32. The socket 31 has an inner cavity 31a adapted to removably accommodate the guide pin 33. The guide 33 is formed with a rectangular bar of thermoplastic material and has a substantially planar outer surface 33a parallel to the plane of each of the stringers 10 and 11.

20 An important feature of the assembly 30 resides in the configuration of the socket pin 32. Like the guide pin 33, the socket pin 32 is made up of a rectangular bar of thermoplastic material, but has two different outer surfaces 32a and 32b. As shown in 25 Figure 3, one surface 32a is substantially straight or flat and is flush with the guide pin 33, while the other surface 32b extends integrally from the flat

surface 32a and is beveled transversely toward the plane of the stringer 10. The beveled surface 32b is so dimensioned as to be close to the stringer 10 and spaced from a particular region on the socket pin 32. This
5 region is one bounded and occupied by the locking prong 28, Figure 5, when the slider 20 is brought into upright contact with the socket 31. Moreover, the beveled surface 32b on the socket pin 32 terminates short of the forward end of the socket 31.

10 With the above-described arrangements, the locking prong 28 remains rested directly above the flat surface 32a on the socket pin 32, as viewed in Figure 4, when the guide pin 33 is in threaded engagement with both the slider 20 and the socket 31. In this position, the
15 slider 20 is maintained in proper or stable posture. Upon withdrawal of the guide pin 33 first from the socket 31 and then from the slider 20, the slider 20 moves to be tilted with respect to the plane of the stringer 10, as shown by the slider longitudinal axis or
20 line A in Figure 5. Such slider movement thus displaces the locking prong 28 outwardly upwardly of the beveled surface 32b.

In the position shown in Figure 5, as the guide pin 33 is threaded into the slider 20, the latter rotates in
25 a clockwise direction, indicated by the arrow B, and allows the locking prong 28 to smoothly travel on the beveled surface 32b and then ride over

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the flat surface 32a. Accordingly, the slider 20 can be put into its proper posture, with the guide pin 33 fitly interengaged therewith. It should be noted that this particular advantage accrues from the cam-like
 5 action of the beveled surface 32b, as will be best seen from the arrow C in Figure 3, with respect to the movement of the locking prong 28.

Figure 6 is concerned with a prior art arrangement in which like primed reference numerals
 10 designate like parts already described in connection with Figures 1 to 5 and which shows the manner in which a guide pin 33' is being threaded into a slider 20' depleated angularly relative to the plane of the fastener. Effective threading is difficult to achieve
 15 between the guide pin 33' and the slider 20' in this known arrangement. The guide pin 33' is prone to bear against the corner of a socket pin 32', with a locking prong 28' caught by the outer side wall of the socket pin 32'.

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CLAIMS:

1. A separable slide fastener comprising:
 - (a) a pair of oppositely disposed stringers
11) each carrying a row of coupling elements
5 along one longitudinal edge portion thereof;
 - (b) a slider movable reciprocally on and
along said pair of stringers to couple and
uncouple the coupling elements, said slider
including a locking prong; and
 - 10 (c) a separable bottom end assembly mounted
on adjacent lower ends of said stringers
characterized in that said bottom end assembly
includes:
 - (1) a socket member fixedly connected to
15 one of said stringers;
 - (2) a first separate pin member ~~(32)~~ projecting
from said socket member and fixedly connected to
said one stringer;
 - (3) a second separate pin member - fixedly
20 connected to the other of said stringers and
extending at both of its ends beyond the ends of said
first pin member, said second pin member
having a substantially planar outer surface; and
 - (4) said first pin member having a first
25 outer surface defined flatly adjacent to and
flush with said second pin member, and a second
outer surface extending integrally from said



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(25)

first flat surface and beveled transversely toward the plane of said one stringer

2. A separable slide fastener according to claim 1, characterised in that said beveled surface
5 is disposed close to said one stringer and spaced from a region on said first pin member, said region being bounded and occupied by said locking prong in a position in which said slider is brought into upright contact with said socket member, said
10 beveled surface terminating short of the foreward end of said socket member.

3. A separable slide fastener according to claim 1, characterised in that said slider is of a self-locking type.

15 4. A separable slide fastener substantially as described with reference to and as illustrated in Figures 1 to 5 of the accompanying drawings.
