

March 22, 1932.

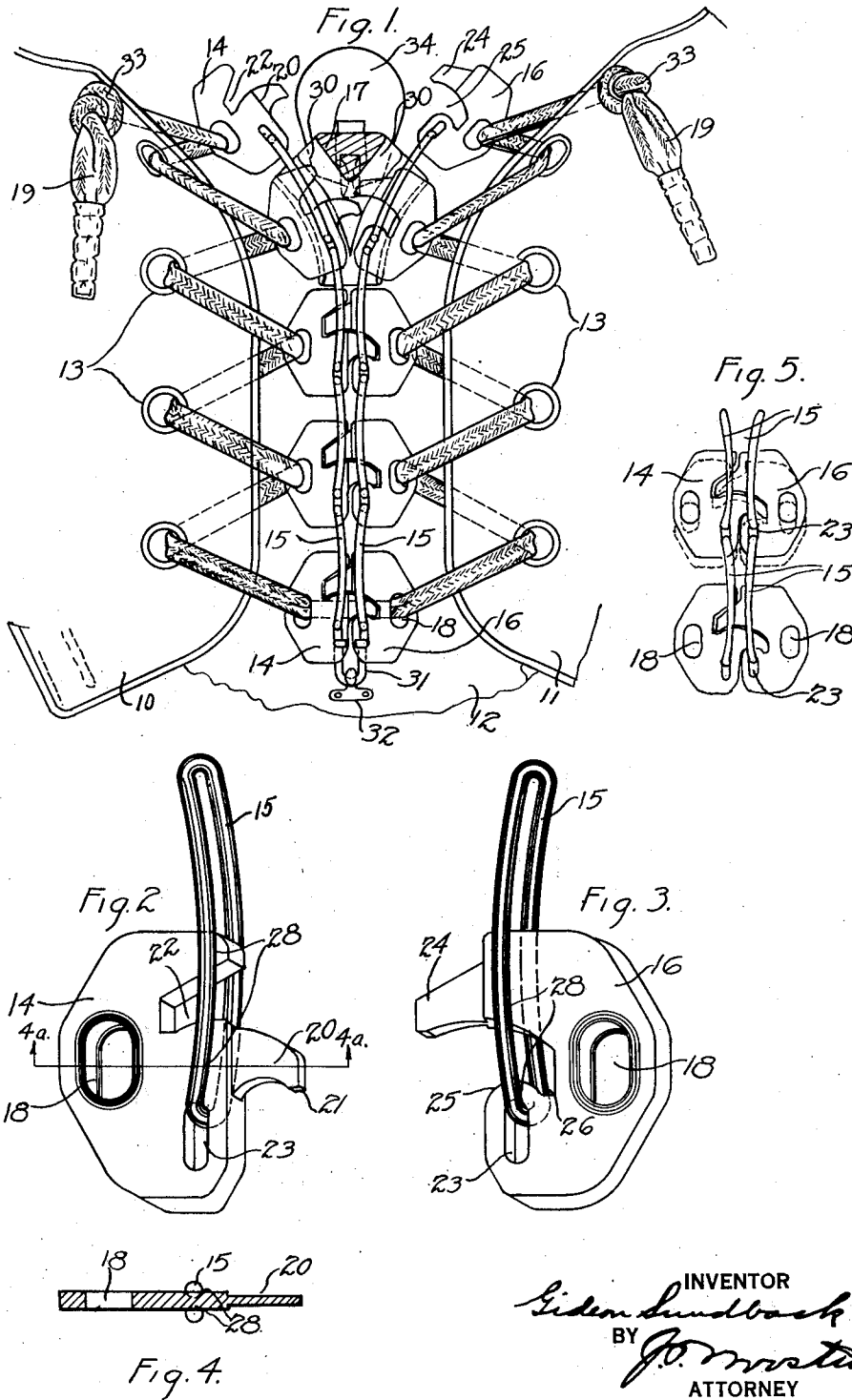
G. SUNDBACK

1,850,160

SEPARABLE FASTENER

Filed March 9, 1928

2 Sheets-Sheet 1



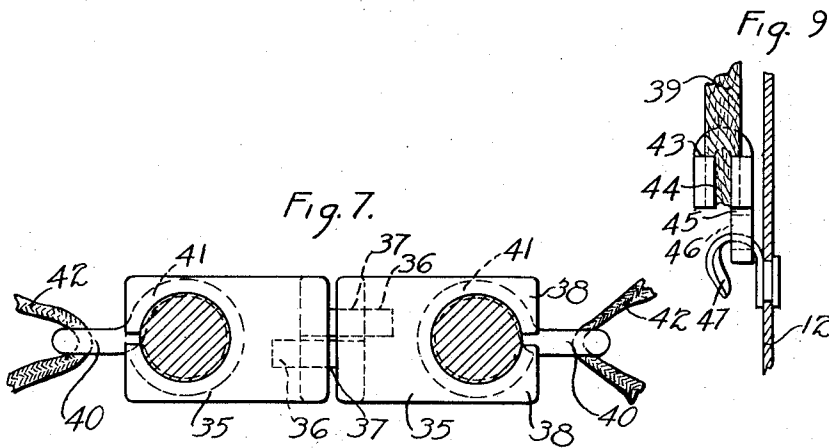
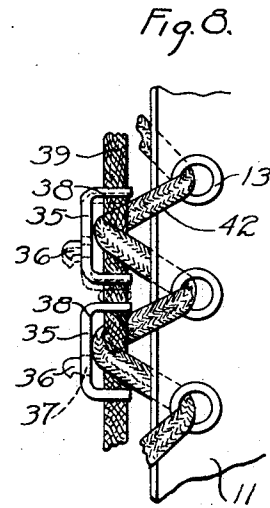
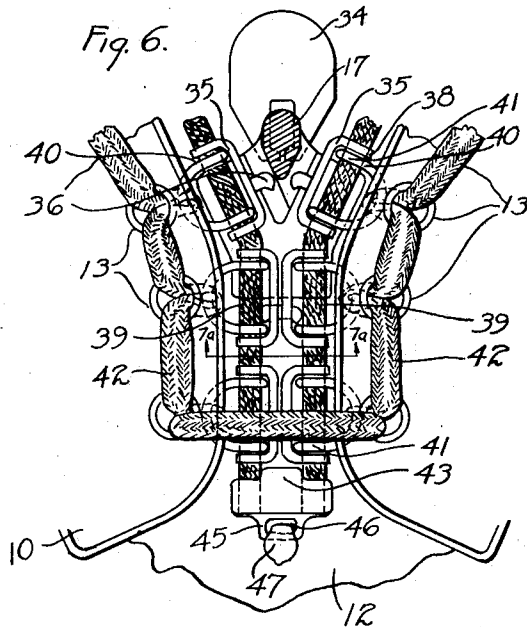
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2 Sheets-Sheet 2



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SEPARABLE FASTENER

Application filed March 9, 1928. Serial No. 260,494.

This invention relates to separable interlocking fasteners and particularly to a slide actuated fastener having opposed series of interlocking members which may be laced to the opposite edges of a closure.

An object of the invention is to provide a separable fastener of this type which is simple, economical and reliable, having increased flexibility and holding power, which may be laced to an ordinary shoe or other article without deforming or otherwise altering such article, and may be quickly adjusted or entirely removed from such article without special knowledge or manipulation.

Another object of the invention is to provide a novel construction of interlocking members which may be used on various types of separable fasteners to increase the holding power and facilitate locking and unlocking.

Still another object is to provide an improved fastener having a series of fastener elements each interlocking with an element directly opposite it in another series, the elements in each series being corrected to each other in such manner that considerable relative longitudinal movement can take place thus permitting longitudinal expansion and contraction of the fastener when interlocked.

While separable interlocking fasteners have previously been laced to various articles, and a number of patents issued on such constructions, difficulty has been encountered in practically applying them to present day conditions of use. The interlocking members have either been so loose as to impair the security in locking, or else have been so inflexible as to prevent them from conforming to the contour of the article to which they are applied. This has made the fastener difficult to manipulate, has also given the article an unsightly appearance, and, in the case of extreme rigidity, has resulted in discomfort to the wearer when the fastener is applied to shoes and other apparel.

The present invention provides a simple and efficient interlocking fastener having novel interlocking members which may be laced directly to a shoe or other article of standard construction, and may be quickly adjusted or entirely removed therefrom as

a unit. The interlocking members may be manufactured economically, of sheet metal, and when engaged are flexible enough to conform to the varying contour of any article on which they are employed, and yet secure enough to withstand the most severe operating strains without coming apart. In the preferred form of the invention the interlocking members are each provided with an edgewise projection and recess in the same longitudinal plane for engagement with the complementary parts of similar opposite members.

A further feature of the invention consists in the combination of chains each having opposite members interlocking in pairs, with lacing recesses so disposed relatively to the interlocking surfaces that the members when locked and laced on are not subject to canting or unlocking from the tension of the lacing. This result is partially obtained by a special arrangement of interlocking surfaces so as to hold stable under transverse strain, irrespective of slight relative longitudinal displacement of the members, and partially by so disposing lacing recesses at the rear of each member that the transverse strain will be properly transmitted. Means are also provided whereby the fastener can vary in length to accommodate itself to the article without effecting the interlocking. In such a system the flexibility desired for articles such as footwear, leggings, etc., can be obtained without sacrificing of strength and convenience.

The various features and advantages of the invention will be described in connection with certain preferred embodiments shown in the accompanying drawings, in which:

Fig. 1 is a plan view of a separable fastener embodying the invention;

Fig. 2 is an enlarged isometric view of a locking member of one series;

Fig. 3 is an enlarged isometric view of a complementary locking member of the opposite series;

Fig. 4 is a cross-section taken on the line 4a-4a of Fig. 2;

Fig. 5 is a detail view illustrating the flexibility between the interlocked members;

Fig. 6 is a plan view showing a modification of the invention;

Fig. 7 is an enlarged cross-section taken on the line 7a-7a of Fig. 6;

Fig. 8 is a plan view showing one series of locking members embodying another modification of the invention; and

Fig. 9 is a side view of the separable bottom connection shown in Fig. 6.

In Fig. 1, the invention is shown applied to an ordinary shoe having flaps 10 and 11 and a tongue 12. The flaps 10 and 11 are provided with eyelets 13 disposed directly opposite one another in the usual manner.

The fastener consists of two chains or stringers, one consisting of a series of locking members 14 held together by connecting links 15, and the other consisting of a series of complementary locking members 16 held together by similar connecting links 15. The links 15 also provide a novel track for the slider 17 which moves up and down to engage and disengage the locking members, as hereinafter described.

The locking members 14 and 16 are each provided with a hole 18, and the two series of locking members are laced to the opposite flaps of the shoe by means of a continuous lace or shoestring 19 which passes alternately through the eyelets 13 and the holes 18.

The locking members 14 of one series, shown in detail in Fig. 2, are each provided with a curved hook portion 20 of reduced thickness having a substantially flat depending end 21, a recess or cut-away portion 22, and an elongated slot 23. The locking members 16 of the opposite series, shown in detail in Fig. 3, are each provided with a hook portion 24 of reduced thickness, a recess or cut-away portion 25 having a downwardly extending portion 26, and an elongated slot 23. The projection and recess of each locking member are thus disposed in the same plane with the projection jutting out from the longitudinal edge of the member and the recess opening on such edge.

The resultant line of transverse strain between member 20 and its recess 25, and member 24 and its recess 22, will be intermediate thereof, and to utilize this, the lacing recess or hole 18 is placed at the rear of the member so that the line of strain passes through the lower member 20. This also brings the lacing recesses of each locked pair substantially opposite each other. Hence, under strain when laced, there is no tendency to open the members by canting movement, and this provision holds even where the members are interlocked loosely enough to have slight relative vertical movement.

Each of the connecting links 15 has one end, preferably its lower end, firmly secured to one locking member, and its opposite end loose in the slot 23 of the locking member directly above it in the same series. This is

preferably accomplished, as illustrated in Figs. 2, 3, and 4, by seating the inner sides of the links 15 in grooves 28 which are formed in the opposite longitudinal faces of the locking members, with the links 15 compressed into these grooves. The lower ends of the links 15 are thus firmly fastened in their respective longitudinal slots 23 and cannot move therein. If desired, the links 15 may also be soldered or welded in position in the grooves 28. The upper ends of the links 15 are free to slide up and down to a limited extent in the longitudinal slots 23 of the upper adjacent locking member of the same series, thus permitting the whole series of locking members to expand and contract.

The links 15 form side edges for the recess 22 and 25, as shown, thus preventing side-wise disengagement of the interlocked members. The reduced thickness of the projections 20 and 24 enables them to pass freely between the inner edges of the links 15 into their respective cooperating recesses. When the parts are engaged, the depending flat end 21 of the hook 20 is seated in the downwardly extending portion 26 of the recess 25, thereby preventing the locking members 14 and 16 from coming apart laterally when subjected to transverse strain. The contour of the projections 20 and 24 enables them to cant in the opposite recesses, thus facilitating locking and unlocking and also enabling operating strains to be distributed evenly between the projections 20 and 24.

The longitudinal expansion and contraction of the cooperating interlocking members is illustrated in Fig. 5. In the position shown in full lines therein, the interlocked members are drawn out or expanded longitudinally as far as possible, with the upper slidable ends of the connecting links 15 engaging the lower ends of the slots 23 of the members directly above. In the position shown in dotted lines, the interlocked members are telescoped together with the upper slidable ends of the connecting links 15 extending up inside the slots 23 of the members directly above. This gives the fastener great flexibility and enables it to conform to the varying contour of the article on which it is employed. In Fig. 1, for example, the locking members when engaged will expand and contract with the shoe without in any way impairing the security of the interlock. The entire fastener will thus come and go with the shoe or other article, and any expansion or contraction which is too great to be taken up by one pair of members will be communicated successively along the line to others until the whole fastener assumes the shape of the body upon which it is mounted.

The connecting links 15 are curved inwardly, as shown, thereby conforming substantially to the contour of the diverging channels 30 of the slider 17. The two series of

links 15 provide a substantially continuous track for the slider, forming a practically continuous contact or bearing for the cam surface of the slider. In previous fasteners of this type the lack of sufficient bearing surfaces for the slider has made it difficult to close the fastener when exposed to heavy crosswise strain, because in such case the slider will not bring the opposed interlocking members close enough together to accomplish interlocking. Since the connecting links 15 conform substantially to the contour of the diverging channels of the slider, and are each rigidly fastened to one locking member, they will naturally enter the diverging channels in the proper position, each locking member guiding the next succeeding link and the locking member which is rigidly attached thereto through the channel.

In order to permit the fastener to be detachably connected to the device on which it is used, the lowermost interlocking members 14 and 16 are connected by a loop 31 having its free ends bent over in the slots 23. The loop 31 engages a hook 32 mounted, for example, adjacent the lower end of the tongue 12. Hence, by merely unlacing the shoe-string 19, and disconnecting the loop 31 from the hook 32 the fastener may be instantly removed from the shoe. Any other suitable means may be employed in place of the loop 31 and hook 32 to anchor the lower end of the fastener in the desired position. The closure may be adjusted to conform to the foot, in the case of a shoe, by adjusting the cord 19 and varying the position of the knots 33 therein to permit a loose or tight fit, as desired. The loop 31 also acts as a bottom stop for retaining the slider on the chains or stringers when it reaches the lowermost limit of its travel. Any suitable form of upper stop may be employed at the upper end of the fastener to prevent the slider from coming off when it reaches the uppermost limit of the slider. The slider 17 may be of any suitable type, such as that disclosed in my Patent No. 1,661,144, dated Feb. 28, 1928, and is actuated by means of a pivoted pull member 34.

In the modification shown in Figs. 6 and 7, the interlocking members 35 are of the type disclosed in my copending application Serial No. 8,340, filed Feb. 11, 1925, each being provided on its longitudinal edge with a projection 36 and a recess 37 coextensive therewith. The ends of the members 35 are bent substantially parallel and provided with pairs of compressible clamping jaws 38 which clamp the members on longitudinal braided cords or stringers 39. In order to fasten the braided cords 39 to the edges of the closure, a plurality of U-shaped members 40 are provided with their ends 41 looped around the cord between the pairs of clamping jaws 38 of each interlocking member. The lace 42 is

passed through each eyelet 13, around the U-shaped member 40, then back through the same eyelet, and thence to the next eyelet where the same lacing is repeated and so on until the free ends of the lace 42 are fastened at the top of the flaps 10 and 11 in the manner shown in Fig. 1. This form of lacing allows the fastener to be partially drawn under the edges of the flaps 10 and 11 and permits these edges to be drawn closely together by tightening the lace 42.

In Figs. 6 and 9 the lower ends of the cords 39 are shown anchored in a bottom stop 43 having clamping jaws 44 which grip the cords, and an extension 45 provided with an elongated hole 46. The hole 46 engages the flat hook 47 which is secured to the tongue 12 midway between the flaps 10 and 11. The bottom stop 43 limits the downward movement of the slider 17 and prevents it from coming off the lower end of the fastener.

In Fig. 8 the U-shaped members 40 are eliminated, and the braided cord or stringer 39 is fastened directly to the edge of the closure by the lace 42. The lace 42 passes alternately through the eyelets 13 and around the cord 39 between the clamping jaws 38. The distance of the cord 39 from the edge of the closure may be varied by adjusting the lace 42. This construction also illustrates the expansion and contraction of the fastener, wherein the interlocking members 35 are shown in two positions in relation to their distance from one another.

When laced to the article, the form of interlocking members shown in Figs. 6 and 8 function in the same way as those in Fig. 1 to hold against transverse strain and canting. In Fig. 6 the members 40 attached to the cord 39 receive the lacing strain in the line of transverse strain between members 36. In Fig. 8, the lacing strain comes directly on cord 39 and continues through jaws 38 to members 36.

The invention is also capable of various other modifications and adaptations not specifically referred to but included within the scope of the appended claims.

The invention claimed is:

1. A separable fastener comprising a pair of stringers, cooperating series of locking members connected to each of said stringers, the members of both series being similar and each being disposed directly opposite a member of the other series, each member having a relatively flat body portion, a projection extending outwardly therefrom in the plane of said body portion, a portion of said body longitudinally spaced from said projection being cut away to provide a recess opening on the edge of said member adjacent said projection to receive the projection of the corresponding oppositely disposed member.
2. A locking member for a slide type fastener having a curved projection and a

curved recess one above the other on the longitudinal edge thereof for engagement with a recess and projection of an opposite locking member, said projection including
 5 a hook portion insertable in a portion of the recess of the opposite member to prevent lateral separation.

3. A separable fastener comprising opposed series of cooperating locking members,
 10 an elongated recess in each of said members, and a plurality of connecting links each having one end rigidly fastened to one locking member and the other end slidable in the elongated recess of the adjacent locking
 15 member of the same series.

4. A separable fastener comprising opposed series of cooperating locking members, a vertically elongated slot in each of said members, and a plurality of connecting links
 20 each having one end rigidly fastened to one locking member and the other end movable in the slot of an adjacent member.

5. A separable fastener comprising opposed series of cooperating locking members,
 25 an elongated slot in each of said members, and a plurality of connecting links each having one end rigidly fastened in the slot of one locking member and the other end movable in the slot of an adjacent member.

6. A separable fastener comprising opposed series of cooperating locking members, a slot in each of said members, elongated grooves in opposite sides of each member, and
 30 a plurality of connecting links each having its opposite sides compressed into the grooves in one locking member and one end slidable in the slot of an adjacent member.

7. A separable fastener comprising opposed series of cooperating locking members,
 40 an elongated slot in each of said members, elongated grooves in opposite sides of each member, and a plurality of closed connecting links each having its opposite sides compressed into the grooves in one locking member with one end rigid in the slot of said member and the other end slidable in the slot of
 45 an adjacent member of the same series.

8. A separable fastener comprising opposed series of cooperating locking members,
 50 a slider having diverging channels to engage and disengage said members, and means on said locking members conforming substantially to the contour of said channels throughout the entire length thereof, said
 55 means having inwardly curved slider guiding surfaces to guide said members through the channels.

9. A separable fastener comprising opposed series of cooperating locking members,
 60 a slider having diverging channels to engage and disengage said members, and means on said locking members forming a substantially continuous track for the slider and having inwardly curved surfaces conforming substantially to the contour of said channels
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throughout the entire length thereof to guide said members therethrough.

10. A separable fastener comprising opposed series of cooperating locking members, a slider having diverging curved channels to engage and disengage said members, and a plurality of curved links connecting the locking members of each series together and conforming substantially to the contour of
 70 said channel to guide said members therethrough. 75

11. A separable fastener comprising opposed series of cooperating locking members, a slider having diverging curved channels to engage and disengage said members, and a plurality of connecting links curved to fit the contour of said channels to guide said members therethrough, each having one end rigidly fastened to one locking member and the other end movably mounted in an adjacent locking member of the same series. 80 85

12. A separable fastener comprising a pair of adjacent bodies having eyelets substantially opposite one another therein, two series of locking members having the members of one series directly opposite those of the other, each locking member of one series having a projection and recess interlocked with a recess and projection of a single member directly opposite the same in the other series and a lace connecting said series of locking members to said bodies through said eyelets. 90 95

13. A separable fastener comprising a pair of adjacent bodies having eyelets substantially opposite one another therein, two series of cooperating locking members each having a projection and recess one above the other on its longitudinal edge for engagement with a recess and projection of a cooperating member of the other series, and a lace connecting said series of locking members to said bodies through said eyelets. 100 105

14. A separable fastener for connecting two edges of a body, comprising opposed series of cooperating locking members, a loop portion joining the lowermost members of both series, and a hook on said body adapted to engage said loop portion to connect the lower end of the fastener to said body. 110

15. A separable fastener comprising a pair of adjacent bodies having eyelets in their adjacent edges, fastening means comprising two series of locking members laced to said eyelets, each locking member of one series being adapted to interlock with a locking member of the other series directly opposite thereto constituting an interlocking pair of directly opposed members, and flexible connections between adjacent interlocking pairs permitting substantial displacement of each pair of said members relative to the next adjacent pair in a direction longitudinally of the fastener. 115 120 125

16. A separable fastener comprising oppositely disposed series of interlocking members, 130

each member of one series adapted to interlock with a directly opposed member of the other series to constitute an interlocking pair arranged to hold against transverse strain and relative longitudinal movement, means 5 connecting adjoining members of different pairs to permit relative pivoting of the members of each pair in opening and closing and permitting substantial displacement of each pair relative to adjacent pairs to vary the 10 total length, and a sliding operating device movable along said members to engage and disengage the same.

Signed at Meadville, in the county of Crawford and State of Pennsylvania, this 15 2nd day of March, A. D. 1928.

GIDEON SUNDBACK.

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