Aug. 13, 1929. G. E. PRENTICE 1,724,311

INTERLOCKING FASTENER CONSTRUCTION

Filed April 28, 1924

Fig. 1

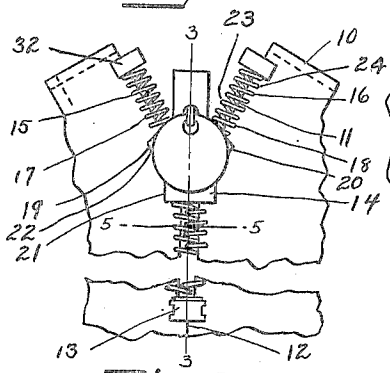


Fig. 6

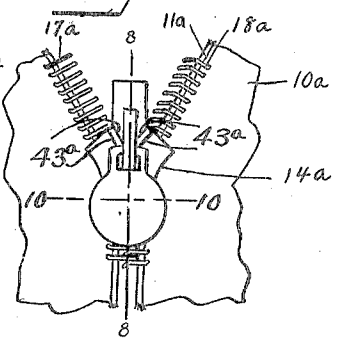


Fig. 8

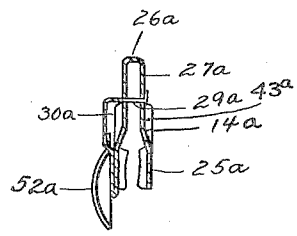


Fig. 2

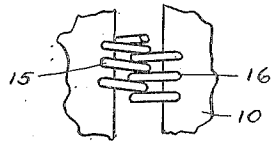


Fig. 7

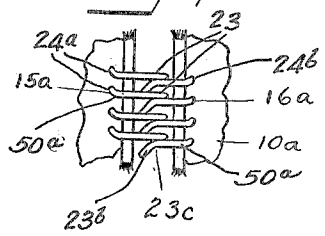


Fig. 5

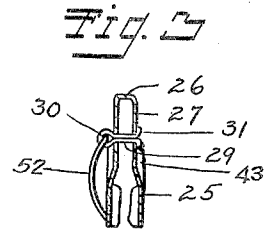


Fig. 9

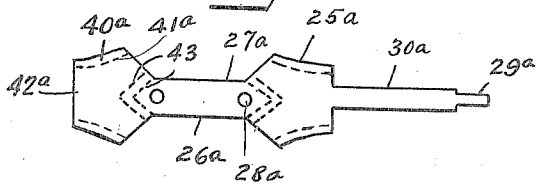


Fig. 11.



Fig. 5

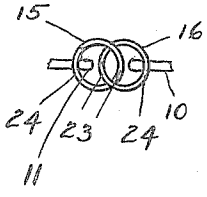


Fig. 10

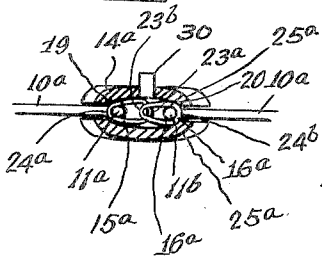
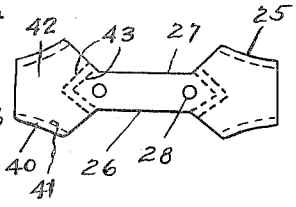


Fig. 4



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UNITED STATES PATENT OFFICE.

GEORGE E. PRENTICE, OF BERLIN, CONNECTICUT.

INTERLOCKING FASTENER CONSTRUCTION.

Application filed April 28, 1924. Serial No. 709,643.

My invention relates to improvements in interlocking fastener construction, of the form involving the use of a series of mating devices arranged along the opposed edges of material in the form of fabric, leather, or rubber or the like and which edges define the borders of a gap or opening in a garment or shoe or container and which devices cooperate to permit of readily closing and opening said gap or opening, reference being made to my companion application filed August 29, 1924, Serial No. 735,014, and the object of my improvement is to produce a device and means of producing the same whereby the construction will be relatively simple and economical and in use said device will be convenient and efficient.

In the accompanying drawing:—

Figure 1 is a front elevation of a pair of strips of fabric in the form of braided material having edges opposed and provided with interlocking fastener means in accordance with my invention.

Figure 2 is a similar view of a portion of the same on a considerably enlarged scale.

Figure 3 is a sectional view of the operating slide on the line 3—3 of Fig. 1.

Figure 4 is a plan view of the blank for the slide on a reduced scale.

Figure 5 is a sectional view on the line 5—5 of Fig. 1, showing the relations of the parts in the locked position.

Figure 6 is a front elevation of a pair of strips of fabric in the form of webbing, of woven material, having edges opposed and provided with interlocking fastener means also in accordance with my invention and differing in certain details from the structure shown in Fig. 1, both as to the interlocking devices proper and the operating slide.

Figure 7 is a similar view of a portion of the same on the same scale as Fig. 2.

Figure 8 is a sectional view of the operating slide on the line 8—8 of Fig. 6.

Figure 9 is a plan view of the blank for the slide that is shown in Figs. 6 and 8.

Figure 10 is a sectional view on the line 10—10 of Fig. 6, showing the relation of the parts in the locked position.

Figure 11 is a fragmentary view in perspective showing the interengagement of the interlocking elements of the form that is shown in Figs. 6, 7 and 10.

My improvement in interlocking fastener construction so far as concerns the general operative features and also the field in which it is operatively applied corresponds to devices in common use, the purpose being to provide means for opening and closing a gap and which latter may be provided in a garment, shoe, pouch, or the like.

Thus in the structure that is shown in Fig. 1 there are two strips 10 of braid that are positioned side by side and with the edge portions 11 oppose one to the other. These may be permanently connected as at the lower ends 12 by any suitable and proper means, such as the metal clip 13 shown.

Said strips 10 extending upwardly from said clip 13 may be of any length desired suited to the special need and the interlocking means serve to permit of alternatively closing and opening or unlocking said opposed edge portions 11 and the operating means for effecting such closing and unlocking is in the form of a slide 14.

The interlocking means consist of a series of mating devices that are adapted to cooperate for the purpose mentioned and which are extended along said edge portions 11. Said devices may be designated as the left members 15, being at the left in Fig. 1, and the right members 16, which are at the right. The entire series of the left members 15 is designated by the character 17 and the series composed of the members 16 is designated by 18.

Said series are threaded through channels that are provided in the slide 14, the series 17 in the left channel 19 and the series 18 in the channel 20. Said channels 19 and 20 are bordered on the outsides by dependent flanges 40 that are connected along the border edges 41 of the body portions 42 of the top and bottom plates 25. On the inside of

each of said channels 19 and 20 and at the upper portion thereof is a wall 43 that serves to define the corresponding portion of the said channels. Said wall 43 is the equivalent of the flange 40 in function in that it serves as a guide under operating conditions, but is formed differently in that it is located at the junction of the plate 25 with the arm 27 to be described and it is formed in each case by suitably swaging the material at said junction. The two adjacent junctions or swaged portions 43 meet in V-formation.

Said channels 19 and 20 are adjacent and parallel as to the lower portions 21 and the upper portions 22 are divergent. Thus the two channels 19 and 20 are arranged in a Y-formation. The members of the series 17 and 18 are slidable in their respective channels and operate through the movement of the slide to bring the members 15 and 16 into the interengaging and interlocking position responsive to a lifting or upward movement of the slide 14 and to separate and unlock the same upon reverse movement.

Fixed stops, such as the metallic clips 32, of any approved and suitable form may be provided to limit the upward movement of the slide 14.

The left members 15 and right members 16 have free portions 23 that project inwardly beyond the edge 11 of the braid 10 and that in the locked position overlap the mating free portions 23 that are opposed.

The features so far described are common to devices that are in common use.

One of the important features that serves to distinguish the present invention from such devices resides in the fact that, in lieu of having the locking members that compose the series in the form of individual and separate units, each of which is mounted upon and secured to the fabric by itself and independent of the others, they are integrally connected. Actually each series is made up of a single piece of spring wire that is wound in the form of a spring. The convolutions thereof comprise in each case the inwardly projecting or overhanging portion 23 mentioned at the inner side and the outer portion 24 outward therefrom. Said outer portion 24 is threaded through the material, the braid 10 in the present instance, and serves as the connecting means for incorporating the structure of the spring with that of the fabric.

An important detail, however, is further to be noted. This is that the two springs are to be oppositely wound.

Thus in the structure that is shown in Fig. 1 the left series 17 is formed by means of a simple plain helical or coil spring that is wound left handed and the right series 18 by means of a right handed spring.

Also, the engagement with the braid 10 is effected by threading or screwing the spring into the material.

By arranging the spacing between the convolutions to correspond to the thickness of the material, with some allowance for play or leeway, the overlapping parts 23 will serve when interengaged to positively lock the edges 11 against separation.

As to the slide 14, this is made of sheet metal, and comprises similar top and bottom plates 25 that are opposed and positioned in spaced relation and that are suitably swaged to provide the channels 19 and 20.

I prefer to form the two plates 25 integral from a blank that comprises at the upper end a return bend or loop structure 26 that has opposed upper and lower arms 27 that merge individually with the top and bottom plates 25.

Under conditions of use the springs that are housed in the channels 19 and 20 serve as spacers for the plate structures described so far as concerns the minimum distance therebetween and simple means suffice for limiting the outward spacing and holding the plates in operative engagement with the springs. As shown, the arms 27 are provided with registering openings 28 for a limiting device 29 that is virtually a cotter-pin having the eye 30 at the upper end and the bent-over finger-ends 31 at the lower end.

The eye 30 is utilized, as shown, as the connecting means for the operating handle 52 that is in the form of a dished disc-like structure, suitable for being grasped by the fingers and thumb, and that is provided with a perforation for receiving the material of said eye 30.

Reverting to the details of the spring structures, suitable conditions for satisfactory operation are provided by the use of wire of nickel-silver of .029 inches diameter, wound on a one-eighth inch mandrel and with an allowance of .010 inches leeway.

The spring structures 17 and 18 extend along the full length of the gap to be closed and to this end terminate at the fixed stops mentioned, comprising the stop 13 at the lower ends and the stops 32 at the upper ends. Said stops also serve to fix the positions of the ends of the springs and determine in this way the dimension in the longitudinal direction or the effective over all length. In other words they tend to maintain the spacing that is provided between the adjacent convolutions and oppose the tendency that is inherent in springs generally and of the coil form to open up and unwind when subjected to pressure.

The springs shown in Fig. 1 are precisely as wound on a cylindrical mandrel. In some cases it is desirable to provide a flatter and less bulky form of structure and it is expedient to meet this condition by swaging the structure of the spring. Other features may also be introduced by swaging, such as specially formed engaging parts, and differing in this respect from the structure of Fig. 1. Thus in said figure the springs on the two sides are alike except that one is right-handed and the other left-handed.

Thus in the structure that is shown in Fig. 6 the springs 17^a and 18^a are both flattened, the details being special as will be described, reference being had to Fig. 10.

The border edge portion of the webbing 10^a is represented by the cord 11^a shown in cross-section. Considering the left spring 17^a, a single convolution 15^a thereof is shown. The form of said convolution is substantially egg-shaped, the smaller or more pointed end 24^a being at the outer end and the larger and more open end 23^a being at the inner end. Said outer pointed end 24^a is looped around the cord 11^a and serves as the holding means or means for connecting the spring with the webbing. The larger and more open inner end 23^a is in the form of a relatively open loop that is adapted to more readily receive and cooperate with the mating locking member. That is to say, the receiving loop 23^a is larger and more open than is the case with the spring in the original shape, as delivered from the mandrel.

For cooperating with the loop 23^a the right spring 18^a has a hook-like structure 23^b that is relatively narrow and pointed, and, also, is directed inwardly and downwardly by means of an angle or abrupt bend 23^c in the material adjacent the inner side. The form of the individual convolutions 16^a is also substantially egg-shaped with the relations of the large and small ends reversed relatively to the holding cord 11^b and the other parts from that described in regard to the left convolutions 15^a.

The relation and construction of the smaller, pointed inner end 23^b has been described. The larger outer end 24^b of the convolution 16^a extends around the holding cord 11^b.

By providing the specially formed locking members as described a positive locking effect is obtained with a larger leeway in the dimensions of the interengaging parts.

Reverting to the details of the left spring 17^a and the right spring 18^a, it will be noted, as shown particularly in Fig. 7, that the individual convolutions comprise a portion in front and a portion in back of the fabric that are in a common plane and which plane is substantially at right angles to the axis of the particular spring and at right angles to the edge of the fabric. The portions referred to and seen in Fig. 7 are at the front of the fabric and serve to conceal the mating portions that are at the rear, and they are designated by the character 50 for the spring 17^a and the character 50^a for the spring 18^a.

Thus in the case of the spring 17^a, and considering an individual convolution 15^a, the active portion is the larger or relatively open inner end 23^a and this is in the form of a loop or return bend that is supported by a pair of arms 50. Said arms 50 cross the edge of the fabric, the one in front thereof and the other in back. Said arms 50, furthermore, connect individually with outer connecting portions 24^a. Thus the arms 50 that are shown as exposed and visible in Fig. 7 merge at the left with connecting portions 24^a that are directed upwardly for connecting with the convolution that is next above.

The mating arm 50 that is covered by the front arm 50 that is shown in Fig. 7 is located at the rear of the fabric and merges with an outer connecting portion 24^a that is directed downwardly and that connects with the convolution that is next below in each case.

In the case of the right hand spring 18^a and the individual convolutions 16^a, the arms 50^a support the return bends 23^b that serve as the active overhanging portions of the convolutions and said arms 50^a merge each with an outer connecting portion 24^b that connect respectively, the one with the convolution that is next above and the other with the convolution that is next below.

In Fig. 7 the arm 50^a that is shown is the front arm for the different convolutions and these merge with a connecting portion 24^b that is directed so as to connect with the convolution that is next above.

The point to be particularly noted is that the springs 17^a and 18^a have their convolutions so swaged that what may be described as a change in elevation from one convolution to the next is confined substantially to the outer connecting portions 24^a and 24^b. It follows from this that the mating arms 50 and 50^a in a particular case are located substantially in a common plane, as mentioned above, and that the particular plane is generally at right angles to the axis of the spring, or a radial plane.

In the slide 14^a the opposed plates 25^a, arms 27^a of the return bend structure 26^a, and the opening 28^a for the limiting device 29^a are similar to the corresponding parts already described. Said limiting device 29^a, however, is in the form of a finger or prong that extends integrally from the lower free edge of the upper plate 25^a and is bent upwardly to permit said finger or prong to be entered into the openings 28^a. Actually, however, there is an intermediate connecting strip 30^a between said plate 25^a and the

prong that extends over the top of said plate 25^a and serves as the eye 30^a for operatively holding the disc-like handle piece 52^a. Thus the eye 30^a is of elongated form and permits of limited travel for the handle 52^a over the top of the slide between the two operating positions, the one for locking and the other for unlocking.

In all of the different forms of structure shown and described the interlocking elements are all made of wire and the contacting engagement of mating members involves essentially a crossing of wires in some manner. This detail is advantageous both as regards the feature of construction and manufacture and also that of results under conditions of use.

Thus in manufacture, only a bending of the material is involved in forming the active part or interlocking part proper.

As to use, with the members made of wire there is less liability of becoming forcibly locked or "frozen," a condition that may require damage or injury to the parts to effect a separation.

I claim as my invention:—

1. A fastener of the class described comprising two opposed series of fastener elements secured respectively to the edges of material bordering a gap or opening, each series of fastener elements being formed of an open coil wire, the fastener elements of each series being so spaced and shaped as to receive between them the fastener elements of the other series and to produce a positive locking effect by the cumulative action of neighboring elements when the elements are interengaged, and a slider for controlling the engagement and disengagement of the two series of fastener elements.

2. A fastener of the class described comprising two opposed series of fastener elements secured respectively to the edges of material bordering a gap or opening, each series comprising a plurality of fastener elements formed of a continuous wire, the fastener elements of each series being so spaced and shaped as to receive between them the fastener elements of the other series and to produce a positive locking effect by the cumulative action of neighboring elements when the elements are interengaged, and a slider for controlling the engagement and disengagement of the two series of fastener elements.

3. A fastener of the class described comprising two opposed series of fastener elements secured respectively to the edges of material bordering a gap or opening, each fastener element consisting of a wire loop projecting beyond the edge of said material, the fastener elements of each series being so spaced and shaped as to receive between them the fastener elements of the other series and to produce a positive locking effect by the cumulative action of neighboring elements when the elements are interengaged, and a slider for controlling the engagement and disengagement of the two series of fastener elements.

4. A fastener of the class described comprising two opposed series of fastener elements secured respectively to the edges of material bordering a gap or opening, each fastener element consisting of a wire loop projecting beyond the edge of said material, the fastener elements of each series being so spaced and shaped as to receive between them the fastener elements of the other series and to produce a positive locking effect by the cumulative action of neighboring elements when the elements are interengaged, each loop of each series having its outer end engaging behind the outer end of a loop of the other series, and a slider for controlling the engagement and disengagement of the two series of fastener elements.

5. A fastener of the class described, said fastener comprising opposed series of fastener elements arranged respectively upon the edges of material bordering an opening or gap, each one of said series of fastener elements consisting of an open coiled spring, all of whose convolutions are substantially alike, each of said convolutions projecting beyond the edge of the material, the convolutions being so spaced as to receive between them the fastener elements of the opposed series, the projecting portion of each convolution of one spring comprising means adapted positively to interlock with the convolutions of the opposite spring thereby to resist separation of the springs.

6. A fastener of the class described, said fastener comprising opposed series of fastener elements disposed respectively at opposite edges of flexible material bordering a gap or opening, each series consisting of an open coiled spring, the respective springs being of opposite pitch, the convolutions of one spring being spaced to receive the convolutions of the other spring between them, each convolution of each spring being anchored to the material bordering the gap, the outwardly projecting portions of each convolution of one spring being so shaped as to provide locking means affording positive resistance to separation from the convolutions of the other series.

7. A fastener comprising a pair of stringers each having a cord extending along one of its edges and an open coiled helical spring secured to the corded edge of each stringer, all of the convolutions of each spring being substantially alike and each convolution embracing the cord of its respective stringer, those portions of the convolution of the respective springs which

project beyond the cords being shaped to grip each other directly and thereby positively to oppose separating stress.

8. In a device of the character described, in combination, a fastener member resilient and flexible transversely, having transverse teeth resiliently connected in a series longitudinally of said member and a cooperative fastener member having a series of teeth, the teeth of said cooperative member adapted to be received between and interlocked with the teeth of the other fastener member when the fastener is closed, a body member of flexible fabric, the teeth of said first-mentioned fastener member having loop portions passing through said body member for connecting said first-mentioned fastener member and a slider for moving the teeth of the two series into interlocking relationship to said body member.

9. In interlocking fastener construction, a fabric piece having a finished edge, a series of fastener members overhanging said edge and separated individually from adjacent members by spaces for receiving cooperating fastener members, said members being each a part of a convolution of a coil spring that is threaded through the material of said fabric, and said coil spring being swaged so that portions of the different convolutions on opposite sides of said fabric are in a common plane.

10. In interlocking fastener construction, opposed edge portions of material and coil springs of open form mounted on said material and having spaces between adjacent convolutions for receiving the convolutions of the mating spring, and the parts of said convolutions on one side that enter within the spaces between the convolutions on the other side having deflected or bent portions adjacent the tip or free ends for assisting in the locking effect.

11. In interlocking fastener construction, two mating series of interlocking members supported individually by strips of fabric, the individual elements of each of said series comprising a convolution that is formed of wire, and the convolutions of the two series being shaped differently to facilitate interconnection, those on one side providing a relatively open loop and those on the other side providing a relatively pointed form of structure for being entered into said loop.

12. In interlocking fastener construction as described in claim 11, said relatively pointed form of structure in the case of each of the convolutions on the said other side having the free end portion bent relatively to the adjacent portion of the convolution to further facilitate such interconnection.

13. In interlocking fastener construction, two mating series of interlocking members supported individually by strips of fabric, each series constituting part of a coil spring that is formed of wire, and the convolutions of the two series being shaped differently to facilitate interaction, those on one side providing a relatively open loop and those on the other side providing a relatively pointed hook-like structure for being entered into said loop.

14. In interlocking fastener construction, opposed edge portions of material bordering an opening or gap, coil springs threaded into said material and each having parts of the convolutions opposed to parts of the other spring, said springs being of open coil form with spaces between adjacent convolutions for receiving the convolutions of the mating spring, one of said springs being swaged so that the convolutions are substantially egg-shaped, and the small or pointed ends of said convolutions serving as the parts that are entered between the convolutions of the mating spring.

15. In interlocking fastener construction as described in claim 14, the convolutions of said mating spring being also swaged so as to be substantially egg-shaped and being arranged so that the large or open ends cooperate with said small or pointed ends.

16. In interlocking fastener construction, opposed edge portions of material and convolutions of spring wire mounted on said material and having spaces between adjacent convolutions for receiving the convolutions of the opposite side, said convolutions being threaded through said material, and part of the wire of each convolution opposed to one face of said material being substantially in a common plane with another part of said wire that is opposed to the opposite face of said material.

17. In interlocking fastener construction, opposed edge portions of material and coil springs of open form mounted on said material and having spaces between adjacent convolutions for receiving the convolutions of the mating spring, arms serving as supports for the parts of the convolutions that enter within said spaces and consisting of one arm in front of said material and a second arm at the rear thereof, and said arms for the individual convolutions being located substantially in a common plane.

18. A fastener of the class described, said fastener comprising opposed series of fastener elements arranged respectively upon the edges of material bordering an opening or gap, at least one of said series of fastener elements consisting of an open coiled spring all of whose convolutions are substantially alike, each of said convolutions being anchored to the material and projecting from the edge of the material, the projecting portion of each convolution being deformed to provide a locking element, the coils being so spaced that when the fastener elements of the opposed series are disposed between the

convolutions of the spring the locking element of each convolution engages an opposed fastener element thereby positively to oppose separating stress acting perpendicularly to the edge of the gap.

19. In interlocking fastener construction, a slide comprising opposed plates that are swaged to provide divergent channels, a return bend structure serving to interconnect said plates, means in the form of a finger extending through opposed portions of the material of the slide for limiting the outward spacing of the plates, and a connecting strip serving to integrally connect said finger with one of said plates.

20. In interlocking fastener construction as described in claim 19, a handle supported by said connecting strip.

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