Oct. 3, 1961 J. E. BURBANK 3,002,245

SLIDE FASTENER

Filed July 3, 1958

FIG.1.

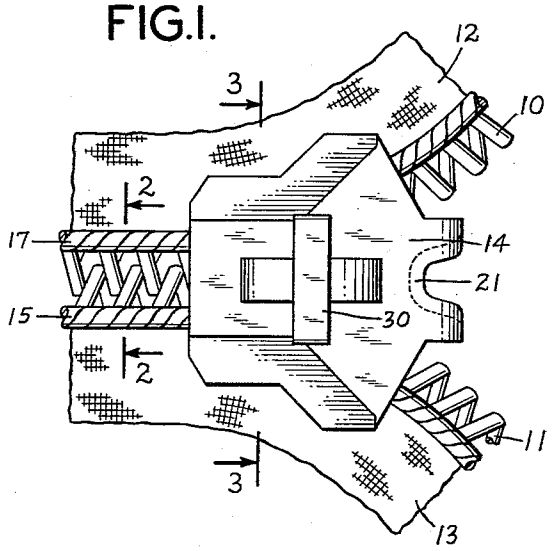


FIG.2.

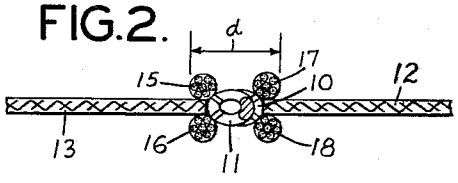
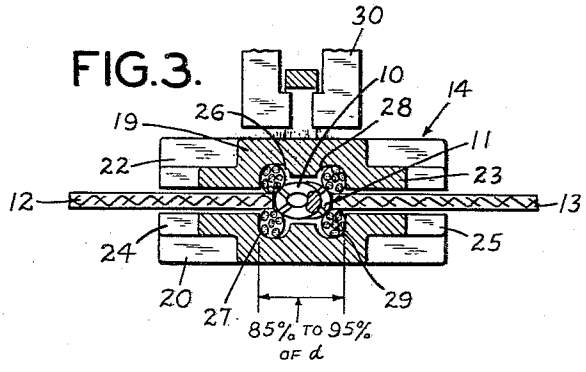


FIG.3.



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United States Patent Office 3,002,245 Patented Oct. 3, 1961

3,002,245
SLIDE FASTENER

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Filed July 3, 1958, Ser. No. 746,541
3 Claims. (Cl. 24—205.15)

This invention relates to improvements in slide fasteners, and it relates particularly to an improved type of fastener in which the fastening elements are continuous and include a plurality of convolutions or loops such as, for example, the helical or spiral type of fastener.

Slide fasteners of the type referred to above have problems in their manufacture and operation which are not encountered with the metallic tooth or scoop-type of fastener. With these latter types of fasteners, for example, the slider which is used to open and close the fastener has side flanges which bear against and ride along the outer metallic edges of the fastener teeth. A metal to metal sliding contact is obtained which permits the slider to move readily along the fastener without undesirably high friction and without danger of derailment of the slider.

With the coil or convoluted type of slide fastener formed of plastic, it is undesirable to have a metallic slider in direct contact with the plastic fastening elements for the reason that operation of the slider tends to wear and abrade the fastening elements. Moreover, the coil-like or convoluted form of such fasteners sometimes causes the slider to be derailed or disengaged from the fastening elements when the fastener is subjected to strong laterally directed forces tending to pull the fastening elements apart. For that reason, it is customary to secure to the tapes adjacent the outer edges of the fastening elements, bead cords formed of textile yarns against which the flanges of the slider bear. The bead cords form guide rails or tracks along which the slider moves out of contact with the fastening elements. The use of such bead cords requires the slider flanges to be fitted rather closely to the pieces of material to which the cords and the fastener members are secured in order to prevent the cords from wedging in the slider and preventing its operation. When the flanges are too closely spaced, they rub against the tapes or other pieces of material to which the fastening elements are secured, and result in undesirably rapid wear thereof.

The present invention involves a relationship between the slider, the bead cords and the fastening elements, which overcomes the disadvantages noted above, and results in a slide fastener which is opened and closed readily and positively even under conditions where high lateral stresses are exerted on the fabric tending to pull the fastener elements apart and in which wear on the tapes or pieces of material, to which the fastener members are secured is reduced to a minimum.

More particularly, in accordance with the present invention, the slider is provided with grooves or recesses in the opposing surfaces of the inner and outer plates thereof to receive and engage the bead cords and the fastener members, and guide the fastener members into and out of meshing relation, the recesses having their outer or lateral edges spaced apart a distance considerably less than the distance between the outer or lateral edges of the bead cords when they are in an uncompressed condition and the fastener members are in meshed or closed relation. By means of this relation, the bead cords are compressed inwardly, and the fastening elements adjacent thereto are urged together so that meshing thereof is assured even though large tension stresses are exerted on the tape members or pieces of material to which the fastener members are secured.

Surprisingly, compression of the bead cords by the restricted grooves in the slider does not result in a markedly increased resistance to movement of the slider of the slide fastener or substantially increased wear on the bead cords. Moreover, due to the compression of the bead cords laterally, they are expanded somewhat in a plane at right angles to the plane of the material to which they are secured, so that they provide an increased lateral surface for engagement with the flanges at the edges of the slide fastener. As a result, the opposed edges of the flanges on the opposite sides of the tapes or pieces of material can be spaced more widely apart, thereby reducing wear on the tapes or pieces of material to which the fastening elements are attached.

For a better understanding of the present invention, reference may be had to the accompanying drawing in which:

FIGURE 1 is a plan view of a portion of a slide fastener embodying the present invention;

FIGURE 2 is a view in cross-section taken on line 2—2 of FIGURE 1; and

FIGURE 3 is a view in cross-section taken on line 3—3 of FIGURE 1.

The form of slide fastener chosen for purposes of illustration is a so-called spiral fastener, the type disclosed in the Schwartz application Serial No. 346,380 filed April 2, 1953, now Patent No. 2,858,592, dated November 4, 1958. This type of fastener includes a pair of generally helical coils **10** and **11** formed of a filament of nylon or other similar plastic of oblong cross-section. It will be understood that other types of coils or continuous fastening elements having a series of loops or convolutions may also be provided, such as, for example, the types of fastening elements shown in the Schwartz application Serial No. 470,318 filed November 22, 1954 (now abandoned), and the Casson application Serial No. 403,107 filed January 11, 1954, now Patent No. 2,919,482, dated January 5, 1960. The coils **10** and **11** are stitched to pieces of material **12** and **13** such as the tapes of conventional slide fasteners. In order to provide a guide for the slider **14** used for opening and closing the fastener, a pair of bead cords **15** and **16** are secured to the tape **13** on opposite sides thereof, adjacent to and extending lengthwise of the coil **11** thereon. Similar bead cords **17** and **18** are secured to the tape **12** on opposite sides thereof adjacent the coil **10** attached thereto.

As best shown in FIGURES 1 and 3, the slider **14** has an upper plate **19** and a lower plate **20** which are normally disposed on opposite sides of the tapes **12** and **13** and the coils **10** and **11** and are connected in substantially parallel relation at their leading end by means of an island **21**. At each lateral edge of the slider **14** are edge flanges **22**, **23**, **24** and **25** which define the outer edges of grooves **26**, **27**, **28** and **29** for receiving the bead cords **15** to **18**, respectively.

The space between the grooves **26** to **29** is relieved somewhat to form a recess in which the meshed coils **10** and **11** are received. It will be understod that the grooves **26** and **27** diverge away from the grooves **28**, **29** on opposite sides of the island **21** but are in substantially parallel relation at the opposite end of the slider **14**. A slider of the type described above is disclosed in my copending application Serial No. 524,071 filed July 25, 1955, now Patent No. 2,909,824, dated October 27, 1959.

The slider **14** differs from that disclosed in my above-mentioned application in that the spacing between the lateral edges of the grooves **26** and **28** and the grooves **27** and **29** in the trailing portion of the slider, is between 85% and 95% of the distance *d* between the outer edges of the beads **15** and **17** or the beads **16** and **18** as in-

dicated by the legends on FIGURES 2 and 3. When the slider **14** is moved by means of its operating tab **30** along the fastening members to the right as viewed in FIGURE 1, the diverging portions of the fastener members **10** and **11** are brought together and directed into meshing relationship. If the recess in the slider **14** were big enough to receive the bead cords **15** to **18** without compressing them, tension exerted transversely of the tapes **12** and **13** would compress and move the cords **15**, **16** away from the cords **17**, **18**, so that the coils **10** and **11** would be pulled apart and prevented from meshing properly. By making the distance narrower between the outer walls of the grooves **26** and **28** and outer walls of the grooves **27** and **29**, in accordance with the present invention, the bead cords **15** to **18** are compressed inwardly by the slider toward the coils **10** and **11**, and the coils thereby are forced together in proper interlocking relation even though strong tension stresses may be exerted transversely of the tapes **12** and **13** in opposition to the action of the slider in causing the fastening members to mesh.

Compression of the bead cords by the slider does not introduce enough friction to preclude the easy movement of the slider along the fastening elements, but it does assure full and complete meshing of the coils **10** and **11** in opposition to lateral stresses exerted thereon, as explained above. Accordingly, by proper dimensioning or proportioning of the recesses in the opposing faces of the slider as described above, substantially all of the disadvantages which have been encountered in the operation of coil fasteners and other fasteners having continuous interconnected loops or convolutions are overcome.

It will be understood that the shape and dimensions of the slider and fastening elements can be modified and that the form of the invention described herein is illustrative.

I claim:

1. A slide fastener comprising a pair of continuous flexible fastening elements composed of springy filaments, each having a plurality of convolutions, said elements being adapted for meshing engagement, a piece of flexible material fixed to each fastening element, at least one compressible guide bead secured to each piece of flexible material and extending adjacent to and lengthwise of said fastening element, said beads being disposed outwardly of said fastening element, and a slider having internal grooves for receiving said fastening elements and beads, the spacing between the outer opposite sides of at least a portion of the grooves for receiving the beads being about 85% to 95% of the spacing between the outer edges of said beads when the fastening elements are in meshing engagement and said beads are unconfined.

2. A slide fastener comprising a pair of pieces of flexible material, an elongated flexible fastening element having a plurality of convolutions secured to an edge of each piece of material, compressible bead cords secured to opposite sides of each piece of material adjacent each fastening element and extending substantially parallel therewith, a slider having a pair of spaced plates on opposite sides of said fastening elements, pieces of material and bead cords, and an island connecting said plates and extending between said fastening elements, and internal recesses in said plates for receiving said fastening elements and bead cords, a portion of the recess in each plate having a maximum width between about 85% and 95% of the distance between the outermost sides of the bead cords received in said recess when said fastening elements are engaged and the bead cords are unconfined.

3. A slide fastener comprising a pair of pieces of flexible material, an elongated flexible fastening element having a plurality of springy convolutions secured adjacent to an edge of each piece of material, compressible guide elements secured to opposite sides of each piece of material adjacent each fastening element and extending substantially parallel therewith, a slider having a pair of spaced plates on opposite sides of said fastening elements, pieces of material and guide elements, an island connecting said plate and extending between said fastening elements and flanges at the lateral edges of each plate extending toward said pieces of material for engaging the outer lateral surfaces of said guide elements, portions of the flanges on each plate having a maximum spacing between about 85% and 95% of the distance between said outer lateral surfaces of the guide elements when said fastening elements are engaged and the guide elements are unconfined.

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