United States Patent

Heimberger et al.

[15] **3,663,996**

[45] **May 23, 1972**

[54] **TAPE-SUPPORTED SEPARABLE SLIDE FASTENER**

[72] Inventors: **Helmut Heimberger**, Grenzach; **Alfons Frohlich**, Essen, both of Germany

[73] Assignee: **Optic-Holding AG**

[22] Filed: **Jan. 27, 1970**

[21] Appl. No.: **6,120**

[30] **Foreign Application Priority Data**

June 6, 1969 Germany ..... P 19 28 691.0

[52] **U.S. Cl.** **24/205.11**, 24/205.15

[51] **Int. Cl.** **A44b 19/38**, A44b 19/12

[58] **Field of Search** ..... 24/205.11 F, 205.11

[56] **References Cited**

UNITED STATES PATENTS

2,553,230	5/1951	Bashover	24/205.11
3,170,207	2/1965	Morin	24/205.11
3,175,268	3/1965	Morin	24/205.11
3,309,746	3/1967	Carlile	24/205.11 F

FOREIGN PATENTS OR APPLICATIONS

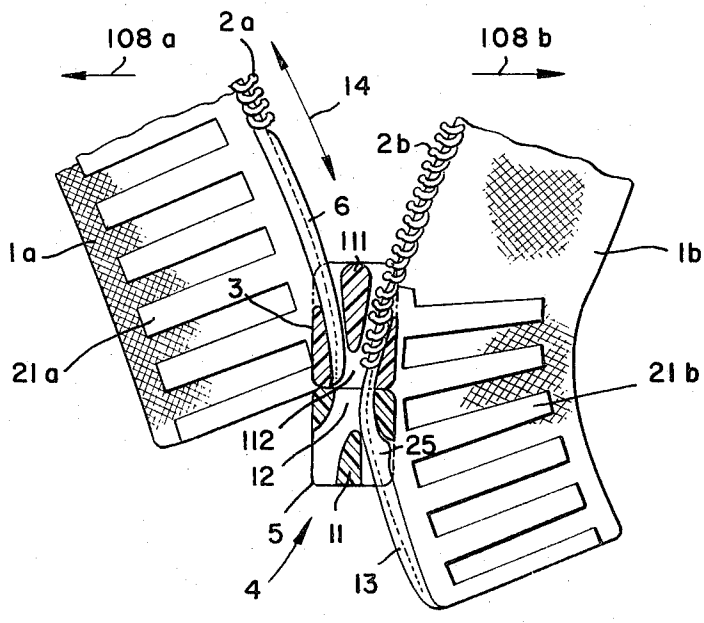
1,213,655	3/1966	Germany	24/205.11 F
681,335	10/1952	Great Britain	24/205.11
624,334	6/1949	Great Britain	24/205.11 F
542,748	5/1956	Italy	24/205.11

Primary Examiner—Bernard A. Gelak
Attorney—Karl F. Ross

[57] **ABSTRACT**

In a separable tape-supported slide fastener comprising a pin-and-socket connection at one end, accidental separation of the two halves by a transverse pull exerted below the socket connection is prevented by a slidable mounting of the pin socket which is provided with internal camming formations shifting the socket in response to such pull to interlock the end portions of the intermeshing coupling elements.

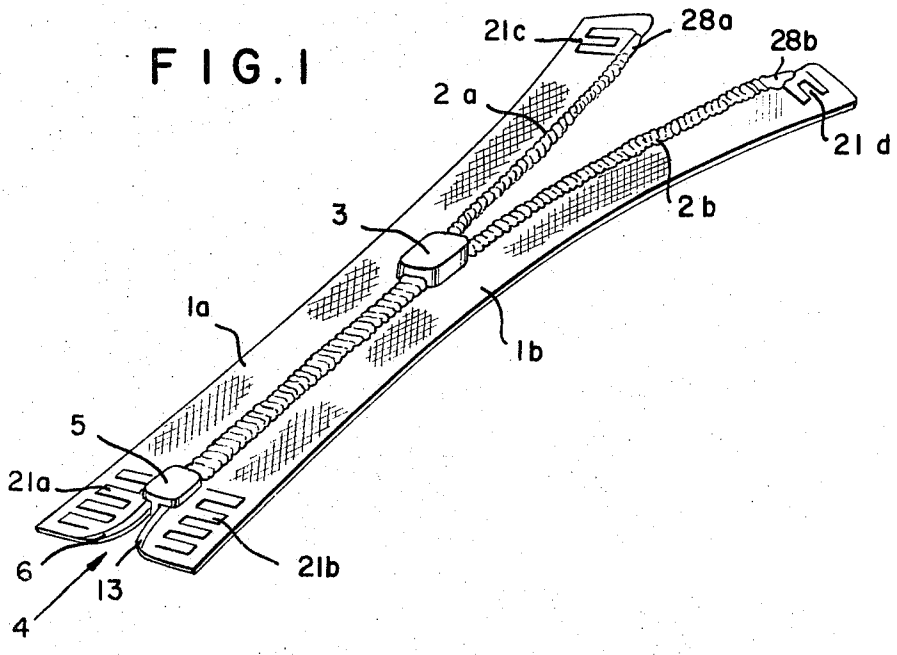
12 Claims, 14 Drawing Figures



Patented May 23, 1972 3,663,996

7 Sheets-Sheet 1

FIG. 1



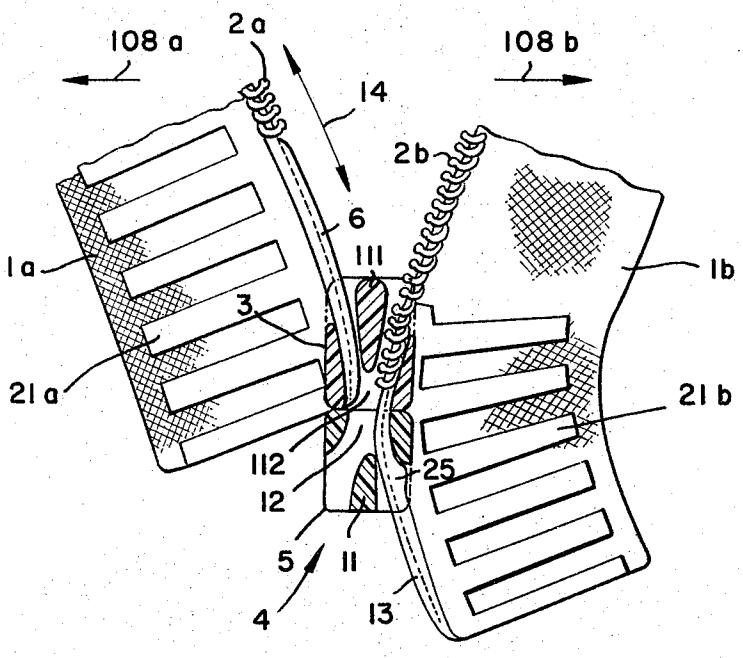
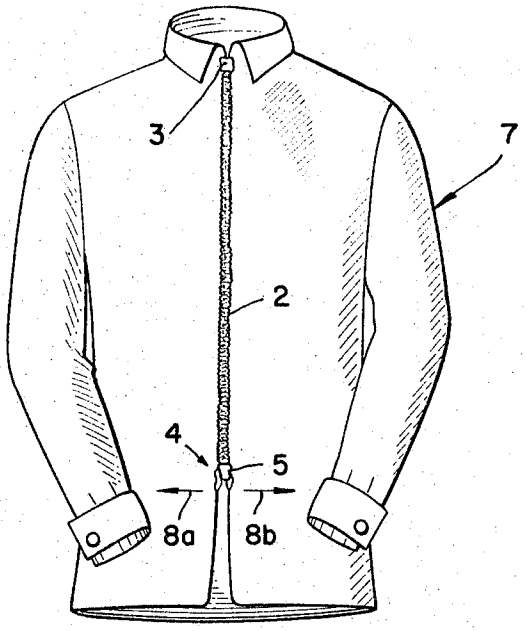


FIG. 4

INVENTORS,
H. HEIMBERGER
BY A. FRÖHLICH
Karl F. Ross
ATTORNEY

FIG. 6



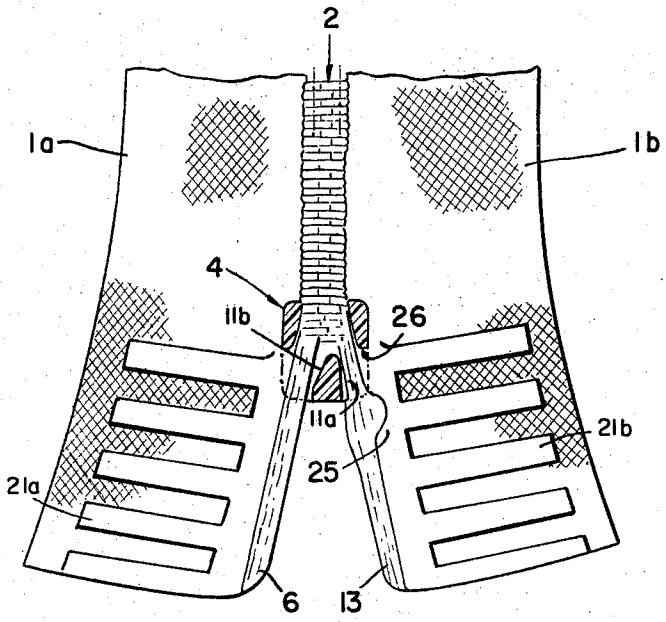
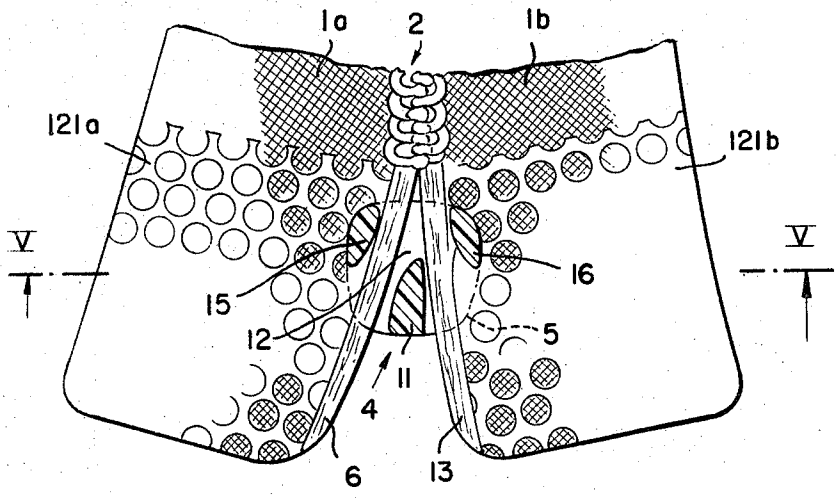


FIG. 2

INVENTORS
H. HEIMBERGER
A. FRÖHLICH
BY Karl F. Ross
ATTORNEY

FIG. 3



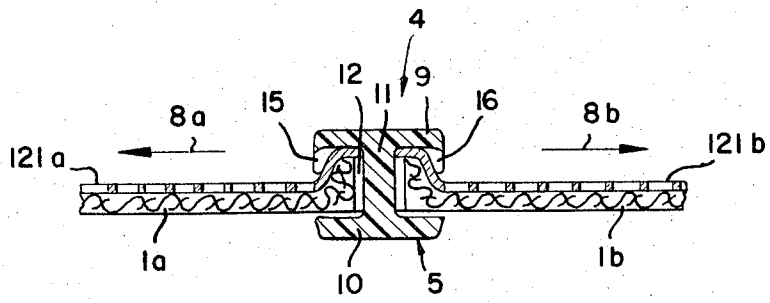
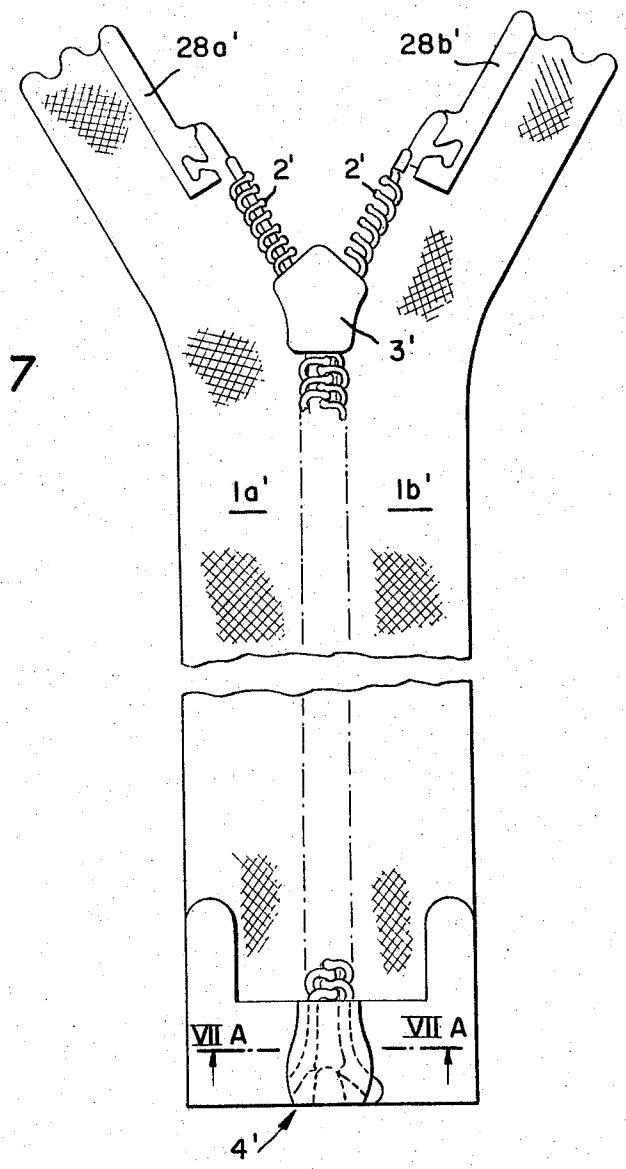


FIG. 5

INVENTORS,
H. HEIMBERGER
BY A. FRÖHLICH
Karl F. Ross
ATTORNEY

FIG. 7



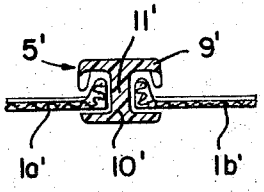
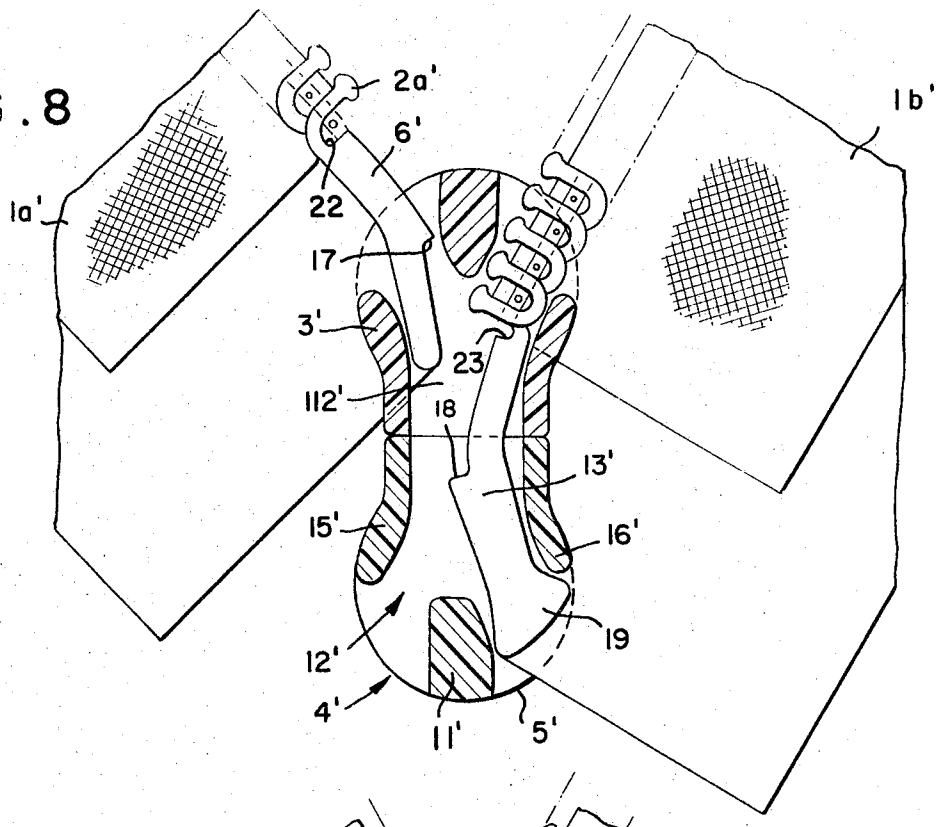


FIG. 7A

INVENTORS,
H. HEIMBERGER
BY A. FRÖHLICH
Karl F. Ross
ATTORNEY

FIG. 8



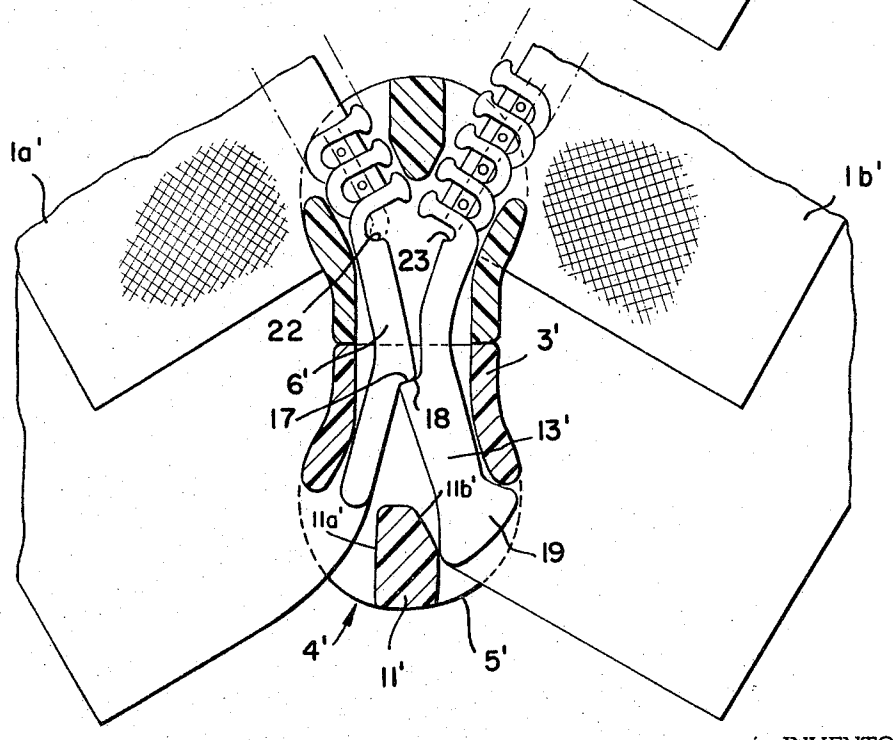
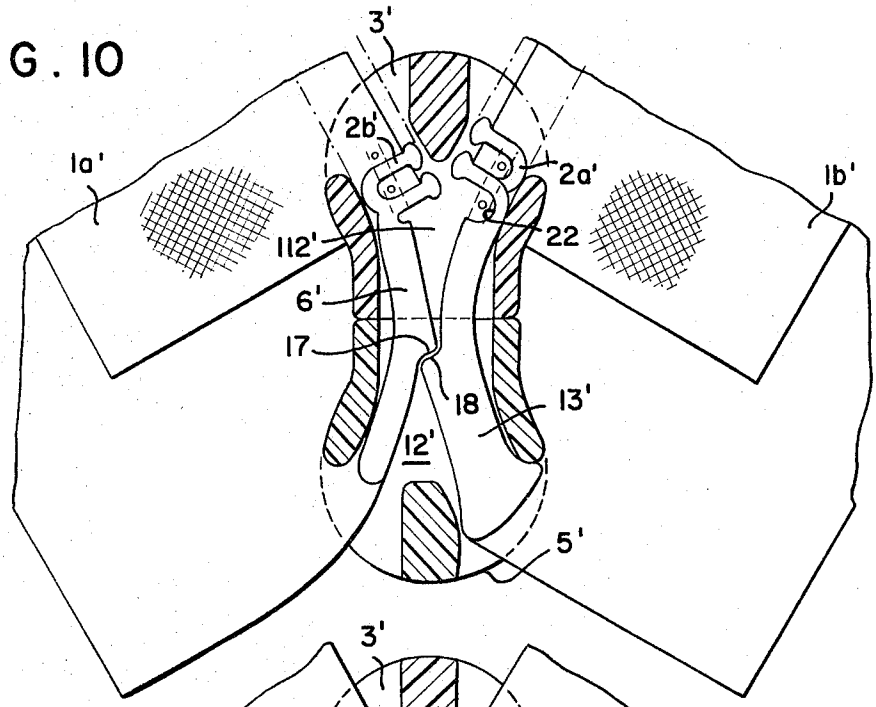


FIG. 9

INVENTORS,
H. HEIMBERGER
BY A. FRÖHLICH
Karl F. Ross
ATTORNEY

FIG. 10



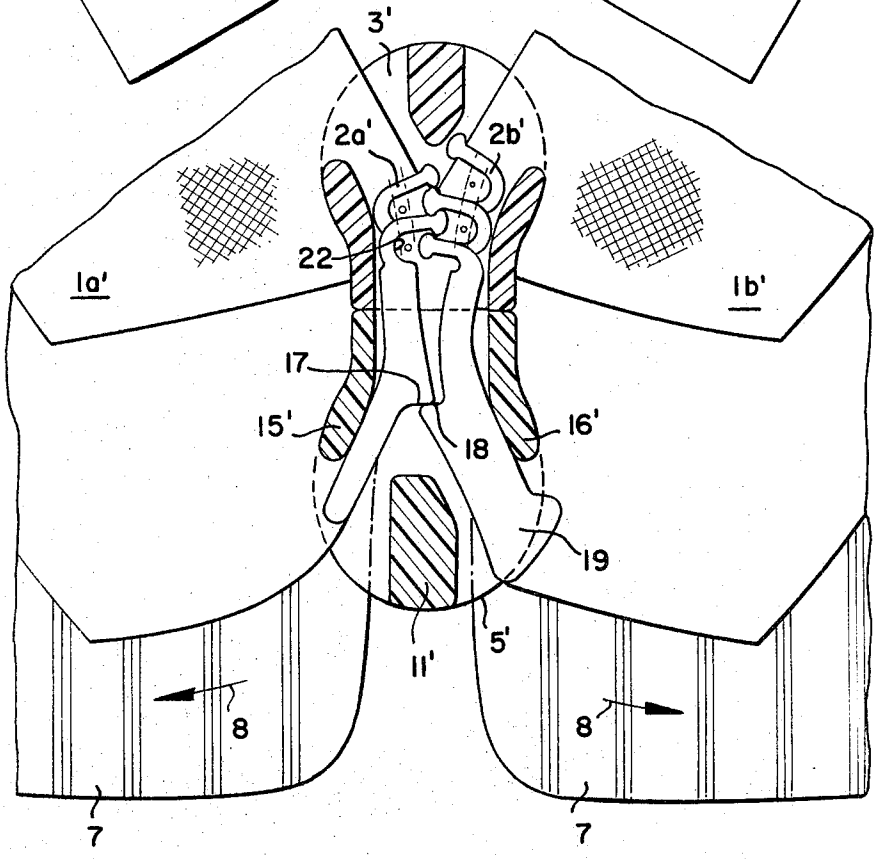


FIG. 11

INVENTORS,
H. HEIMBERGER
BY A. FRÖHLICH
Karl F. Ross
ATTORNEY

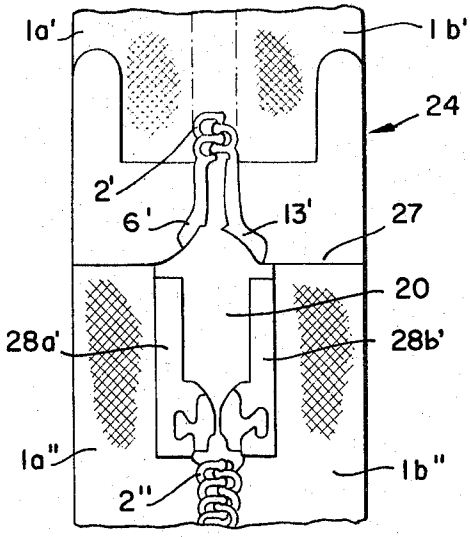


FIG. 13

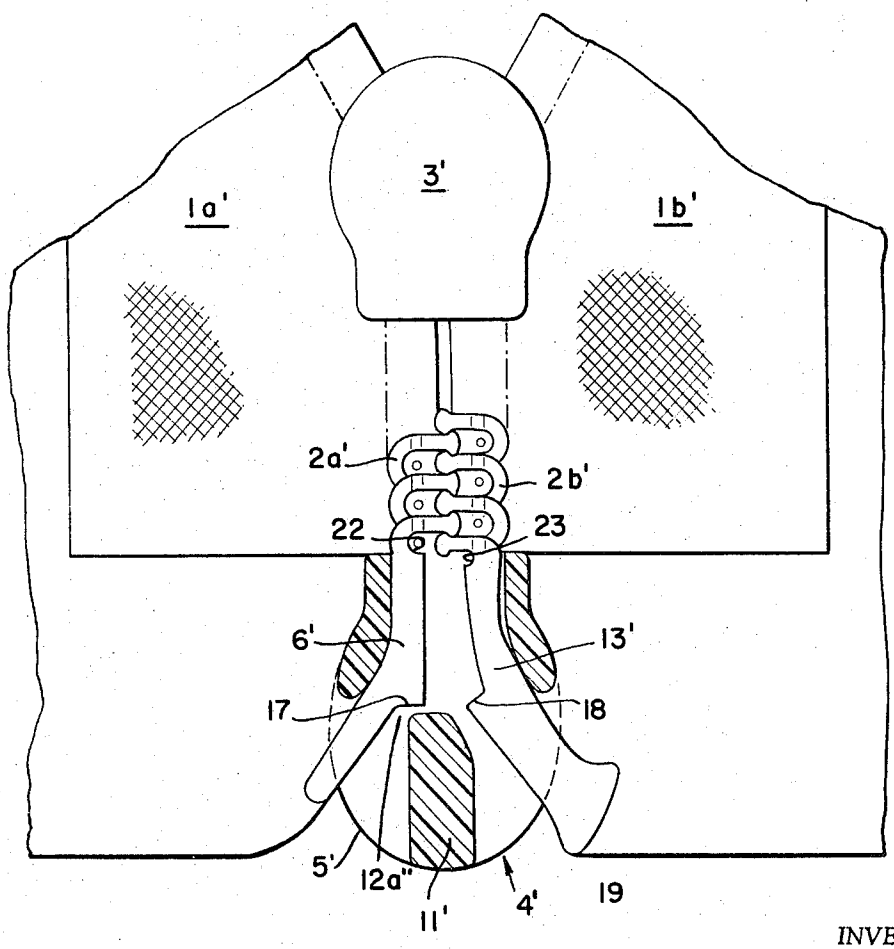


FIG. 12

INVENTORS,
H. HEIMBERGER
BY A. FRÖHLICH
Karl F. Ross
ATTORNEY

TAPE-SUPPORTED SEPARABLE SLIDE FASTENER

The halves of tape-supported slide fasteners normally locked together by a separable end stop (commonly referred to as bottom stop), including a pin on one tape inserted into a socket on the other tape, are liable to accidental separation if a pull in opposite directions is exerted on the meshing fastener chains below the pin-and-socket connection along a line transverse to the fastener.

Under this condition the pin is likely to slip out of the socket, whereupon the coupling elements on the two tapes separate progressively in the direction toward the remote slider.

It is therefore an object of our present invention to provide an improved fastener of the above-described type wherein the separable end stop is so constructed as to prevent such a splitting of the meshing coupling elements.

Another disadvantage of known slide fasteners of the separable type lies in the difficulty of extracting the pin from its socket after full disengagement of the coupling elements by the slider, i.e. with the latter positioned next to the separable end stop.

It is therefore another object of our present invention to provide an improved slide fastener in which a transverse pull exerted above the slider readily causes the pin to be withdrawn from its socket without special manipulation.

Essentially, our invention involves the use of a pin socket which is longitudinally slidable on the coupling element and the adjoining guide pin at the end of one half of the fastener. Internal camming formations engageable with respective extensions of the two coupling elements or fastener chains, advantageously the guide pin on one chain and a similar spur on the other chain, translate any spreading of the tapes below the bottom stop into an upward shift of the socket, i.e. a movement thereof toward the slider, with resulting positive interlocking of the terminal links of these chains.

The camming formations are constituted, according to a more specific feature of our invention, by lateral walls of a downwardly flaring channel in the pin socket; a divider or spreader at the mouth of that channel, remote from the slider, forms a branch channel with one of the sidewalls to engage the spurlike extension of the nondetachable coupling element with freedom of limited relative slidability. This divider may be part of a web interconnecting a pair of parallel flange portions or shields similar to those of a conventional slider. The length of the two guide members integrally extending from the fastener chains, i.e. the pin and the spur, is advantageously so chosen that these members project from the downwardly diverging branches of the socket channel when the socket is in a raised position.

Accurate meshing of the coupling elements can be facilitated by a pair of coacting abutments on the two terminal extensions received in the socket passage. Thus, the retaining spur may comprise an upwardly facing lug which a downwardly facing lug on the guide pin engages when the pin is fully inserted. The coupling elements are then in the proper meshing position in which the lowest link of one coupling element is opposite the lowest gap on the other coupling element.

A flaring mouth on the slider, bounded by lips with rounded edges lining up with the sidewalls of the pin-socket passage upon juxtaposition of these two sliding bodies, permits opening of the fastener and complete separation of its halves, including withdrawal of the pin from the socket, by a transverse pull exerted on the fastener above the slider which therefore should be free to slide off the top of at least one of these halves.

Relative terms such as "top" and "bottom," as used hereinafter in accordance with conventional terminology, are not intended to limit the invention to a particular orientation of the fastener components.

The above and other objects, features and advantageous of the present invention will become more readily apparent from the following description, reference being made to the accompanying drawing in which:

FIG. 1 is a perspective view of a slide fastener embodying the invention;

FIG. 2 is a plan view, drawn to an enlarged scale, of the bottom portion of the fastener of FIG. 1;

FIGS. 3 and 4 are fragmentary plan views similar to FIG. 2 but showing the fastener in different operational positions;

FIG. 5 is a cross-sectional view of the fastener taken on the line V — V of FIG. 3;

FIG. 6 is a view of a garment fitted with a slide fastener embodying the invention;

FIG. 7 is a plan view of a modified form of slide fastener embodying the invention;

FIG. 7A shows a detail in section taken on the line A — A of FIG. 7;

FIGS. 8 to 12 are enlarged plan views of the bottom portion of the slide fastener of FIG. 7 in different operating positions; and

FIG. 13 illustrates a step in the manufacture of slide fasteners of the type shown in FIG. 7.

As shown in FIGS. 1 to 6, stringer tapes 1*a* and 1*b* adapted to be sewn to a garment 7 (FIG. 6) support fastener chains 2*a* and 2*b* (FIG. 1) which are coupled and uncoupled by movement of a slider 3 away from and toward an end stop 4. The ends of the stringer tapes are reinforced and made resilient slotted or perforated stiffeners 21*a*, 21*b* (FIGS. 1, 2, 4) or 121*a*, 121*b* (FIGS. 3 and 5) of synthetic resinous sheet material bonded to the tape; similar strips 21*c*, 21*d* (FIG. 1) are integral with the upper ends 28*a*, 28*b* of chains 1*a*, 1*b* as part of the top stop of the fastener.

Bottom stop 4 comprises a pin socket 5, carried by fastener half 1*b*, 2*b*, into which a pin 6 on the other fastener half 1*a*, 2*a* is insertable.

Details of the bottom stop 4 are illustrated on an enlarged scale in FIG. 4 showing the pin 6 adjoining the lower end of the coupling element 2*a* as a downward integral extension thereof. The pin 6 is preferably made of flexible material and is also unitary with, or bonded to, the reinforcing strip 21*a* or 121*a* overlying the tape 1*a*.

A similarly shaped retaining spur 13 extends integrally from the coupling element 2*b* and is unitary with or bonded to the other reinforcing strip 21*b* or 121*b*.

The pin socket 5 has an internal channel 12, substantially of inverted-Y shape, with a rising stem portion and with downwardly diverging branch portions respectively receiving the pin 6 and the spur 13. The branches are divided by a spreader 11, which serves as a web interconnecting a pair of parallel shield plates 9, 10, and are externally bounded by sidewalls formed by a pair of flanges 15, 16 which depend from shield plate 9 but terminate short of shield plate 10 to leave a pair of lateral slots for the entry of the tapes 1*a*, 1*b* and their overlying reinforcing strips as best seen in FIG. 5. Socket 5, like the generally similar slider 3, is preferably molded integrally from thermoplastic material which may or may not be the same as that from which the monofilamentary fastener chains are shaped, e.g. by a conventional extrusion process and subsequent deformation to form the coupling heads.

The pin socket 5 is limitedly slidable along spur 13 (and therefore with reference to fastener half 1*b*, 2*b*) and is shown in FIG. 2 near its topmost position. Camming formations constituted by the convex inner surfaces of flanges 15 and 16 cause this socket to move automatically into that position in response to a transverse pull exerted on the fastener below the socket, as represented by arrows 8*a*, 8*b*. The upper limit of the socket movement lies at the point where the spreader 11 abuts the lower end of the fastener 2 consisting of the intermeshing coupling elements 2*a*, 2*b*; see FIG. 2. In this position the stem of channel 12 receives the lower ends of the coupling elements and positively prevents their separation.

This is so because the spreader 11, contrary to the wedge piece 111 of slider 3, is unsymmetrically disposed and closer to flange 16 than to flange 15 so that coupling element 2*b* cannot enter the channel branch to the right of the spreader. The latter, therefore, comes to rest against the overlying bottom

link of element 2*b*, as is apparent from FIG. 2, when an attempt is made to move it beyond that limiting position; the right-hand flank 11*a* of the spreader, confronting the flange 16, is substantially straight whereas the opposite flank 11*b*, facing the flange 15, slopes at an acute angle to the direction of slider motion.

Normally, the pin socket occupies a lower position, shown in FIG. 4, in which a stop 25 on the spur 13 engages a shoulder 26 (FIG. 2) on the wall 16 of pin socket 5. These abutting surfaces prevent complete removal of the socket from the spur 13. Upon their interengagement, and with the slider 3 adjoining the socket 5, the pin 6 can be inserted or withdrawn for interconnecting or separating the two fastener halves. Slider 3, with its spreader 111 and generally Y-shaped channel 112, constitutes a substantial mirror image of socket 5, the channels 12, 112 of the two juxtaposed bodies 3, 5 forming a roughly X-shaped passage with slightly curved branches accommodating the similarly curved extremities 6, 13 of coupling elements 2*a*, 2*b*. Pin 6, therefore, is positively guided downwardly upon insertion from above and is also gently cammed outwardly upon exertion of a lateral pull above the slider as indicated by arrows 108*a*, 108*b* in FIG. 4.

In FIGS. 7 – 13 we have shown a similar fastener assembly wherein elements corresponding to those of the preceding embodiment have been designated by like numerals with the addition of a prime mark; this obviates any need for their detailed description, except insofar as the elongated extensions 6′ (guide pin) and 13′ (retaining spur) of the fastener chains 2*a*′, 2*b*′ are concerned.

Pin 6′ and spur 13′ are angularly bent, rather than curved like the guide members 6, 13 of the preceding embodiment, in substantial conformity with the legs of the generally X-shaped passage defined by the channels 12′ and 112′ in the juxtaposed position of slider 3′ and socket 5′. At their point of closest approach, i.e. at the waist of the "X" when the parts in their position of incipient engagement or disengagement illustrated in FIG. 10, pin 6′ and spur 13′ are provided with a pair of coating formations which limit the insertion of the pin and cause the downward entrainment of the spur by the pin, relative to the juxtaposed bodies 3′ and 5′, during the insertion step; these formations have been shown as a downwardly facing lug or tooth 17 on pin 6′ and an upwardly facing lug or tooth 18 on spur 13′. Upon a raising of the socket 5′ (FIG. 12) so that its web 11′ separates the lower ends of these guide members within channel 12′ while maintaining the interconnection of the fastener chains as described above, the lugs 17, 18 move apart but still maintain their confronting position. An enlarged head 19 at the free end of spur 13′, replacing the detent 25 of spur 3, prevents the complete detachment of socket 5′ from the coupling element terminating in spur 13′. The upper halves of members 6′ and 13′ are almost in line with the respective fastener chains; the aforedescribed camming effect is substantially the same as in the preceding embodiment.

FIGS. 8 – 12 clearly show the unsymmetrical shape of web 11′ with its straight flank 11*a*′ and sloping flank 11*b*′, similar to those of web 11 in the preceding embodiment, which converge toward an abutment surface confronting the transverse edge of lug 17 so as to prevent the socket 5′ from rising above its limiting position illustrated in FIG. 12.

As best seen in FIG. 10, the length of guide members 6′ and 13′ is such that they pass substantially completely through the X-shaped passage 12′, 112′ when the slider 3′ is depressed to push the socket 5′ into its bottom position. In the preceding embodiment, the corresponding members 3 and 13 are somewhat longer and advantageously more flexible.

Fastener chain 2*a*′, whose coupling heads are upwardly staggered with reference to those of chain 2*b*′, is separated by a notch 22 from the guide member integral therewith, i.e. from the pin 6′ in FIGS. 8, 9, 11, 12 and from the spur 13′ in FIG. 10 which illustrates the reverse arrangement with that pin extending from chain 2*b*′. Notch 22 is, of course, designed to receive the lowermost link of chain 2*b*′ which is separated from its guide element by a small incision 23 only.

As shown in FIG. 13, adjoining fasteners 2′, 2″ of monofilamentary thermoplastic material are stitched or otherwise secured, in end-to-end relationship, to a continuous fabric strip 24 having a cutout 20 which is bounded by the upper extremities 28*a*′, 28*b*′ of the interlocked coupling elements of fastener 2″ defining a top stop. Through this cutout 20, prior to a severing of strip 24 along a transverse line 27, the pin socket for the upper fastener 2′ may be introduced with its shield portions 9′, 10′ (FIG. 7A) spaced apart sufficiently to clear the guide members 6′, 13′ of that fastener; they are then squeezed together, with a slight deformation of web portion 11′, to grip these guide members in a sufficiently loose manner to preserve relative slidability. In an analogous manner, the slider for the lower fastener 2″ may be slipped over the guide members 28*a*′, 28*b*′ of the top stop of that fastener.

We claim:

1. A slide fastener comprising a pair of stringer tapes; a first and a second coupling element respectively secured to said tapes, said elements being provided with interengageable links; a slider movably mounted on said elements for interlocking their links upon displacement therealong in an upward direction and for separating their links upon displacement therealong in a downward direction; and a bottom stop separably interconnecting said elements at their lower ends, said bottom stop including a socket secured to one of said tapes with limited relative mobility by the lower extremity of said first element, said socket having an internal channel removably receiving the lower extremity of said second element, said socket being provided with camming formations engageable by said lower extremities upon a spreading thereof for exerting an upward force on said socket, said camming formations being a pair of sidewalls bounding said channel, the latter diverging downwardly and being provided at the bottom with a spreader defining with said sidewalls a pair of channel branches respectively receiving said extremities, one of said extremities partly overlying said spreader for preventing a relative upward movement of said socket beyond an upper limiting position, said spreader being unsymmetrically positioned with reference to said sidewalls, the channel branch receiving said one of said extremities being narrower than the opposite channel branch.

2. A slide fastener as defined in claim 1 wherein said extremities are elongated extensions of said coupling elements projecting from said branches in a raised position of said socket.

3. A slide fastener as defined in claim 2 wherein said slider is provided with an internal channel having upwardly diverging branches accommodating said coupling elements, the channels of said slider and said socket complementing each other to a generally X-shaped passage upon juxtaposition of said slider with said socket.

4. A slide fastener as defined in claim 3 wherein said extensions are long enough to pass substantially completely through said passage upon juxtaposition of said slider with said socket in a lowered position of the latter.

5. A slide fastener as defined in claim 2 wherein said slider and said socket are substantial mirror images of each other, the channels thereof being generally Y-shaped with respective spreaders dividing their branches.

6. A slide fastener as defined in claim 5 wherein said slider and said socket are each provided with a pair of parallel shields interconnected by the associated spreader and with sidewalls projecting from one of said shields but terminating short of the opposite shield to leave slots for receiving respective edges of said tapes.

7. A slide fastener as defined in claim 6 wherein said tapes are provided with elastic reinforcing strips overlying said tapes in the region of said bottom stop, said strips being integral with said extensions and thin enough to pass through said slots.

8. A slide fastener as defined in claim 7 wherein said coupling elements, extensions and strips consist of thermoplastic material.

9. A slide fastener as defined in claim 3 wherein said extensions are angularly bent in substantial conformity with the legs of said generally X-shaped passage.

10. A slide fastener as defined in claim 1 wherein said lower extremity of said first element and said socket are provided with coacting abutments preventing detachment of said socket from said first element.

11. A slide fastener as defined in claim 10 wherein said lower extremities are provided with coacting formations engaging each other in a position of closest approach within said channel to define a stop for the insertion of said lower extremity of said second element, said spreader being overlain by a transverse edge of one of said formations.

12. A slide fastener as defined in claim 1 wherein said spreader has a substantially straight flank adjacent said one of said extremities and an inclined flank bounding said opposite channel branch.

* * * * *