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SLIDE OPERATED FASTENER
Filed Sept. 24, 1943

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

WITNESS
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Filed Sept. 24, 1943

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WITNESS

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2,415,643

SLIDE OPERATED FASTENER


Application September 24, 1943, Serial No. 503,614

7 Claims. (Cl. 24—205)

1. This invention relates to slide fasteners, and more particularly to improvements in the construction of such fasteners.

Considered generally, slide fasteners include two stringer tapes provided on their opposed longitudinal edges with complemental series of mating or interlocking fastener elements which are interlocked or disengaged by means of a manually operable slider movable longitudinally of the stringers. As usually constructed, the fastener elements are independent units made of metal or plastic material and secured to the fabric tapes by clinching, sewing or cohering. Usually also, the sliders are constructed so that the elements are disengaged or interlocked in the plane of the fabric tapes.

The principal purpose of the present invention is to provide novel and improved slide fastener stringers in which the interlocking elements are an integral part thereof and which can be readily manufactured in quantity at a relatively low cost, will be effective in operation and will have unusual wearing qualities.

A further object of the invention is to provide a novel slider construction which lends itself admirably to use on stringers constructed in accordance with the invention.

Other objects, as well as the novel features of construction of the invention will be in part apparent and in part hereinafter pointed out in connection with the following description of the invention when read in connection with the accompanying drawings, in which Fig. 1 is a plan view of a portion of a fastener stringer which incorporates the improvements of the present invention and which is shown in an intermediate stage of construction; Figs. 2 and 3 are plan views of portions of completed complemenal stringers constructed from blanks such as shown in Fig. 1; Fig. 4 is a plan view of the lower portion of a complete partially closed slide fastener embodying the invention; Fig. 5 is a side view of the construction shown in Fig. 4, such view being taken from the left hand side of Fig. 4; Fig. 6 is a similar view showing the other side of the slide fastener construction illustrated in Fig. 4; Fig. 7 is a sectional view taken along the line 1—1 of Fig. 4; Fig. 8 is a plan view of a portion of a slide fastener embodying another form of the invention; Fig. 9 is a sectional view taken along the line 9—9 of Fig. 8; Fig. 10 is a perspective view of a portion of two complemenal stringers made in accordance with another form of the invention, the two stringer portions being shown in Fig. 10, in separated condition; Fig. 11 is a transverse sectional view illustrating another embodiment of the invention; Fig. 12 shows a portion of a slider blank made in accordance with still another form of the invention; Fig. 13 is a top view of the slider shown in Figs. 4 to 6 and Fig. 14 is a bottom view of such slider, the two end views showing the slider separated from the fastener and omitting the pull tab thereof for the sake of clearness.

In the fastener construction illustrated in Figs. 2 to 7 of the drawings, the flexible supports or stringers thereof are indicated by the numerals 1 and 2 while the interlocking elements of such stringers are designated by the numerals 3 and 4, respectively. As is shown more clearly in Fig. 1 of the drawings, each slider includes a fabric tape 5 which is twice the width of the final form of the slider, and upon the interior surface of which is positioned a centrally disposed, longitudinally extending strip 6 of cellulose plastic material, such as Celluloid. The Celluloid strip 6 is adhered to the tape 5 by either first brushing the tape with, or dipping it into a suitable cement, such as, a solution of liquid Celluloid made by dissolving the Celluloid in acetone, and then while the tape is in a moistened condition, applying the strip 6 of Celluloid to the surface of the tape. The composite structure is then dried to unit the material of the strip 6 to the tape 5 through the plastic material which has been impregnated in the tape by the brushing or dipping operation. It will be noted that the thus treated portions of the tape 5 will become stiffened and strengthened by the plastic material which has been thoroughly impregnated in the fibers of the tape. The entire width of the fabric tape 5 may be treated with the plastic cement or only the central portion thereof to a width at least equal to the width of the Celluloid strip 6. The flat composite strip or slider is then blanked out to provide a centrally disposed, longitudinally extending series of connecting strips 7 (Fig. 1) from which are formed the interlocking elements of the stringers. The connecting strips 7 may be formed by the blanking operation to give the interlocking elements any desired shape. In the blank illustrated in Fig. 1, the
3 strips 7 are substantially rectangularly shaped and are provided with centrally disposed down-
wardly projecting portions 8 which form the locking portions 9 and 10 of the interlocking ele-
ments 3 and 4, respectively. The blanked com-
posite strip is then shaped to give it the strip form shown in Figs. 2 to 7 of the drawings, by
folding the strip along its longitudinal center-
line about a forming pin or rod with the aid of
heat to cause the central portion of the tape 5
and the Celluloid strip 6 to assume a looped
shape, as is shown more clearly in Fig. 7 of the
drawings, the connecting strips 7 forming a se-
ries of spaced loops whose sides are spaced apart
and integral with longitudinally extending por-
tions and from which depend the now acutely-
shaped portions 8. As is shown in Figs. 2, 3 and
7, the thus formed loops constitute the inter-
locking elements 3 and 4 of the strings 1 and 2
respectively, while the acutely-shaped portions
form the locking portions 9 and 10, re-
spectively, of such elements. While the two
strings 1 and 2 are constructed in the manner
just described, they differ in the respect that
the stringer 1 is formed so that the loop-like in-
terlocking elements 3 thereof are in staggered rela-
tion with respect to the loop-like interlocking
elements 4 of the stringer 2. Thus the down-
wardly projecting portions 8 of the locking ele-
ments in stringer 1 are enabled to interlock with
the loop-shaped locking elements 4 of stringer 2,
while the downwardly projecting portions 8 of
the elements of stringer 2 are enabled to in-
terlock with the loop-shaped elements 3 of stringer
1, as is shown more clearly in Figs. 4 and 7 of the
drawings. This interlocking action may be
accomplished by progressively bringing the ele-
ments of the two strings together either in a
direction at right angles to the flat surfaces of
the strings or in the plane of the strings as
in the usual manner.

In Figs. 4 to 6, 13 and 14 of the drawings, there
is shown a novel form of slider for accom-
plishing the interlocking of the strings in a
direction at right angles to the flat surfaces
thereof. The slider includes a front plate 11
and a rear plate 12, the former of which has
connected thereto a ball 13 on which is movably
mounted a pull tab 14 by which the slider may
be moved manually longitudinally of the
strings. The two plates 11 and 12 are sub-
stantially the same width throughout their
lengths, and the lower portions thereof are dis-
posed in substantial parallelism while the upper
portions thereof, from a point approximately
midway of the slider, diverge away from each
other, so that such plates form a substantially
V-shaped space therewith (see Figs. 5 and 6).

The front or upper plate 11 is acutely-shaped in
transverse section throughout its length to
provide an acutely-shaped channel 15 on its
interior surface adapted to receive the front por-
tions of the loop-like interlocking elements 3
and 4 of the strings, the upper end of such plate in
the region of such channel being provided with
a central recess 16, (Fig. 4) to reduce to a mini-
imum frictional contact with the elements 4 of
the stringer 2 in the slider or of the
strings. The rear plate 12 is of substan-
tially equal thickness throughout its entire area
except that in its lower portion there is pro-
vided a longitudinally extending, acutely-
shaped channel 17 (see Fig. 14) which comple-
ments channel 15 in the lower portion of the
slider but is of such dimensions that it engages
only a small portion of the rear surfaces of the
loop-like interlocking elements, thereby enabling
the thickness or depth of the rear portion of
the slider to be reduced to a minimum while still
affording a positive guiding channel for the in-
terlocked elements passing through the slider.
It is to be noted also that the arc of curvature
of channel 17 is such that such channel engages
only with the undersurfaces of the elements 3
and 4, while the channel 15 spans the upper sur-
faces of such elements and extends over the ad-
jacent edge portions of the stringers from which
such elements project. The working of the
slider on the stringers will thus tend to flatten
the underside of the stringers as much as pos-
sible, while on the outer sides thereof the inter-
locking elements in their locked condition will
form a pronounced longitudinally extending
head. The rear plate 12 at its upper end termi-
nates in a straight edge extending straight across
the back of the slider at a point above the bottom
of recess 16, (see Fig. 4) such straight upper
der edge being designated 18 in Fig. 13 of the
drawings. The under surface of plate 12 along such
der edge 18 is beveled to enable it to ride over un-
dergarnments 19 and 20, respectively, as shown in
Figs. 5 and 6 whose inner side edges are obliquely inclined in opposite directions and are in substantial spaced parallelism with the opposed side edge portions of the opposite plates. There is thus formed on each side of the slider between the spaced plates 11 and 12, an
elongated slot through which the associated
stringer moves in the operation of the slider and
which in the lower portion of the slider is in parallelism with the other slot and which in the upper portion of the slider is disposed at an angle
to the other slot, compare Figs. 5 and 6. The
flange portions 19 and 20 are connected together
at their upper ends by a substantially trigly-
larly-shaped member 21, which extends at right angles to such flange portions and transversely of the longitudinal axis of the slider to bridge the space between such flange portions (see Figs. 5 and 6).

From the foregoing, it will be observed that
when the slider is moved towards the top of the
stringers 1 and 2, the interlocking elements 3
and 4 thereof entering the slider will be posi-
tioned by the plates 11 and 12 and member 21
and their associated parts in overlying relation,
note Fig. 4, which shows the interlocking ele-
ments 4 overlying the interlocking elements 3.
As the interlocking elements pass through the
upper portion of the slider, the inclined upper portions of plates 11 and 12 progressively bring
such elements together at an angle until the
upper end of the lower half of the slider is
reached where such elements are pressed side-
wise into interlocking relation, with the locking
portions 9 and 10 thereof positioned within such
loop-like elements. The interlocked elements 3
and 4 of the strings then pass through the
lower portion of the slider. In their interlocked
relation, see below the slider in Fig. 4, the lock-
ing portions of the 18 will, through their engage-
ment with the interior upper portions of the in-
terlocking elements 3 and 4, effectively prevent
opening of the stringers under transverse stresses
applied to the sliders. When the slider is
moved in the opening direction or downwardly
on the strings, the interlocked elements pass-
ing into the upper portion of the slider are pro-
gressively separated by the guide flange portions 19 and 20 and the wedge-shaped member 21. As the disengaging or unlocking of the fastener elements is thus mainly controlled by the action of the guide flange portions 19 and 20 on the stringers along those portions thereof adjacent to the bases of the interlocking elements 3 and 4, the wear on the interlocking elements and particularly their locking portions 9 and 10, respectively, is reduced to a minimum. This novel locking and interlocking action of this slider also has been found to be facilitated and to be much easier and smoother than the method of operation of the usual slider due principally it is believed, to the fact that this slider offers practically no resistance to the passage of the elements per se through the slider. The slider can be constructed of metal or any other suitable material but it is preferred to make it of cellulose plastic material, the peculiar construction of the slider making it readily adaptable to the use of such material. The usual top and bottom stops which limit the range of movement of the slider on the stringers may also be made of plastic material.

It is believed apparent from the above description, that the present invention provides an essential improvement in fastener construction which can be made readily and in large quantities from inexpensive materials. The rigidifying of the portions of the fabric stringers from which the interlocking elements are made, by the cellulose material, provides a resulting construction which not only stood up remarkably well under test and compares quite favorably with metallic elements in its locking and wearing qualities. These results have been accomplished without material sacrifice of flexibility of the stringers. Furthermore, the construction lends itself to a more exact matching of the fastener with the material of the garment with which it is to be used and opens a new field in the design of garments embodying fasteners of this type. Also the thickness and weight of the fastener can be reduced to a minimum thus making the fastener admirably suited for use with flimsy materials, such as under-garment material, where the fact that the fabric covering of the elements will come in contact with the skin of the user makes the fastener intolerable to wear than those fasteners which are provided with metallic elements. The slider of this fastener facilitates the accomplishment of these results because it is of minimum thickness at the back of the fastener. Furthermore the form of the back or rear plate of the slider reduces to a minimum any tendency of the slider catching on the underclothes or skin of the user. It will be noted also, that due to the peculiar construction of the interlocking elements, the use of a slider can be entirely dispensed with, the user closing the fastener simply by holding the stringers together and running his or her finger or some object such as a comb up the locking elements to progressively interlock them. This is of special advantage in short stringers, such as are used on skirts, where the fastener may be closed simply by pressing the elements together with the index finger and the thumb with the use of two fingers. For such uses of the fastener where the slider is not employed, a fastening device such as a button or snap may be provided at the upper end of the stringers to prevent inadvertent opening of the fastener while in use by transverse stresses applied on the garment material above the fastener.

While in Figs. 1 to 7 of the drawings, there has been illustrated a preferred form of the invention, it will be at once apparent to those in the art, that such construction can be modified and changed without departing from the spirit of the invention. Thus in the construction illustrated in Figs. 8 and 9 of the drawings, the stringers 25 and 26 are formed so that the plastic strips 27 and 28 are positioned on the exterior sides of the slider tapes instead of being positioned interiorly thereof as in the construction previously described. This construction has the advantage over the previously described construction in that the slider action is improved by reason of the fact that throughout its range of movement, it is in engagement with the smoother plastic material. Furthermore, with this construction there is prevented any possibility of the fabric material becoming frayed in usage. Also this construction lends itself readily to the producing of novel and pleasing design effects not capable of being accomplished by the previous construction. The construction illustrated in Fig. 8 also demonstrates how a slider 29 of somewhat usual form can be used with the fastener of this invention.

Instead of employing only one strip of cellulose material in the construction of each stringer, two strips of plastic material may be connected to such fabric stringer tape, one on each side thereof. A fastener made in accordance with this method is illustrated in Fig. 11 of the drawings where the numeral 40 indicates the fabric tape of the slider and the numerals 41 and 42 designate the inner and outer layers, respectively, of the plastic material. In all other respects the slider shown in Fig. 11 is constructed similarly to the slider shown in Figs. 1 to 7 of the drawings.

It is also within the contemplation of the invention to make the stringers entirely out of plastic material, as is illustrated in Fig. 10 of the drawings. In this embodiment, the stringers 30 and 31 consist of strips of plastic material which have been suitably formed in the manner previously described to provide the locking elements or members 32 and 33, respectively, with their interlocking portions 34 and 35, respectively. The plastic stringers 30 and 31 may be suitably secured to the edges of a garment by means of stitches, or plastic material for such securing purposes may be provided on the inner surfaces of the folded portions of the strips by means of a suitable solvent and the stringers then secured to the garment material. In the latter form the stringers 30 and 31 need only be made sufficiently wide to provide a suitable runway for the slider.

In the embodiment illustrated in Fig. 12 of the drawings, the use of a plastic strip has been dispensed with, the stringer being constructed solely by thoroughly impregnating the fabric tape 36 with plastic material along a longitudinally extending, centrally disposed area 37. The reinforced impregnated portion of the tape is then blanked out to provide the connecting portions 38 with their downwardly extending interlocking members 39 and the thus blanked tape is then formed in the manner previously described to provide the fastener. It has been found that the thus treated central portion of the tape is so rigidified and stiffened by the cellulose material that the interlocking elements formed therefrom will satisfactorily accomplish the purposes of the invention.
embodiments which my invention may take in practice, it will be evident to those skilled in the art that further changes and modifications may be made therein without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. A fastener of the slide operated type comprising a pair of stringers, each composed of a strip of non-metallic material having a substantially uniform thickness and having a longitudinally extending loop-shaped fold forming the fastening edge of the stringer, the strip along such edge having a series of equally spaced cut-outs extending into such edge a distance less than the transverse dimension of such loop-shaped fold to provide from the base of such fold two longitudinally extending sections and to provide from the outer longitudinal portion of such fold, a longitudinally extending series of spaced transverse sections whose sides are integral with said longitudinal sections and which project outwardly therefrom, each transverse section having its sides spaced apart and being substantially loop-shaped and said transverse sections having interlocking projections adapted to interlock with the loop-shaped transverse sections on the other stringer, the portions of said longitudinal sections from which said transverse sections project diverging from each other to provide a pair of longitudinally extending guideways for a slider and the longitudinal portions of the slider having interlocking projections projecting longitudinally of the stringer in one direction for interlocking engagement with the longitudinally extending transverse sections being impregnated with a hardened non-metallic material, a second strip of flexible material having substantially the same configuration as said fabric strip in the regions of said longitudinally extending and transverse sections and adhered to the latter by said non-metallic material so that said longitudinally extending and transverse sections are constituted of a rigidified composite layer of substantially uniform thickness and the remainder of said stringer is constituted of said rigidified fabric material, each transverse section having its sides spaced apart and being substantially loop-shaped and said transverse sections having interlocking projections adapted to interlock with the loop-shaped transverse sections on the other stringer, the portions of said longitudinally extending sections from which said transverse sections project diverging from each other towards the sides of said transverse sections to provide a pair of longitudinally extending guideways for a slider and the longitudinal portions of said fold sections adjacent to said divergent portions being in substantial parallelism.

4. A fastener such as defined in claim 3, in which said flexible strip is adhesively adhered to the interior surface of said stringer in the regions of said longitudinally extending transverse sections and adhered to the inner lining of the impregnated fabric material and said rigidified longitudinal extending sections of said composite layer are constituted of an interior layer of the flexible strip of material and an exterior layer of the impregnated fabric material and said rigidified longitudinal extending sections of said composite layer forming the guideways for a slider having smooth guiding surfaces which facilitate the sliding action of the slider.

6. A fastener such as defined in claim 3 in which said flexible strip is composed of plastic material adhered to the exterior surface of said fabric strip and including a second strip of plastic material having the same configuration as said fabric strip in the regions of said longitudinally extending and transverse sections and adhered to the same whereby the loop-shaped transverse sections and the longitudinally extending sections of such composite layer are constituted of two outer layers of plastic material and an intermediate layer of rigidified fabric material, the outer layer of plastic material providing smooth surfaces to facilitate the sliding action of the slider.

7. A slide operated fastener comprising a pair of stringers each composed of a strip of non-metallic material having a longitudinally extending loop-shaped fold along one edge of the stringer, the strip along such edge having a series of equally spaced cut-outs extending into such edge a distance less than the transverse dimension of such loop-shaped fold to provide from such fold two longitudinally extending sections and a longitudinally extending series of spaced loop-shaped transverse sections whose sides are integral with said longitudinally extending sections and which project outwardly therefrom, said fabric strip in the regions of said longitudinally extending and transverse sections being impregnated with a hardened non-metallic material, a second strip of flexible material having substantially the same configuration as said fabric strip in the regions of said longitudinally extending and transverse sections and adhered to the latter by said non-metallic material so that said longitudinally extending and transverse sections are constituted of a rigidified composite layer of substantially uniform thickness and the remainder of said stringer is constituted of said rigidified fabric material, each transverse section having its sides spaced apart and being substantially loop-shaped and said transverse sections having interlocking projections adapted to interlock with the loop-shaped transverse sections on the other stringer, the portions of said longitudinally extending sections from which said transverse sections project diverging from each other towards the sides of said transverse sections to provide a pair of longitudinally extending guideways for a slider and the longitudinal portions of said fold sections adjacent to said divergent portions being in substantial parallelism.

8. A fastener of the slide operated type comprising a pair of stringers, each composed of a strip of non-metallic material having a substantially uniform thickness and having a longitudinally extending loop-shaped fold forming the fastening edge of the stringer, the strip along such edge having a series of equally spaced cut-outs extending into such edge a distance less than the transverse dimension of such loop-shaped fold to provide from the base of such fold two longitudinally extending sections and to provide from the outer longitudinal portion of such fold, a longitudinally extending series of spaced transverse sections whose sides are integral with said longitudinal sections and which project outwardly therefrom, each transverse section having its sides spaced apart and being substantially loop-shaped and said transverse sections having interlocking projections adapted to interlock with the loop-shaped transverse sections on the other stringer, the portions of said longitudinal sections from which said transverse sections project diverging from each other to provide a pair of longitudinally extending guideways for a slider and the longitudinal portions of the slider having interlocking projections projecting longitudinally of the stringer in one direction for interlocking engagement.
ment with the loop-shaped fastener elements on the other stringer, the inner longitudinal sections of the loop-shaped fold from which said elements project diverging toward the free edge of the fold to provide longitudinally extending guide-ways for a slider and the folded portions of said stringer from which said longitudinal sections extend being in close parallel relation.

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REFERENCES CITED

The following references are of record in the file of this patent:

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,252,305</td>
<td>Puschner et al.</td>
<td>Aug 12, 1941</td>
</tr>
<tr>
<td>2,221,411</td>
<td>Quisling</td>
<td>Nov. 12, 1940</td>
</tr>
<tr>
<td>2,273,732</td>
<td>Quisling</td>
<td>Feb. 17, 1942</td>
</tr>
<tr>
<td>2,077,350</td>
<td>Sundback</td>
<td>Apr. 13, 1937</td>
</tr>
<tr>
<td>2,303,870</td>
<td>Wahl</td>
<td>Dec. 1, 1942</td>
</tr>
</tbody>
</table>

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>541,786</td>
<td>British</td>
<td>June 8, 1940</td>
</tr>
<tr>
<td>376,040</td>
<td>Italian</td>
<td>Oct. 30, 1939</td>
</tr>
</tbody>
</table>